

Corruption and Embedded Autonomy: A Cross-National Analysis of Forest Loss

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Abstract

Previous research finds that the influences of colonial heritage on cultural norms and practices may have an effect on corruption levels. On the one hand, researchers argue that former colonies have higher levels of perceived corruption, due to the patrimonial systems colonizers set up. Others argue that the different legal systems colonizers imposed on nations are more susceptible to corruption than others, and some find this effect diminishes over time or where colonizers remained a minority. Moreover, scholars also suggest that non-colonized nations do not have the legal structures, political stability, and support from colonizers, and thus have higher levels of corruption. While this previous research contributes to our understanding of corruption as embedded in larger, historical structures, it does not consider how colonial processes shape how corruption impacts material outcomes in nations. Building on this previous research, and in combination with research on sustainable development, the present study uses ordinary least squares regression (OLS) for a sample of 95 low- and middle-income nations from 2001 to 2015 to test how the impact of colonial forces, measured as domestic and international autonomy (the extent to which a nation is free of the direct control of external political actors), moderates the effect of corruption on forest loss.

Keywords: forest loss, corruption, embedded autonomy, cross-national

1. Introduction

1.1 Introduce the Problem

Previous research has demonstrated that corruption within a nation is connected to historical global forces such as colonial legacy (La Porta et al. 1997, 1999; Fieldhouse 1982; Grier 1995; and Horrabin 1937). The general premise is that colonial heritage may influence cultural norms and practices which can have a direct effect on corruption levels (Treisman 2000). On the one hand, researchers argue that former colonies have higher levels of perceived corruption, due to the patrimonial systems colonizers set up (Englebert 2000; Weiner 1987, Lipset et al. 1993; Eckstein 1966; Mulinge and Lestedi 1998, 2002). Others argue that the different legal systems colonizers imposed on nations are more susceptible to corruption than others (David and Brierly 1985; La Porta et al. 1999), and some find this effect diminishes over time or where colonizers remained a minority (Angeles and Neandis, 2010). On the other hand, scholars suggest that non-colonized nations do not have the legal structures, political stability, and support from colonizers, and thus have higher levels of corruption (Serra 2006; Pellegrini 2011). For example, Treisman (2000) finds that former British colonies had significantly lower levels of perceived corruption, citing Britain's preoccupation with legal procedures as an explanation. However, some also find no evidence that countries that were never colonized perceive any lower levels of corruption today.

While this previous research contributes to our understanding of corruption as embedded in larger, historical structures, it does not consider how colonial processes shape how corruption impacts material outcomes in nations. Put differently, while it is clear that there is some impact of colonial legacy on the way corruption is perceived or developed in nations, there is little research that considers how the impact of these forces on corruption yields differential outcomes of concern, such as environmental issues. This is surprising because there is considerable previous research in sustainable development that uses world-systems and dependency theory perspectives to show the ecologically unequal exchange of natural resources, and corresponding environmental damage from low- and middle-income nations exporting natural resources to high-income nations, as well as high-income nations dumping waste in low- and middle-income nations (Bunker 1985; Frey 2006; Shandra et al. 2009). Much of this previous literature emerged as a critique of modernization theory arguments such as the environmental Kuznets

Curve, which argues that issues like deforestation will subside after a nation reaches a certain level of economic growth (see Ehrhardt-Martinez, Crenshaw, and Jenkins 2002), despite, as world-systems and dependency theory-based arguments point out, that nations with higher levels of economic growth tend to outsource their environmental damage (like forest loss) to lower-income nations. The present hierarchical nature of the global political economy, which was largely influenced by Western and Eastern colonialization should help explain differences in environmental outcomes, such as forest loss; however, less is known about how factors such as colonialism have shaped processes known to increase forest loss: corruption (Sommer 2017).

This is particularly interesting because corruption within a nation is conceptualized as both an internal, national issue, and the result of external processes, like exploitation, and norms from outside the nation (Amsden 2007; Collier 2007; Evans and Rauch 1995; Bryant and Bailey 1997; Peet 2003; McMichael 2004). Rather than blaming levels of corruption on the nation or putting full responsibility on external factors, the present study aims to combine both ideas, to understand how the embedded autonomy of a nation, or the autonomy a nation experiences or perceives to make decisions and perform activities independent of external pressures is in constant feedback with, as well as has different levels of influence on, external political-economic factors (Sommer and Hargrove 2020). In other words, embedded autonomy acknowledges the interplay between a nation's internal decisions in relation to external forces and pressures. Building on previous research, the present study empirically evaluates how the impact of colonial forces, measured as domestic and international autonomy (the extent to which a nation is free of the direct control of external political actors), moderates the effect of corruption on forest loss. The autonomy variable is from the Varieties of Democracy database. It measures domestic autonomy of a nation on a scale from non-autonomous ("national-level authority is exercised by an external power, either by law or in practice and/or domestic actors provide de jure cover for de facto control by a foreign power"), semi-autonomous ("an external political actor directly constrains the ability of domestic actors to rule, decides who can or cannot rule through formal rules or informal understandings, or precludes certain policies through explicit treaty provisions or well-understood rules of the game from which the subject state cannot withdraw"), and autonomous ("domestic political actors exercise political authority free of the direct control of external political actors") (Daniel et al. 2015:21).

In this analysis, I use ordinary least squares regression (OLS) for a sample of 95 low- and middle-income nations from 2001 to 2015. This study uses the World Bank's World Governance Indicator's (WGI) control of corruption to measure corruption and the Varieties of Democracy measure of domestic autonomy to measure autonomy. Before reviewing the methodology of this research and the findings, I review previous research concerning the measurement of corruption in more depth and explain how autonomy may moderate the effect of corruption on forest loss.

1.2 Measuring Corruption

Corruption is complex and evades simple definition (Sundström 2016). While corruption is something that "we recognize when we see it," it also varies by time and place, making it difficult for scholars and practitioners to agree on a definition. Some traditional conceptualizations of corruption focus on 'behavior which deviates from formal duties' for private gain (Nye 1967: 419). Others focus more on embezzlement and bribes (Knox 2009; Transparency International 2016). These definitions have transformed to encompass the misuse of public office for private gain (Klitgaard, Abaroa, and Parris 2000; Rose-Ackerman 1999; Transparency International 2016). From these, we understand that corruption occurs in "a formal organizational context," and definitions insinuate that it is a deviation from an established normal (Jancsics 2014: 359). However, many scholars have pointed out that corruption can be a new normal or a normal, alluding to corruption as a political tool, as well as its use to gain or transfer power and authority (Witsoe 2011; Elinoff 2017; Zimring and Johnson 2005; Wilson 2011; Garrido 2021). While there are many different pathways and definitions of corruption, cross-national literatures tend to try to define corruption in ways that are both material as well as universally observable. Still, all of these measures are based on surveys on perceptions of corruption, which are then converted into scales rather than directly measuring something like the amount of money a nation loses from corruption every year.

The concept of 'corruption' is material and measurable, but also value-laden and contextual (Ivanov 2007; Knox 2009; Savedoff 2007; Lewis 2006; Zaloznaya 2014). The above 'traditional' definitions range from being intentionally all-encompassing, which tend to overlook the intricacies and context of this concept, fail to divorce the definition from hegemonic frames, or are hyper-specific in an effort to signal to readers exactly what the researcher is aiming to focus on (Sundström 2016). Overarching conceptualizations of corruption can limit how cross-national academics and practitioners can interpret their findings for how corruption, however, it is measured and defined, impacts forest loss (Callister 1999). Being able to measure some of the complexities of corruption thus would benefit from measures that focus on smaller or more specific expressions of corruption (Barrett et al.

2006). The measurement of corruption is key in cross-national quantitative studies because researchers may use a specific definition of corruption simply because that is the definition the index was given by the researchers who collected or measured the data.

However, characterizing the conceptualization of corruption in such studies as data-driven would be inaccurate, as the evolution of the operationalization of corruption in cross-national research tends to move from broader to more specific measures of corruption, most likely because of theoretical developments pushing for more specific measures alongside data science advancements. The following section discusses the operationalization of corruption used in this article and gives more clarity into how autonomy may moderate the impact of corruption on forest loss. Both measures are discussed in tandem in an effort to clearly specify what these variables are interpreted to mean, and therefore, what the findings could suggest.

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1.4 Operationalizing Corruption as Embeddedness

As mentioned above, nations may be pressured externally, through various avenues including trade, lending agreements, and international non-governmental organizations among others, to conform to various standards that can impact forests, such as exporting forestry products. A nation’s internal functions, such as its level of corruption, may moderate the impacts of external pressures and relationships, and should therefore be an important factor in national led environmental protection efforts. For instance, Sommer (2019) finds that forestry export flows from low- and middle-income nations to high-income nations increases forest loss more in nations with higher levels of control of corruption than lower levels of control of corruption.

This work, however, uses the variable control of corruption from the World Bank Governance Indicators (WGI) alongside of their other governance measures. Therefore, corruption here can be understood as a facet of ‘good governance,’ a concept arising from World Bank lenders with an interest in capturing how stable their business

investments may be in the ‘developing world.’ While they make their data free and available and are also very transparent about the surveys and methodologies used to derive these data, their conceptualization and motivation are still rooted in modernization inspired ways of seeing governance as a process from bad governance to good governance rather than an expression of historical inequalities and the movement of states within their respective embedded autonomies (Evans and Ranch 1995; Evans 1995). This roots the measurement of corruption to western-biased, ethnocentric, neo-colonial, and neoliberal ideologies.

However, the actual measurement of the indicator of control of corruption comes from a variety of surveys that are both perception and materially based. These include: ADB African Development Bank Country Policy and Institutional Assessments, AFR Afrobarometer, ASD Asian Development Bank Country Policy and Institutional Assessments, BPS Business Enterprise Environment Survey, BTI Bertelsmann Transformation Index, CCR Freedom House Countries at the Crossroads, EBR European Bank for Reconstruction and Development Transition Report, EIU Economist Intelligence Unit Riskwire & Democracy Index, FRH Freedom House, GCB Transparency International Global Corruption Barometer Survey, GCS World Economic Forum Global Competitiveness Report, GII Global Integrity Index, GWP Gallup World Poll, HER Heritage Foundation Index of Economic Freedom, HUM Cingranelli Richards Human Rights Database and Political Terror Scale, IFD IFAD Rural Sector Performance Assessments, IJT iJET Country Security Risk Ratings, IPD Institutional Profiles Database, IRP IREEP African Electoral Index LBO Latinobarometro, MSI International Research and Exchanges Board Media Sustainability Index, OBI International Budget Project Open Budget Index, PIA World Bank Country Policy and Institutional Assessments, PRC Political Economic Risk Consultancy Corruption in Asia Survey, PRS Political Risk Services International Country Risk Guide, RSF Reporters Without Borders Press Freedom Index, TPR US State Department Trafficking in People report, VAB Vanderbilt University Americas Barometer, VDM Varieties of Democracy Project, WCY Institute for Management and Development World Competitiveness Yearbook, WJP World Justice Project Rule of Law Index, and WMO Global Insight Business Conditions and Risk Indicators.

Kaufmann, Kraay, Zoido-Lobato, and Mastruzzi, in association with the World Bank, rescaled and combined these data sources using an unobserved components model to create the control of corruption measure (Kaufmann, Kraay, and Zoido-Lobato 2002; Kaufmann, Kraay, and Mastruzzi 2009). To provide a sense of how some of these surveys are collected, and thus, what the underlying data represent, I will give a few examples. The ICRG from the PRS group created their corruption index through “assessments made by their staff members after an in-depth country analysis and discussion, although this method is somewhat less transparent to outsiders” (Ahmad and Aziz 2001: 815). For many measures from business perspectives, the “assessment reports are completed by the staff members working in the survey countries” (Ahmad and Aziz 2001: 814). These data largely appear to be collected by outsiders to a nation behind institutions that want to make measures to identify how businesses can lose the least amount of money from their foreign investments so they can sell the measures to businesses. This is an important thing to study and measure, but it measures corruption from a particular vantage point which should be considered.

Conversely, the control of corruption measure also contains surveys from organizations that appear to be committed to actually reducing the types of corruption that people experience to improve their well-being, such as Transparency International. Still, some of their underlying source material for their corruption measure overlap with the above sources: African Development Bank Country Policy and Institutional Assessment, Bertelsmann Stiftung Sustainable Governance Indicators, Bertelsmann Stiftung Transformation Index, Economist Intelligence Unit Country Risk Service, Freedom House Nations in Transit, Global Insight Country Risk Ratings 2019, IMD World Competitiveness Center World Competitiveness Yearbook, Executive Opinion Survey, Political and Economic Risk Consultancy Asian Intelligence, The PRS Group International Country Risk Guide 2020, World Bank Country Policy and Institutional Assessment, World Economic Forum Executive Opinion Survey, World Justice Project Rule of Law Index Expert Survey, and Varieties of Democracy.

What does this information mean for how corruption is measured in the present research? Data on corruption based only on the opinion of staff members at companies that assess business risk and do not have lived experience in the nation they are evaluating will produce data that is measuring something different than the lived experiences of corruption. The WGI data also includes corruption measures derived from household surveys and internal expert opinions that may, at least in some way, capture the values of corruption from the vantage point of the people experiencing corruption or experts in the region, respectively. Taken together, perhaps we can view the WGI measure as both a measure of how likely a nation is perceived to provide sound investment opportunities from the perspective of the ruling class (perhaps global or regional capitalists broadly defined) for external interests and as the opinions of experts academically trained in empiricism of how corrupt a nation is, with respect to the use of political office (including insider information and knowledge of the nation’s financial system) for private gain, and

materially capturing the insights of non-governmental organizations that aim to reduce corruption for human well-being (as opposed to the minimization of business investment risk) and, at least in part, the perception of corruption of workers or others that do not own the means of production but can be influenced by media and culture, among many other understandings of corruption.

A main reason for why domestic autonomy may interact with control of corruption to impact forest loss is in part the embeddedness of this measure of corruption in issues surrounding domestic autonomy and other external influences such as colonialism, neo-colonialism, and of course, capitalism and neoliberalism. The WGI measure does not objectively measure corruption, but more likely captures the dominant perception of what corruption means in the current period, which is informed by, most recently, modernization perspectives (at least for academics) concerned with shaping diverse and often previously colonized nations into the ideal type (i.e. so called developed nations where the people who made these theories inhabit). However, I am not saying that this measure is purely ideological; it captures corruption both materially and non-materially from perspectives both internal and external to each nation. But I hold that these measures are influenced by the dominant perspectives from the Global North on corruption (Smith 2018).

The interaction between domestic autonomy and corruption then may test how relative freedom from external pressures (i.e. domestic autonomy) impacts the control of corruption in forest loss. Thus, the findings may be able to suggest how external influences (or in this case relative freedom from them) may shape the impact of corruption (measured as material corruption people may experience through their constructed lens of what corruption is, and the lens of what corruption is for global and regional capitalists, their organizations, and non-governmental organizations) on forest loss, which is uniquely tied to the global hierarchy of power, trade, and profit that results in environmental and human damage.

2. Method

The sample consists of 95 low- and middle-income nations (Note 1). The sample was selected based on data availability and for theoretical reasons (Shandra 2007; Restivo et al. 2018; Tasmim et al. 2020; Austin 2010; Noble 2017). Panel data are not yet available for the measure of forest loss in the analysis. Moreover, nations with less forest area, including desert countries in Western Asia and Northern Africa were removed from the analysis to not bias the results. After removing all high-income nations and nations with low forest area, the sample includes all nations with relevant data (i.e. no missing data for any indicators). I use ordinary least squares regression using robust standard errors to analyze the data. This is the most common methodology employed to analyze the determinants of forest loss with current data availability reviewed above (e.g., Sommer 2017; Shandra et al. 2016).

This model is denoted by the following formula:

$$y_i = a + b_1X_1 + b_2X_2 \dots + b_kX_k + e_i$$

where,

y_i = dependent variable for each country,

a = the constant,

B_1 to B_k = unstandardized coefficients for each independent variables,

x_k = independent variables for each country, and

e_i = error term for each county.

To ensure that there are no potential errors in the analysis, I examine diagnostics for the following issues: multicollinearity, linearity, outliers, influential cases, and heteroscedasticity. There does not appear to be any potential problems with multicollinearity as mean variance inflation factor scores do not exceed a value of 2.5 in the base model (1) (see table 2) (Roodman 2014). The mean variance inflation factor score exceeds 2.5 in model (2) due to the addition of the interaction term, which is expected to not bias the interpretation of the results (Allison 2012:1). According to Allison (2012), high variance inflation factor scores are common with interaction terms, and therefore should have “no adverse consequences” on the validity of the models (Note 2). I transform variables when appropriate to maintain linearity and note it in table 2 (Tabachnick and Fidel 2013). Extreme values did not bias the results. However, there appears to be issues associated with heteroscedasticity based on Breush-Pagan statistics for each model. The null hypothesis for this chi-square test is that the error variances are homoscedastic or equally distributed (Tabachnick and Fidel 2003). The coefficients for these chi-square statistics are statistically significant for every model, indicating the presence of heteroscedasticity. To deal with this potential issue I report robust standard errors.

2.1 Dependent Variable

Forest Loss: This variable uses data from the World Resources Institute (2016) to calculate the percentage change in forest loss from 2001-2015. To obtain the forest loss measure, we divide the provided number of hectares of forest losses in a country from 2001 to 2015 by the country's total forest size in hectares for 2000, yielding the percentage change of forest loss from 2001-2015. Table 2 contains a bivariate correlation matrix for all the variables used in the analysis. Please note that all data may be obtained from the World Bank (2020) unless otherwise indicated in the following section.

Table 1. Descriptive Statistics and Bivariate Correlation Matrix for Deforestation Analysis (N = 95)

	Mean	Standard	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Deviation									
(1) Forest Loss, 2001-2014 (ln)	.098	.142	1.000								
(2) Control of Corruption, 2000	1.242	.661	-.134	1.000							
(3) Domestic Autonomy, 2000	-.033	1.011	.069	.386	1.000						
(4) Democracy, 2000	16.077	12.404	-.164	.210	.194	1.000					
(5) EINGO, 2000	13.551	31.674	-.078	.058	.304	.007	1.000				
(6) Gross Domestic Product (per capita), 2000 (ln)	7.792	1.664	-.220	.452	.544	.368	.304	1.000			
(7) Economic Growth Rate, 1990-2000	.619	.984	-.083	.241	.154	.065	.063	.333	1.000		
(8) Population Growth, 2000	.178	.154	.393	-.180	-.131	-.277	-.044	-.272	.132	1.000	
(9) Agricultural Land Area, 2000 (ln)	3.345	.970	.202	.065	-.084	-.164	-.282	-.113	-.151	-.130	1.000

2.2 Independent Variables

Control of Corruption: As detailed above, the control of corruption index is from the (WGI) World Governance Indicators database by the World Bank (Kaufmann, Kraay, and Mastruzzi 2010). It is defined by WGI as capturing "perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests." Based on the above discussion, I see the corruption measure as capturing the phenomenon of corruption defined by the WGI both materially and non-materially (both actual experiences of corruption and corruption ideologically). This measure ranges from -2.5 to 2.5, where a score of -2.5 represents very low levels governance (and therefore higher levels of corruption) and a score of 2.5 represents very high levels of governance. For more information on the source material and operationalization of the variables, please see Kaufmann, Kraay, and Mastruzzi (2010) or World Governance Indicators (2020). More details are available from Rohwer (2009) or see Apaza (2009) for an in-depth review of the quality, critiques, and underlying data used. Additionally, for robustness, I replicate the models using the Corruption Perception Index from Transparency International (described above). Main findings are substantively similar to those presented even though the sample size when using CPI drops to 45 nations due to data availability.

Domestic Autonomy: This measure represents the extent to which the state is autonomous from the control of other states with respect to the conduct of domestic policy. This measure was originally ordinal but was converted to interval level using a Bayesian item response theory measurement model (see Dahlberg et al. 2016; Coppedge et al. 2015). Domestic autonomy ranges from -2 to 2, where less autonomous nations correspond with lower scores, and more autonomous nations correspond with higher scores. According to the creators of these data (Dahlberg et al. 2016; Coppedge et al. 2015), non-autonomous nations are in a situation where national level authority is exercised or largely influenced by an external power, either by law or in practice, or where domestic actors provide de jure cover for de facto control by a foreign power. In the sample in this analysis, some examples of nations with lower levels of autonomy include The Gambia, Central African Republic, Honduras, and Moldova. In the center of this continuum, semi-autonomous states are in a situation where external political actors directly constrain the ability of domestic actors to rule, decide who can or cannot rule through formal rules or informal understandings, or precludes certain policies through explicit treaty provisions or well-understood rules of the game from which the subject state cannot withdraw. Some nations in the middle of the sample of this variable include Bolivia, Thailand, Guyana, and Nigeria. On the far end of the continuum, in autonomous nations, domestic political actors exercise political authority free of the direct control of external political actors. Nations in the sample with high

levels of autonomy include Mexico, Brazil, China, and Costa Rica. It is also important to note that this variable is also obviously ideologically informed by past historical processes in addition to measuring them. For more information on these measures, please see Dahlberg et al. (2016) and Coppedge et al. (2015).

2.3 Control Variable Selection and Measurement

Control variables were based on decades of cross-national research on forest loss in low and middle-income nations (Shandra, Rademacher, and Coburn 2016; Jorgenson and Burns 2007). The analysis controls for *democracy* (2000), *international environmental non-governmental organizations* (EINGOs) as a percentage of total population (2000), *gross domestic product* (GDP) (2000), *economic growth* (1990-2000), *population growth* (1990-2000), and *agricultural land area* (2000). All variables use the year 2000 or the growth over the period between 1990 and 2000 to avoid synchronicity bias, endogeneity, and to establish temporal precedence. The democracy measure is provided by Vanhanen (2014) and EINGOs are originally from the Yearbook of International Associations (see Schofer and Hironaka 2005 for more information), all other data can be obtained from the World Bank (2020).

3. Results

Table 2 presents the ordinary least squares regression estimates for forest loss from 2001- 2014. Two-tailed significance tests are reported. Model 1 contains the linear effects of forest loss. Model 2 adds the interaction term. In model 2, the coefficients that represent the interaction term between domestic autonomy and control of corruption is negative and statistically significant. In Figure 1 (below), I use the coefficients from Model 2 to graph the change in control of corruption as domestic autonomy simultaneously increases, holding all continuous covariates at their mean.

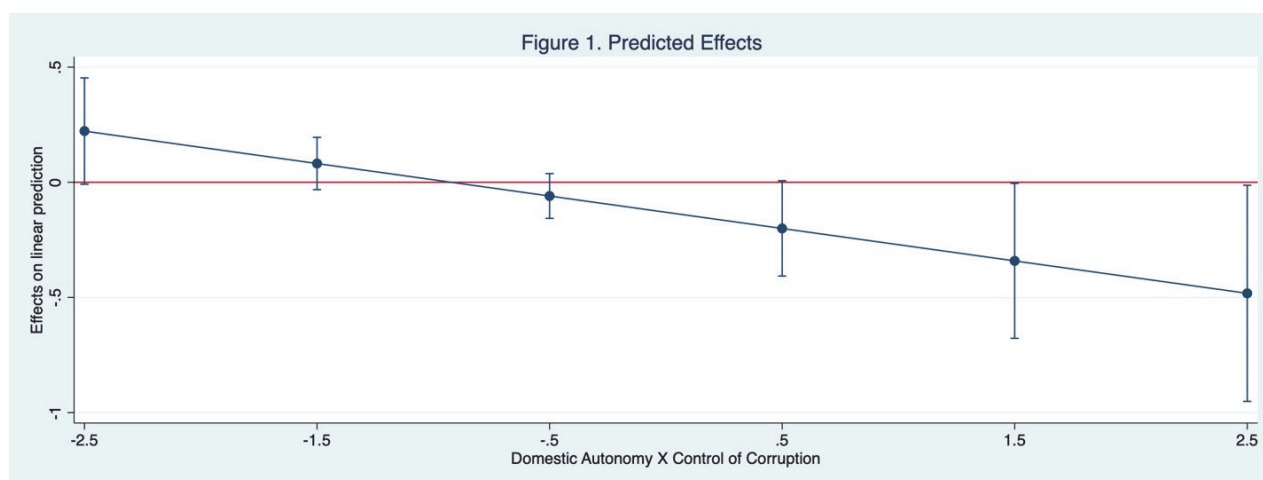
Table 2. Ordinary Least Squares Regression Estimates of Corruption on Forest Loss, 2001-2015

	Model (1)	Model (2)
Independent Variables		
Control of Corruption, 2000	.101**	.297**
	.286	.844
	(.036)	(.113)
Domestic Autonomy, 2000	-.033	-.130*
	-.097	-.384
	(.046)	(.074)
Control of Corruption X Domestic Autonomy		-.141*
		-.559
		(.068)
Democracy, 2000	.001	.001
	.027	.015
	(.002)	(.002)
EINGOs, 2000	-.001	-.001
	-.011	-.015
	(.001)	(.001)
GDP per capita, 2000	-.029	-.024
	-.177	-.143
	(.018)	(.018)
Economic Growth, 1990-2000	-.013	-.015
	-.062	-.075
	(.017)	(.016)
Population Growth, 1990-2000	.566***	.599***

	.412	.437
	(.137)	(.144)
Agricultural Land Area, 2000	.057***	.055***
	.258	.250
	(.016)	(.016)
Mean VIF	1.40	3.68
R-Squared	.288	.302
Number of Countries	95	95

Notes:

- a) * indicates $p < .05$, ** indicates $p < .01$, and *** indicates $p < .001$ for a one-tailed test.
 b) The first number is the unstandardized coefficient, the second number is the standardized coefficient, and the third number in parentheses is the robust standard error.



3.1 Summary of Findings

Overall, the findings show control of corruption reduces forest loss more at higher rather than lower levels of domestic autonomy. It is also important to note that in both models, the coefficients that represent population growth and agricultural land area are positive and statistically significant. This suggests that higher levels of population growth and agricultural land area are associated with higher levels of forest loss. The rest of the variables fail to reach levels of statistical significance.

4. Discussion

What may these findings mean for the potential for sustainable development in low- and middle-income nations? Why would nations with higher levels of domestic autonomy decrease forest loss more in nations with higher, rather than lower levels of control of corruption? The global trade of forestry resources is part of an ecologically unequal exchange of natural resources. While some argue that countries export their abundant services (Davis and Weinstein 2001), others focus more on how history plays an important role in trade relationships (Eichengreen and Irwin 1998). For instance, less-developed nations are thought to gain less from trade compared to higher income nations due to the differences in the strength of their institutions (Levchenko 2007). These uneven exchanges are rooted in social and economic disparities between nations.

As demonstrated by landmark comparative-historical work, more advantaged nations increase their wealth and power through their environmental degradation of less advantaged nations (Bunker 1985). This is largely because natural resource export prices from less advantaged nations often fall relative to the price of manufactured products poorer nations import from wealthier nations (Rice 2007). In result, poorer nations often need to expand production to purchase imports, further increasing their dependence on richer nations, while accumulating environmental damage (Giljum and Eisenmenger 2004). Within ecologically unequal exchange theory, researchers find that flows of resources and materials from poorer nations to more advantaged nations result in increased environmental

degradation in poorer, exporting nations (Jorgenson 2006, 2016; Jorgenson 2016; Rice 2007; Shandra et al. 2009). For instance, Shandra, Leckband, and London (2009), show that the amount of forestry exports sent from low- and middle-income nations to Organization for Economic Cooperation and Development (OECD) nations as a percentage of total forestry exports is associated with greater forest loss for low- and middle-income nations.

Thus, previous research from ecologically unequal exchange theory and the present analysis suggests that forests are extremely important to the consumption and waste of high-income nations, many of which were former colonizers or reinforced or benefited from colonialization or neocolonialism. Though these resources are valuable, they are relatively cheap on the global market, perhaps due to more powerful nations influencing these prices. It could also be the case that environmental materials are not valued beyond their role in production due to the incomparability between environmental protection and global capitalism (Rice 2007). As a result, it is possible that more autonomous nations may have had the opportunity to reduce extraction activities for export that increase forest loss like illegal logging. This could help explain why nations with higher levels of domestic autonomy decrease forest loss more in nations with higher, rather than lower levels of control of corruption.

5. Conclusion

Corruption is challenging to define and empirically measure, especially when trying to create a definition of corruption that encompasses the nuances of every country. Both corruption as a material experience and as an ideology will vary from each individuals' and groups' perspective. However, the data used to capture "corruption" in this research is certainly measuring something. Given the multiple surveys used to gather the WGI corruption measure, it is possible that the scores represent the concept from multiple perspectives, often with differences influences and competing interests. Although a business owner may perceive corruption differently than an individual, the surveys most likely influence the respondent to interpret corruption as something, on the whole, contrary to their interests. This value-laden negative construction of corruption is not universally agreed upon, and surely obfuscates complexities within corruption, however, it may be helpful to interpreting the findings concerning this measure.

For the present analysis, corruption as a material experience and as an ideology is argued to be embedded in social, political, economic, and historical contexts, and thus its conceptualization, measurement, and interpretation should reflect its embeddedness. Therefore, this cross-national research treats corruption as inextricably linked to the past and current hierarchies of the global world-system. It also aims to see corruption as a part of the complex freedoms and constraints nations experience which impact real domestic issues, like forest loss. Measuring how domestic autonomy moderates the impact of control of corruption on forest loss thus seeks to capture the embeddedness of corruption within the larger global context while also capturing the sovereignty of each individual nation (Smith 2018). Relating historical context to current issues like the impact of corruption on forest loss can help us better understand the barriers to sustainable development.

The present analysis finds that the coefficients that represent the interaction term between domestic autonomy and control of corruption are negative and statistically significant. Thus, domestic autonomy shapes the impact of control of corruption on forest loss. Figure 1. illustrates how control of corruption reduces forest loss at higher rather than lower levels of domestic autonomy. These findings suggest that if a nation has more domestic autonomy its control of corruption will help reduce forest loss and if a nation has less domestic autonomy its control of corruption will be less effective at reducing forest loss. One interpretation of this findings could be that nations that are further from, or less influenced by past colonialism or neocolonialism may be more effective at controlling their corruption to reduce forest loss. This is a reasonable assumption based on past theory concerning the benefits of national sovereignty in setting their own agendas and goals to meet their own needs (Stewart et al. 2020).

While previous research argues that former colonies have higher levels of perceived corruption, due to the patrimonial systems colonizers set up (Englebert 2000; Weiner 1987, Lipset et al. 1993; Eckstein 1966; Mulinge and Lestedi 1998), and that the different legal systems colonizers imposed on nations are more susceptible to corruption than others (David and Brierly 1985; La Porta et al. 1999; Angeles and Neanidis, 2010), the current work is more concerned with how these external forces may shape the impact of control of corruption on forest loss. For scholars that suggest that non-colonized nations do not have the legal structures, political stability, and support from colonizers, and thus have higher levels of corruption (Serra 2006; (Pellegrini 2008), or those that find no evidence that countries that were never colonized perceive any lower levels of corruption today, the current findings focus more on how the ongoing influence of external nation-states shapes the ability of nations to control their corruption to reduce forest loss. However, this interpretation only applies to the nations in the sample and these effects on average. Comparative historical research would be necessary to see if nations with less colonial ties or neocolonial influences actually allows for a nation to better control their corruption to reduce forest loss,

and mechanisms for why this could be the case.

Still, there are many limitations of this research including data only being available for the dependent variable cross-sectionally, which seriously limits the generalizability of the findings. Another obvious short-coming of this research discussed throughout this work is the measure of corruption. Rather than see the underlying data, measurement, and operationalization of the control of corruption measure as just a short-coming, I have tried to make it a feature of this analysis, tied to the main themes of this analysis concerning embedded autonomy. While operating on this, perhaps, “meta” level of considering how the actual data may be informed by processes the analysis is trying to measure may be more confusing than helpful, it at the very least encourages cross-national researchers to continue to consider what their variables are actually measuring. It could also help researchers make interpretations more closely related to what the data are measuring while also making critical arguments concerning the implications of the global hierarchy of nations. In sum, acknowledging how the data we use is informed by a geopolitics of knowledge may strengthen our contributions to the sociology of corruption.

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