Pre-colonial institutions and economic development in Latin America: Evidence from a new ethnic homeland dataset

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ABSTRACT

This paper examines the effects of pre-colonial institutions on economic development in Latin America using historical ethnic homelands as the unit of analysis. We construct a newly digitised and georeferenced map of 257 ethnic homelands. Our results show a strong and positive relationship between pre-colonial institutions and contemporary economic development. Beyond the role of pre-existing institutions, our dataset provides a foundation for future research on long-run development in Latin America.

1. Introduction

Recent studies have linked pre-colonial institutions to contemporary development, often relying on modern administrative units (Gennaioli and Rainer, 2007; Michalopoulos and Papaioannou, 2013; Angeles and Elizalde, 2017). However, national borders were largely drawn by colonial powers, usually splitting or merging ethnic groups. This complicates nation-level analysis, as it conflates the effects of modern institutions with historical ethnic characteristics. To address this issue, Michalopoulos and Papaioannou (2013) use ethnic homelands as the main unit of analysis in Africa. We extend this approach to Latin America, where despite profound territorial reconfigurations, many Indigenous groups continued to inhabit their ancestral lands, allowing colonial authorities to exploit pre-existing political structures.

At first glance, examining institutional persistence through ethnic homelands in Latin America might appear problematic. Colonisation profoundly disrupted Indigenous societies across the region through diseases, exploitation, and warfare (Adams and Macleod, 2000; Mann, 2005). The map of Latin America was then drawn based on the delineations marked by Europeans or Mestizos (descendants of Indigenous and European ancestors), thus overlooking the existence of numerous ethnic homelands. Nevertheless, the effects of colonisation appear to have varied significantly based on the pre-colonial political complexity of Indigenous groups encountered by Europeans (Engerman and Sokoloff, 1997; Acemoglu et al., 2001, 2002).

Specifically, Indigenous groups with complex and centralised political systems had developed institutional arrangements capable of organising large-scale tribute systems and exercising authority over expansive territories, for example the Incas in the Andes and the Aztecs in Central Mexico. Similar forms of political centralisation were present among groups in present-day Colombia and Ecuador, including the Chibchas, Quito, and Catios, whose institutions enabled control over multiple subordinate communities beyond their immediate settlements. Colonisers leveraged these established institutions to facilitate governance, taxation, resource extraction, and labour mobilisation, which ensured political and economic dominance more efficiently (Lang, 1974; Adams and Macleod, 2000). In practice, local Indigenous leaders—such as *Caciques* or *kurakas* —were integrated into the colonial apparatus, performing vital intermediary roles by organising tribute payments and labour drafts that supported the expanding colonial enterprise.

In contrast, regions inhabited by smaller, politically fragmented ethnic groups provided fewer institutional resources for colonisers (e.g. groups in the Amazon basin or the Pampas). These areas presented greater challenges for settlement and sustained economic exploitation due to the lack of centralised structures.

Consequently, colonisation led to diverse long-term developmental trajectories depending significantly on these initial institutional conditions. As colonisation advanced, Europeans increasingly concentrated their efforts in areas inhabited by large, centralised Indigenous groups. These areas offered strategic advantages: their existing administrative

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hierarchies, infrastructure for mobilising labour, and systems for tribute collection allowed colonisers to more efficiently establish economic ventures and administrative control. Over time, these regions evolved into important nodes of colonial governance and commercial activity, laying the groundwork for the main political and financial centres that persist today.[1] Indeed, although the ethnic configuration of these homelands was profoundly transformed during colonisation, one key factor influencing colonial settlement and economic organisation was the degree of pre-existing political complexity. Thus, in this paper, we argue that regions originally inhabited by more politically advanced ethnic groups tend to exhibit higher levels of economic development today, irrespective of the current or historical presence of Indigenous populations.

To explore empirically the above argument, we construct a georeferenced map of 257 ethnic homelands across Latin America based on the ethnographic work of George P. Murdock in the Americas (Murdock, 1951, 1972). Consistent with Michalopoulos and Papaioannou (2013), we assign to each homeland a level of political complexity of the ethnic groups that inhabited them before colonisation (ranging from 0 for bands and tribes to 4 for complex states). This information is drawn from Murdock's *Ethnographic Atlas* and his *Outline of South American Cultures'* book (Murdock, 1951, 1967).

Our empirical strategy accounts for country-level factors using fixed effects and controls for geographic and climatic characteristics. We find a robust and positive relationship between pre-colonial institutional complexity and contemporary economic development. These results are consistent across multiple robustness checks. The findings reinforce the long-run persistence of pre-colonial institutions at the ethnic homeland level.

Beyond providing new evidence on the institutional legacy of pre-colonial societies, our study introduces a novel georeferenced dataset of Latin American ethnic homelands. Like the widely used Murdock's map for Africa, this dataset aims to offer a new framework for investigating long-term development patterns in Latin America. Future research may leverage this dataset to explore other historical determinants of development, thus broadening our understanding of how Indigenous societies shaped contemporary outcomes.

2. Data and sources

2.1. Ethnic homelands and key variable of interest

To construct our main unit of analysis, we digitise and georeference a map of ethnic homelands in mainland Latin America. This effort Is based on two key works by George P. Murdock: *Outline of South American Cultures* (Murdock, 1951) and *Ethnographic Bibliography of North America* (Murdock, 1972). The first source provides 27 maps depicting the homelands of Indigenous groups in Central and South America, from which we digitise 211 ethnic homelands, excluding those in the Caribbean. The second source delineates ethnic homelands in North America, enabling us to digitise an additional 46 homelands in Mexico. Our final dataset comprises 257 ethnic homelands across mainland Latin America.

Fig. 1a illustrates the constructed map. The black boundaries represent ethnic homelands, while the grey lines denote modern administrative divisions at the country-level. One region, primarily within the Yucatan Peninsula and northern Guatemala, lacks

ethnographic data' and is marked in red. Although omitted from our baseline analysis, we incorporate it in robustness checks by assigning ethnographic information, as this region has historically been inhabited by Maya-affiliated groups whose exclusion could bias our estimates.

We overlay this ethnic homeland map onto modern administrative boundaries to assign each homeland to contemporary countries. This process results in 371 distinct ethnic homelands, as some groups—such as the Charrua—spanned multiple countries.[2]

To measure pre-colonial institutional complexity, we use ethnographic data from Murdock's *Ethnographic Atlas* (Murdock, 1967) and *Outline of South American Cultures* (Murdock, 1951). The *Ethnographic Atlas* provides data on 1267 ethnic groups worldwide, including a measure of political complexity—Jurisdictional Hierarchy beyond the Local Community Level—which ranges from 0 (stateless societies) to 4 (complex states). We directly match 79 ethnic groups from the $_{Atlas}$ to our map and supplement missing values with additional ethnographic data from *Outline of South American Cultures*, allowing us to assign political complexity scores to 80 more groups. Due to data limitations, over 90 ethnic homelands remain without political complexity values.[3]

Our methodology prioritises values from the *Atlas* where available. If data are missing, we use information from the *Outline of South American Cultures*. The correlation between these two sources is 89 %, supporting their consistency. As a robustness check, we also assign missing values a political complexity score of zero, assuming stateless societies, to assess potential selection bias in our estimates.

Fig. 1b displays the spatial distribution of pre-colonial institutions in Latin America at the ethnic homeland level. Yellow represents complex state societies, blue denotes paramount chiefdoms, green corresponds to petty chiefdoms, and purple indicates stateless societies. White areas represent ethnic groups lacking political complexity data. The variation in institutional complexity is evident: the Gran Chaco and Amazon regions exhibit the lowest levels, while Central Mexico, western South America, and parts of northeastern South America contain ethnic groups with complex pre-colonial institutions.

2.2. Outcome and controls

Our main outcome variable is nighttime luminosity from 2015, obtained from the Visible Infrared Imaging Radiometer Suite (VIIRS). This dataset provides higher resolution than the widely used Defense Meteorological Satellite Program (DMSP) data (Elvidge et al., 2017). Following Michalopoulos and Papaioannou (2013), when an ethnic homeland spans multiple countries, we assign its luminosity to the country where the majority of the ethnic group resides. Fig. 1c illustrates the spatial variation of the dependent variable across ethnic homelands.

Indeed, using night-time lights as a proxy for economic activity comes with drawbacks. One key challenge is that it often misses output in low-income or rural areas, where much of the economy operates with restricted electricity. As Chiovelli et al. (2023) point out, even relatively prosperous rural areas may appear dark due to weak infrastructure and limited electrification. In Latin America, a large share of economic activity takes place in the informal sector, which is often under-reported or excluded from official statistics, resulting in biased or incomplete GDP estimates. Moreover, technical issues such as sensor saturation in bright areas and the diffusion of light across neighboring areas (blooming) can further distort the mapping between observed luminosity and local economic activity.

In light of these concerns, we carry out a validation exercise using VIIRS night-time lights data, comparing it with a newly available grid-

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[1] It is important to note that while the literature often associates these historically centralised areas with the emergence of extractive institutions—implying long-run negative effects—recent evidence addressing the "reversal of fortune" hypothesis at the subnational level is somewhat less clear. Please see Bruhn and Gallego (2012) and Maloney and Valencia Caicedo (2016) for two important contrasting views on such hypothesis.

[2] The increase in the number of homelands occurs because several ethnic homelands extend across national borders.

[3] This results in a final sample of 247 ethnic homelands after intersecting with modern country boundaries. Ethnic homelands smaller than 100km2 are excluded from the empirical analysis.
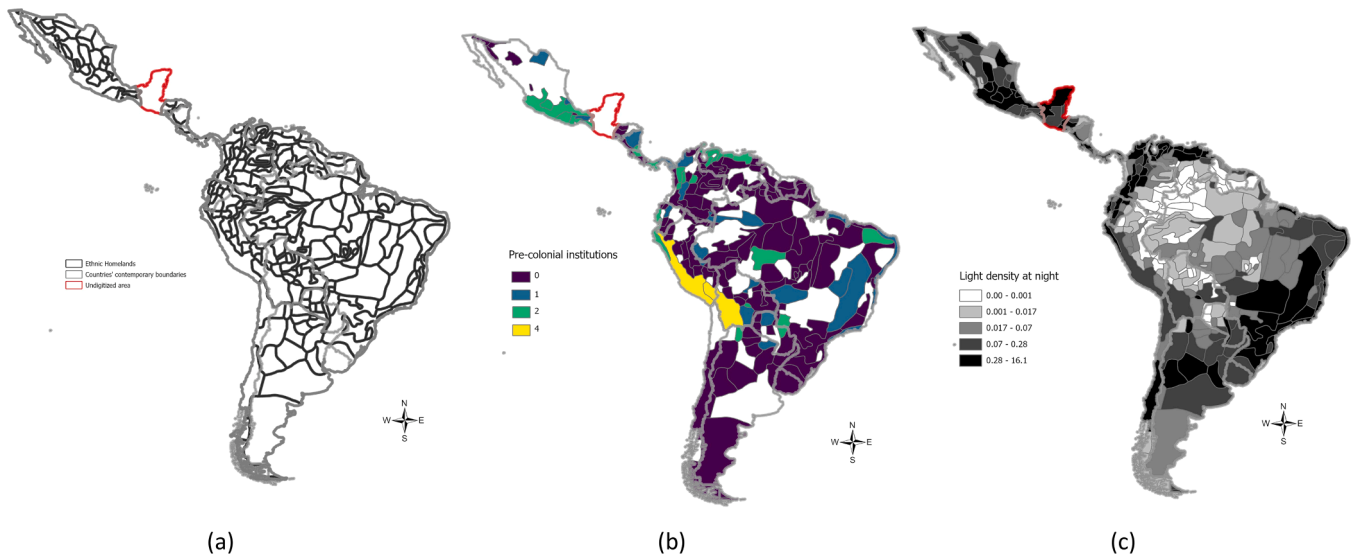
Fig. 1. Ethnic homelands in Latin America.

Notes: (a) presents the digitisation of ethnic homelands in Latin America based on the work by Murdock (1951) and Murdock (1972). The black colour denotes ethnic homelands, while the grey colour represents contemporary administrative divisions of Latin American countries. The red outline indicates undigitised areas due to a lack of ethnographic data. (b) shows the variation in the pre-colonial institutions index at the ethnic homeland level. White areas indicate ethnic groups with missing ethnographic data. (c) illustrates the variation in satellite light density at night at the ethnic homeland level.

level dataset on GDP per capita from Kummu et al., 2025.[4] The analysis is conducted at the 10×10 km grid-cell level, conditional on country fixed effects and population density in 2015. As shown in Figure A.1 in the supplementary material, we find a robust positive correlation (t-stat 95.57) between luminosity and GDP per capita. This supports the use of lights as a proxy for local economic development in our ethnic homeland analysis. Nevertheless, we acknowledge that this relationship may still be weaker in very remote or sparsely populated areas.

Regarding potential confounders, we include a comprehensive set of geographic and climatic controls: absolute latitude, elevation, ruggedness (standard deviation of elevation), rainfall, temperature, agricultural suitability, and proximity to coastlines.

3. Empirical strategy and results

To examine the effects of pre-colonial institutions on present-day economic development at the ethnic homeland level, we estimate the following equation:

$$\text{Luminosity}_{e,c} = \beta PCI_e^c + \alpha X'_{e,c} + Z_c + \varepsilon_{e,c} \tag{1}$$

where e indexes ethnic homelands and c indexes countries. *Luminosity$_{e,c}$* is a continuous variable measuring economic development, proxied by satellite light density at night (log-transformed). The key explanatory variable, *PCI$_{e,c}$*, is a categorical measure of pre-colonial institutional complexity ranging from 0 (stateless societies) to 4 (complex states). The coefficient of interest, β, captures the relationship between pre-colonial institutions and economic development. A positive estimate suggests

that ethnic homelands historically governed by more complex political institutions exhibit higher levels of economic activity today.

$X'_{e,c}$ represents a vector of geographic and climatic controls, while z_c denotes country-fixed effects, which account for country-specific factors, including colonial and post-colonial institutions. Standard errors are double-clustered at both the country and ethnic-family levels (Michalopoulos and Papaioannou, 2013) to account for within group correlation. Additionally, we estimate baseline regressions using Conley-type standard errors to address potential spatial dependence (Colella et al., 2019).

Table 1 presents the results. Column (1) includes only the precolonial institutions variable (*PCI$_{e,c}$*) and country-fixed effects (*Z$_c$*). Column (2) introduces geographic and climatic controls, yielding a fully specified model. In both specifications, the coefficient on *PCI$_{e,c}$* remains positive and statistically significant, indicating that ethnic homelands with more complex pre-colonial institutions exhibit higher luminosity levels. The effect size is economically meaningful: an increase in political complexity by two levels (e.g., from a tribal society to a multi-city

Table 1

Baseline results: Pre-colonial institutions and economic development in Latin American ethnic homelands.

	Dependent variable: light density at night		
	(1)	(2)	(3)
Pre-colonial institutions	0.871**	0.639**	
Double-clustered s.e.	(0.327)	(0.258)	
Spatially adjusted s.e.	[0.199]	[0.193]	
Pre-colonial centralisation			1.170**
Double-clustered s.e.			(0.433)
Spatially adjusted s.e.			[0.334]
Country FE	Y	Y	Y
Geo & Climate controls		Y	Y
N	247	247	247
R2	0.247	0.456	0.454

Notes: The unit of observation is ethnic homeland. Robust standard errors clustered at both the country and ethnic-family level. Below the double clustered errors, standard errors that follows a Conley-type clustering structure to account for spatial correlations are reported (Colella et al., 2019). The constant term was omitted for space. *, ** and *** mean that the coefficient is statistically significant at 10 %, 5 % and 1 % respectively.

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[4] Although these newly developed gridded GDP datasets like Kummu et al., 2025 offer improved spatial resolution, they still rely heavily on extrapolation, interpolation, and machine learning downscaling techniques based on proxy variables such as urbanisation and travel time. These methods can introduce measurement error, especially in regions with sparse or inconsistent underlying data —-a limitation the authors themselves acknowledge, particularly for Latin America. Therefore, we use gridded GDP data not as our main outcome but rather as a benchmark to validate our core measure. In contrast, night-time luminosity captures visible and spatially distributed indicators of development—such as electrification, infrastructure rollout, and urbanization—even in areas where formal economic activity is undermeasured.

chiefdom) is associated with a one standard deviation increase in luminosity.

In Column (3), we construct an alternative measure of pre-colonial institutional complexity following Gennaioli and Rainer (2007). Here, we transform the categorical variable into a binary indicator—assigning zero to ethnic groups lacking political organization beyond the local community and one to those with formal governance structures (chiefdoms or states). This approach mitigates potential measurement error in Murdock's original index (Michalopoulos and Papaioannou, 2013). The results confirm a strong positive association between pre-colonial centralization and contemporary economic development, reinforcing the persistence of historical institutions.

3.1. Robustness checks

We proceed with a set of robustness checks. First, we address the potential selection bias arising from the absence of political complexity values for all societies. To mitigate this concern, we assign a value of zero (indicating stateless societies) to societies lacking information on political complexity. Following the methodology proposed by Angeles and Elizalde (2017), we assume that the absence of this information is attributed to the fact that anthropologists generally overlook smaller groups. Column (1) in Table A.1 in the supplementary material shows the results. Panel A presents the coefficients using the categorical variable on precolonial institutions, while in Panel B we use the indicator on political centralisation. The coefficients remain positive and statistically significant, suggesting that our results are not being affected by the absence of observations in the sample.

An additional potential concern regarding selection bias arises from the omission of ethnic homelands in the Yucatan Peninsula in Mexico and Guatemala due to the absence of ethnographic data (highlighted in red on Fig. 1). Given the predominantly Maya-affiliated groups in this region—among the largest and most renowned in the Americas— its exclusion could impact our estimates. Addressing this issue in columns (2) and (3) Table A.1 in the supplementary material, we assign a political complexity value of 2 and 1 from Murdock's Jurisdictional Hierarchy index to this entire area, respectively. The coefficients in these columns continue demonstrating a relevant impact on economic development.

4. Conclusion

This paper examines the long-run effects of pre-colonial institutions on present-day economic development in Latin America using historical ethnic homelands as the main unit of analysis. To do so, we construct a newly digitised and georeferenced map of 257 ethnic homelands. We find that historical institutional complexity at the ethnic homeland level is positively associated with contemporary economic development. Our findings align with prior research on Africa, reinforcing the persistence of pre-colonial institutions in shaping long-term development outcomes at the ethnic homeland level. In addition to contributing new evidence on institutional persistence, our study introduces a novel dataset that can serve as a foundation for future research on long-term development patterns in Latin America through the lens of historical geography.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.econlet.2025.112482.

Data availability

Data will be made available on request.

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