# Culture, Institutions, and Fading Persistence: Evidence from 450 Years of Portuguese Colonialism in India *

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**Abstract**

Many of the currently observed differences in comparative economic development have their roots in the distant past. However, it is unclear how long history matters and under which circumstances inequalities vanish. To examine this question, I study Portuguese (Catholic) colonialism in Goa, a state in India, and exploit a unique historical quasi-natural experiment. By combining several decades of census data at the village level and leveraging a differences in spatial regression discontinuities (RD) design, I can isolate the effect of culture while holding geography, income, and institutions constant. Only on one side of the RD border did the Portuguese enforce a set of measures that changed the general attitude towards education and triggered the emergence of different gender roles already 500 years ago. After the liberation of Goa by India in 1961 and the subsequent large-scale infrastructure and public goods provision, I find that gaps in male literacy rates between the two parts of Goa, which were exposed to entirely different colonial cultural influences, stood at 50% in 1961 but vanished within three decades. Gaps in female literacy were substantially higher in 1961 but also started converging and stood at less than 5% in the last census. In contrast, discontinuities in male-biased sex ratios stay virtually unchanged across all censuses. My results highlight the differential degree of persistence of deeply rooted preferences. The accompanying missionaries played a crucial role in disseminating these cultural changes through their network of parish schools and churches.

**Keywords:** Long-run Development, Differential Persistence, Path Dependence, Gender Inequality, Culture vs. Institutions, Colonialism, Missionaries, Portuguese India, Spatial RDD.

**JEL Codes:** O1, N0, F54, J16, Z12.

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# 1 Introduction

In recent years, it has been well established that economic phenomena can be remarkably persistent and that events in the distant past affect today's economic outcomes. History matters for the distribution of economic activity and the many correlates of economic development and inequality. However, little is known about the circumstances under which these effects persist over time, how long they matter, and when, if at all, the inequalities induced by certain events or policies vanish.

In broad terms, the status and position of women in society are one crucial channel for economic development through which path dependence can operate. Regarding long-run economic development, even though gender aspects are essential [Duflo2012; Giuliano2017], we still understand surprisingly little about the origins and roots of certain gender inequalities and, more importantly, how they have evolved over time. Gender gaps favoring men – be it in terms of education, autonomy, or health – are more pervasive in poor countries [Jayachandran2015]. Economic development and large-scale economic growth in recent decades have helped greatly. Nevertheless, many disparities still exist. For example, a strong son preference and the resulting male-skewed sex ratios, which remains a challenge even as economies develop.[1]

This paper examines a historical setting, focusing on Goa, a state in India that was colonized without interruption for 450 years, thus making it the longest continuously colonized piece of land in recent human history. Unlike other colonizers in the Indian Ocean, the Portuguese interacted with the autochthonous people. Intermarriage of Portuguese soldiers with local women was encouraged to create a loyal local population and to extend Portugal's cultural influence. Furthermore, efforts were made to convert the populace to Catholicism. Portuguese colonizers were always accompanied by missionaries who made sure that their influence was extended to even the most remote villages in their territories. They belonged to specific religious orders: the Franciscans, the Dominicans, and, most importantly, the Jesuits. They built churches and a college, established a network of parish schools, introduced structured education, and even brought the printing press.

More importantly, the Portuguese colonizers significantly – and, it must be noted, more or less unintentionally – altered the position of women in society shortly after their arrival in the early 16th century: sati (or suttee) and polygamy were forbidden, and early childhood marriage was curbed. Furthermore, women were granted property rights and could, therefore, inherit, conditional on marrying a Christian, thus serving as an additional incentive to convert. Allowing widows to remarry constituted a further break with local cultural norms.

This interference with local customs took place only in one specific part of colonial Goa – the so-called Old Conquests, which were colonized in the early 16th century. The New Conquests were added only about 200 years later and did not experience any of the cultural interventions noted above.[2] The people of the New Conquests were guaranteed religious freedom because the colonial government did not have the resources to engage in a conflict with the landowning upper-caste Hindus in those newly gained territories. It was thus ensured that the missionaries did not perform activities of any sort in those new dominions and that none of the aforementioned cultural changes

[1] Amartya Sen famously highlighted this problem and spoke of 100 million missing women [Sen1990]. Recent demographic estimates suggest that, currently, approximately 60 million women are missing in India. The problem is very similar not only in China but also in many other regions worldwide [Das Gupta2017]. [Bongaarts and Guilmoto2015] estimate that the *annual* number of newly missing women will remain above 3 million every year until 2050.

[2] Starting from around 1780, despite already being economically and militarily weak, the Portuguese managed to extend the territory of Goa by seven sub-districts. These extensions were due to gifts from neighboring rulers and skirmishes with the expanding Marathi Empire in the north. At approximately the same time, the Jesuits were forbidden and expelled by the pope due to exogenous events in Europe. Subsequently, in 1839, all remaining religious orders were forbidden in Goa.

were propagated.

The broad institutional setting, on the other hand, was uniformly the same for both of these areas of Goa despite the cultural influence being very different. The institutional core is the system of village communities, which, in fact, dates back several centuries before the colonizers arrived.[3] This uniformity across Goa also applies to informal institutions such as the caste system – which was kept in place after the conversion to Christianity – and dowry payments.

After India drove out the Portuguese colonizers in 1961, a large-scale campaign to improve the infrastructure and provide public goods – most importantly schools – across the whole territory was started. Before, only a small percentage of villages had electricity, and many were lacking schools. This was especially true for the villages in the hinterland – on both sides of the historical border between the Old and New Conquests.

To conduct the empirical analysis, I leverage the unique historical quasi-natural experiment described above, which allows me to isolate the effect of culture while holding geography, income, and institutions constant. I digitize and cross-link censuses at the village level from 1961 to 2011. To obtain causal estimates of the Portuguese cultural influence on male- and female literacy rates and gender preferences measured by sex ratios, I identify and redraw the historical border that was abandoned 250 years ago and apply a spatial regression discontinuity design (RDD).[4] Villages within a small bandwidth outside of this historical border serve as appropriate counterfactuals to the villages just inside this boundary because they are comparable in all relevant observable characteristics – except for the exposure to the Portuguese "cultural treatment" pertaining to educational norms and gender roles, explained above. This research design allows me to not only leverage the discontinuity to demonstrate the persistent effect of Portuguese (Catholic) colonialism in a South Asian context, but also to assess if and how fast historical inequalities fade out. To this extent, I leverage the identification device to look at differences in spatial RD estimates over time.

I find that at the time of the first systematic Indian census of Goa in 1961, there were large discontinuities at the village level between the two areas that experienced different historical shocks in the 16th century. Female literacy rates were around 12% in villages just outside the RD border in the New Conquests, and the corresponding RD estimate suggests that they were more than double just inside the historical boundary within the Old Conquests. The discontinuous effect for male literacy rates was a bit smaller but still a staggering 50% higher compared to a baseline of 31% in villages in the New Conquests just outside the boundary. The estimate of the discontinuity in sex ratios for 1961 is extremely large and most likely an overestimate due to temporary labor out-migration. Correcting for this, the discontinuity is plausibly around 100 more women per 1,000 men compared to a male-skewed sex ratio of c. 950 women per 1,000 men in the New Conquests. I interpret these estimates as the causal long-run effect of two very different styles of colonialism within the same institutional framework – measured right at the time of independence.

These disparities in literacy rates started to converge once education became uniformly available on a large scale. Discontinuities in male literacy were vanishing within around one generation, standing at 3.5 percentage points in 1991 on a baseline literacy rate for villages in the New Conquests

[3] These ancient rules and customs were later codified by the Portuguese in 1526 as *Foral de usos e costumes dos gauncares* (Charter of the Practices and Customs of the Gauncares), and the village units were referred to as *communidades*. The ancient local name used to refer to the village community was *gaonkari* [Gomes2005]. While the Portuguese brutally replaced the temples – which were at the heart of the village system – with churches, they left the core of the institutional system unaltered.

[4] The core of the spatial part of the analysis has been carried out with the R package `SpatialRDD` [Lehner2023]. For an illustration of often neglected issues when it comes to the implementation and estimation of spatial RDDs, see [Lehner2024].

just outside the boundary of almost 72%. In the censuses of 2001 and 2011, this gap is not detectable anymore, and the average male literacy rate at the village level in the vicinity of the historical boundary rose to 78% and 83%, respectively.

On the other hand, the speed of convergence was much slower for female education than for male education, and a small discontinuity in female literacy rates of three percentage points is still observable in the last available census of 2011. Female literacy rates for villages in the New Conquests close to the RD boundary stood at 73%, which illustrates that the hinterland of Goa experienced an impressive improvement in socioeconomic conditions. I attribute this convergence process in female education for villages right at the cutoff to the exposure – or the lack thereof – to a set of cultural values that alleviated the position of women after the colonization of Goa. The demand for female education was, therefore, higher once schools became widely accessible after 1961.

Surprisingly, I am unable to detect a convergence pattern for discontinuities in sex ratios. After the anomaly in the census of 1961 due to temporary migration, the discontinuity stays roughly constant at around 60 to 80 more women per 1,000 men inside the RD boundary compared to a sex ratio of roughly 970 to 980 for villages just outside the boundary in the New Conquests. The confidence intervals of the point estimates for the censuses from 1991 to 2011 are widely overlapping, which suggests that there was no convergence over time. This interpretation becomes more evident when looking jointly at point estimates across many different specifications in Figure 6.

I trace the gaps in gender preferences back to deeply rooted cultural preferences that were altered by the Portuguese over time while they remained the same in the areas of the New Conquests. The presence of religious orders, most importantly the Jesuits, played a crucial role in this process in the Old Conquests. They penetrated even remote villages and thus implicitly ensured the dissemination of cultural norms even to remote areas in the Old Conquests [Barreto Xavier2022]. These cultural values were then transmitted vertically across many generations.

The importance of education was more salient in the Old Conquests, even in remote places, and the missionaries introduced what could be described as a "taste for education" already several centuries ago. This is because they ensured that every village had a church, and these churches usually came with an adjacent parish school – an artifact that is still observable today in most villages of the Old Conquests. Once education became uniformly available throughout all of Goa due to the post-1961 government interventions, boys were almost equally sent to schools, which is why the discontinuity in male literacy rates disappeared within roughly one generation.

The key role of missionaries for the outlined mechanism is supported by quantitative evidence exploiting the distance of villages to major Jesuit sites cross-sectionally for every census year. I first show that the distance to these sites is a good predictor for literacy rates and sex ratios. Its importance diminishes over time for literacy, but not for sex ratios – which is consistent with the results from the RD exercise. I then provide suggestive evidence that this mechanism was at play only at a very small spatial scale. In this exercise, I gradually expand a buffer around every village and count the number of these major Jesuit sites at every step. Correlating this measure of historical Jesuit intensity with all three outcome variables, I find that the effect is detectable only up until a range of roughly five to ten kilometers. Again consistent with all of the above, the magnitude of this effect does not fade out over time for sex ratios and fades out slower for female than for male literacy rates.

Interestingly, I find that income does not explain the observed discontinuities in outcomes. As a potential channel, one might argue that differences in income could have developed across the colonial boundary. To test this, I use satellite night light data, a reliable proxy for income at a granular level in India. The results reveal a smooth gradient declining towards the hinterlands of Goa, with no discontinuity at the boundary in 1992 – the first year for which these data are

available – or 2011. Similarly, micro-estimates of wealth [Chi et al.2022] confirm no significant differences, further suggesting income not being a driving factor behind the observed disparities. This is particularly puzzling, as the macro development literature usually associates high levels of gender equality with lower income levels in cross-sectional analyses.

For the main econometric exercise, the key regression discontinuity identification assumption is that all relevant factors apart from treatment vary continuously at the boundary between the Old and New Conquests. I show that this is the case: the villages compared have roughly the same number of households and inhabitants, the same size, and a similar occupational structure. More importantly, environmental and climatic variables such as agricultural suitability, the ruggedness of the terrain, temperature, and rainfall exhibit no discontinuity at the cutoff. I also illustrate that the difference is unlikely to have existed before the Portuguese arrived. What is more, the selective sorting of individuals around the border is not a concern. There were no economic incentives to engage in such sorting, as the institutional and legal settings were – and still are – the same. Disaggregate religious estimates constructed from electoral roll data confirm this interpretation.

This paper adds to a growing literature documenting the historical roots of economic development. Many papers have established that a substantial proportion of the variation in economic prosperity that we observe today has its roots in the past [Nunn2014; Nunn2020; Spolaore and Wacziarg2013]. This literature illustrates where disparities come from and that they matter. However, it is silent about how long they matter and whether and under which circumstances inequalities induced by historical events disappear. To my knowledge, this is the first paper that is able to leverage a causal identification device to address this and illustrate a scenario where some disparities fade out, and others do not.[5] This setup and the outlined historical peculiarities also have many desirable features that ensure credible identification. The historical border used as the RD cutoff has a length of only approximately 50 kilometers in a north–south direction, and the analysis is thus constrained to only a very homogeneous and spatially confined environment.[6]

An important literature has documented the key role of institutions[7] over the long-run and how they, in turn, shape cultural values.[8] This study, on the other hand, isolates the effect of culture without any variation in institutions while also holding important confounders such as geography

[5]Most persistence studies are constrained to exploit cross-sectional geographic variation, where econometric concerns would most importantly pertain to endogeneity – often solved with difference-in-differences or instrumental variable analysis [Casey and Klemp2021]. However, these studies are sometimes also affected by correlated error structures, thus violating basic orthogonality assumptions [see, e.g., Conley and Kelly2025; Voth2021, for discussions] – a problem which affects virtually all of applied econometrics and not just one specific literature. For the present study, this is not a concern, because none of the estimated specifications exhibits residual spatial autocorrelation. Spatial autocorrelation consistent standard errors [Conley1999] are reported nevertheless throughout all specifications.

[6]See [Dell2010] for a seminal study relying on a geographic discontinuity for identification. Other studies using a spatial discontinuity for identification in quantitative historical research include [Michalopoulos and Papaioannou2014; Becker et al.2016; Oto-Peralías and Romero-Ávila2017; Ambrus, Field, and Gonzalez2020]. For a general discussion of spatial RDDs, see [Lehner2024], as well as the detailed discussions in [Keele and Titiunik2015].

[7]In the seminal study on the topic of institutions and colonialism, [Acemoglu, Johnson, and Robinson2001] suggest that cross-country variation in the disease environment during colonial times explains the type of institutions that were put in place, which, in turn, affects levels of prosperity today. For a critical examination of this view, see, e.g., [Glaeser et al.2004] or [Easterly and Levine2016].

[8]For example, [Guiso, Sapienza, and Zingales2016] show that independent medieval city-states continue to have a greater prevalence of prosocial cultural traits. [Becker et al.2016] document that villages exposed to Habsburg (instead of Ottoman) institutions within the same contemporary state boundaries have higher levels of trust in the judicial system.

constant.[9] The organization of the centuries-old village system – which formed the institutional core and was in existence long before the Portuguese arrived – was the same on both sides of the historical border in the hinterland of Goa. Instead of changing it, the Portuguese codified this system in the 16th century and also the later civil code was applied uniformly to all areas in the 19th century. Furthermore, an appealing feature for identification is that the "cultural treatment" regarding the position of women in society and what one could call a general "taste for education" in the Old Conquests was not endogenously caused by events happening in Goa but exogenously imposed. More importantly, this treatment also predates the onset of large-scale economic growth; thus, it was not a function of any societal process that was already ongoing. The persistent long-run effect of culture on economic outcomes has been demonstrated by, e.g., [Guiso, Sapienza, and Zingales2006], among many others. A more recent strand of literature seeks to understand the interaction of culture and institutions [see, e.g., Alesina and Giuliano2015; Bisin and Verdier2024]. More generally, this paper is part of the literature studying the role of culture and gender norms [e.g., Fernández and Fogli2009; Alesina, Giuliano, and Nunn2013; Alesina, Giuliano, and Nunn2018].

There is an important literature within the field of comparative economic development assessing the (long-run) impacts of colonialism on contemporary outcomes.[10] In the specific context of colonialism in India, this literature focuses exclusively on the impact of Britain's influence in India.[11] The present study is the first one to quantitatively analyze the effects of Portuguese colonial activities in the Indian Ocean.[12] Importantly, the present study does not consider the impacts of colonialism more generally but instead exploits variation within the same colonial regime. The activities of missionaries have shown to be one prominent channel through which the effect of colonialism often manifests itself.[13] In the context of Goa, my study quantitatively illustrates the importance of the Jesuit order – something which has already been shown by [Valencia Caicedo2019b] in a Latin American context. A novel aspect of my study is to illustrate their positive effect on outcomes pertaining to women – even if involuntary – in the long run. This is somewhat contrary

[9] It is difficult to identify the role of culture because it often varies with ecological variables such as geography or climate. A common perception is that culture varies with ethnic identity, however, there is recent research demonstrating that most of cultural heterogeneity occurs within groups [Desmet, Ortuño-Ortín, and Wacziarg2017] – which is corroborated by this paper.

[10] See, e.g., [Feyrer and Sacerdote2009], [Huillery2009], or [Bruhn and Gallego2012] for work investigating the impact of colonial investments. An important contribution is [Dell and Olken2020], showing that persistent local development effects of forced cultivation reinforce the positive long-run economic impacts of creating a manufacturing infrastructure – which is surprising given that other studies document the negative effects of forced labor systems [e.g., Lowes and Montero2021] or extractive institutions more generally [Acemoglu, Johnson, and Robinson2001; Dell2010].

[11] For example, [Banerjee and Iyer2005] study the legacy of colonial land tenure systems, and [Iyer2010] studies the impacts of being under direct versus indirect colonial rule. For a thorough overview of scholarship on colonial India, see [Gupta, Roy, and Swamy2015].

[12] The seminal historical study on the Portuguese seaborne empire is [Boxer1969]. Supposedly, one reason why, thus far, Lusitanian legacies have received so little attention is that, until recently, the Portuguese empire was a "forgotten empire" among historians and, in particular, among economic historians [Marcocci2012, p. 33]. Arguments, explanations, and a description of the development of the field of Portuguese "overseas history," including a summary of the 2003 e-JPH debate, are described in detail by [Ferreira2016]. Recent work emphasizes the importance of Portugal's overseas territories for its economic growth [Costa, Palma, and Reis2015; Palma and Reis2019]. A novel historical study synthesizes the colonial history in the Old Conquests of Goa [Barreto Xavier2022]. [Lucassen and de Matos2020] use novel archival data to shed light on labor relations in colonial Goa and [Carvalhal, Lucassen, and De Zwart2024] present the first real wage series estimated from Portuguese archival records dating back to the 16th century.

[13] The effect of missionaries on education has been shown to be important in the African [Nunn2010; Gallego and Woodberry2010; Cagé and Rueda2016], Latin American [Waldinger2017; Valencia Caicedo2019b; Valencia Caicedo2019a] and East Asian [Becker and Won2021] context. For overviews of the vast and growing literature assessing the role of religion in economic development and economics more broadly, see [Iannaccone1998; McCleary and Barro2006; Iyer2016; Becker, Rubin, and Woessmannming].

to findings from Africa, suggesting that only Protestant missionaries had a positive impact on female education [Nunn2014]. In the context of colonialism in India, existing work so far has focused on Protestant missionaries.[14] My study is the first one to analyze the long-run effect of Catholic missionaries in this context.

While the literature on gender equality has thus far focused on the effect of institutions on gender equality [Doepke and Tertilt2009; Doepke, Tertilt, and Voena2012; Fernández2014], cultural channels have received less attention. This is partly because variation in culture is much more difficult to credibly exploit, as it typically also varies across geographic dimensions and is therefore influenced by, for example, climate and other environmental characteristics [see, e.g., Giuliano and Nunn2021].[15] Thus, econometric problems such as endogeneity become much more of a concern. The analysis in this paper is confined to a geographically small area with a homogeneous climate and geography, which naturally rules out that ecological variation may have played a role when it comes to the effects documented in this paper.

Furthermore, this article relates to the literature on the evolution and importance of female agency[16] and the historical roots of gender inequality [e.g., Xue2020; Frigo and Roca Fernández2021]. Especially in the context of low- and middle-income countries, where intergenerational mobility in education [Asher, Novosad, and Rafkin2024] and health [Kumar and Nahlen2023] is low, it is important to understand the roots of gender inequality [see, e.g., Jayachandran2015, for a recent survey]. In numerous studies examining the strong correlation between women's empowerment and economic development, the direction in which the causation goes and whether the interrelationship is self-sustaining are typically unclear [Duflo2012; Doepke, Tertilt, and Voena2012]. One common identification problem is that efforts made to improve the position of women in society are often endogenous in the sense that they are a function of economic growth and commonly implemented features in societies on their way to prosperity. In the history of Goa, I identify several early "treatments" that improved the position of women in society. These treatments pre-dated the experience of economic development by several hundred years and thus allow me to take a much stronger position on the causal link from "culture" to contemporary gender discrimination, holding constant many common confounders. I can also rule out that there were any channels regarding higher female wages (or comparative labor market advantages) and their downstream implications at play.[17]

Lastly, this study relates to the pressing problem of son preferences, which can result in male-biased sex ratios [as noted by Sen1990] but also female neglect more generally.[18] Several studies

[14] For example, [Calvi, Hoehn-Velasco, and Mantovanelli2022] analyze the effect of Protestant missionaries in the territories of the British East India Company and [Chaudhary and Garg2015; Castelló-Climent, Chaudhary, and Mukhopadhyay2018] study the effect of colonial educational investments in these territories.

[15] For example, [Alesina, Giuliano, and Nunn2013] show that variation in contemporary gender attitudes can be explained by preindustrial agricultural practices, which were induced to a large extent by geographic conditions. They also illustrate that the same mechanism is responsible for variation in sex ratios [Alesina, Giuliano, and Nunn2018].

[16] Important contributions include [Galor and Weil1996], [Doepke and Tertilt2009], [Fernández2014], and [Doepke and Tertilt2018], among others. [Tertilt2005] documents the effect of banning polygamy (polygyny). [Heath and Jayachandran2018] document the effect of increased female education, and [Dhar, Jain, and Jayachandran2018] document the intergenerational persistence of gender attitudes, which was also present in the Goan context. [Teso2019] illustrates that demographic shocks induced by the transatlantic slave trade explain variation in gender roles today.

[17] See, for example, [Galor and Weil1996; Xue2020]. In a historical context, [Qian2008] illustrates that a short-term increase in tea prices can increase the share of surviving girls likely by enhancing women's household bargaining power.

[18] Dowry payments [Anderson2007; Alfano2017] property rights [Bhalotra et al.2019], and inheritance rights [Bhalotra, Brulé, and Roy2020] have been shown to be important channels.

have pointed out culture's important role in the deep roots of son preferences [Abrevaya2009; Almond, Edlund, and Milligan2013; Blau et al.2020]. Gender discrimination in the form of sex-selective abortion, female infanticide, and the mortal neglect of young girls is still a pervasive feature of many contemporary low- and middle-income countries [Anderson and Ray2010; Das Gupta2017].[19] Son preferences stem from economic and cultural factors that have long influenced the perceived relative value of women in many regions of the world and that have resulted in millions of "missing girls." The observed patterns of gender discrimination have long been practiced by families as a way to control the number and sex composition of their offspring [Bhaskar and Gupta2007; Gupta2014]. Recent research indicates that these biased sex ratios do not improve as countries develop and that being poor is insufficient to explain them [see, e.g., Jayachandran2017].

The remainder of the study is organized as follows. After the brief introduction to Goan and Portuguese overseas history, section 3 describes the data. Section 4 presents the econometric framework and verifies all the necessary assumptions. Section 5 discusses the results and presents further robustness checks while section 6 sheds light on the underlying mechanisms. Section 7 concludes.

## 2 A Short History of Portuguese Colonization in Goa

The contemporary state of Goa, the 25th of the Indian Union, is located mid-way on the west coast of India. Technically, its around 120km long coastline is part of the Konkan Coast; to its south, the Malabar Coast begins. Goa stretches out to a width of about 60 kilometers in an east-west direction and extends to a length of about 105 kilometers from north to south. To the east, Goa (and the whole Konkan) is separated from the Deccan highlands of Karnataka by the mountain ridge of the Western Ghats. These mountains shield the coastal communities from mainland India and shape their unique history. For the present study this feature is useful, as it ensures that there was historically little outside interference from the mainland.

Politically, the state is divided into two districts and eleven sub-districts, so-called talukas: Pernem, Bardez, Bicholim, Tiswadi, Sattari, and Ponda being part of North Goa; and Mormugao, Salcete, Sanguem, Quepem, and Canacona being part of South Goa. The current population comprises about 1.2 million people, of whom 65 percent are Hindus, 27 percent Christians, and 6 percent Muslims, according to the 2011 Indian Census. For more than 100 years, the share of Christians has been declining. In 1900, when Goa had around 500,000 inhabitants, the share of Hindus was around 45 percent. Muslims, brutally expelled by the Portuguese in the 16th century, started to in-migrate only throughout the last decades into urban areas.

Goa is famous for standing out from its neighbors' culture by apparently European, that is, Portuguese, features in its architecture, folklore, and cuisine. This, however, is true only for a specific part of Goa, the so-called Old Conquests, as will become clearer once its peculiar history has been told in the following sections. The Christian population almost entirely lives in this part of the state. Their official religion may have been imported from overseas, yet they are heavily influenced by the Hindu and Indian customs and institutions of their pre-conversion ancestors.

During early colonial times in the 16th century, the urban areas of Goa were some of the richest in the Indian Ocean, if not globally, according to many historians. At the time of independence in 1961, however, Goa ranked amongst the poorest areas in all of South Asia.[20] Within the last decades, this has reversed, and it is now one of the richest areas in India.

[19] Son preference manifests itself not only through health but also educational outcomes [Kugler and Kumar2017]. Recent work also tries to understand this problem in the history of Europe [e.g., Beltrán Tapia2019;

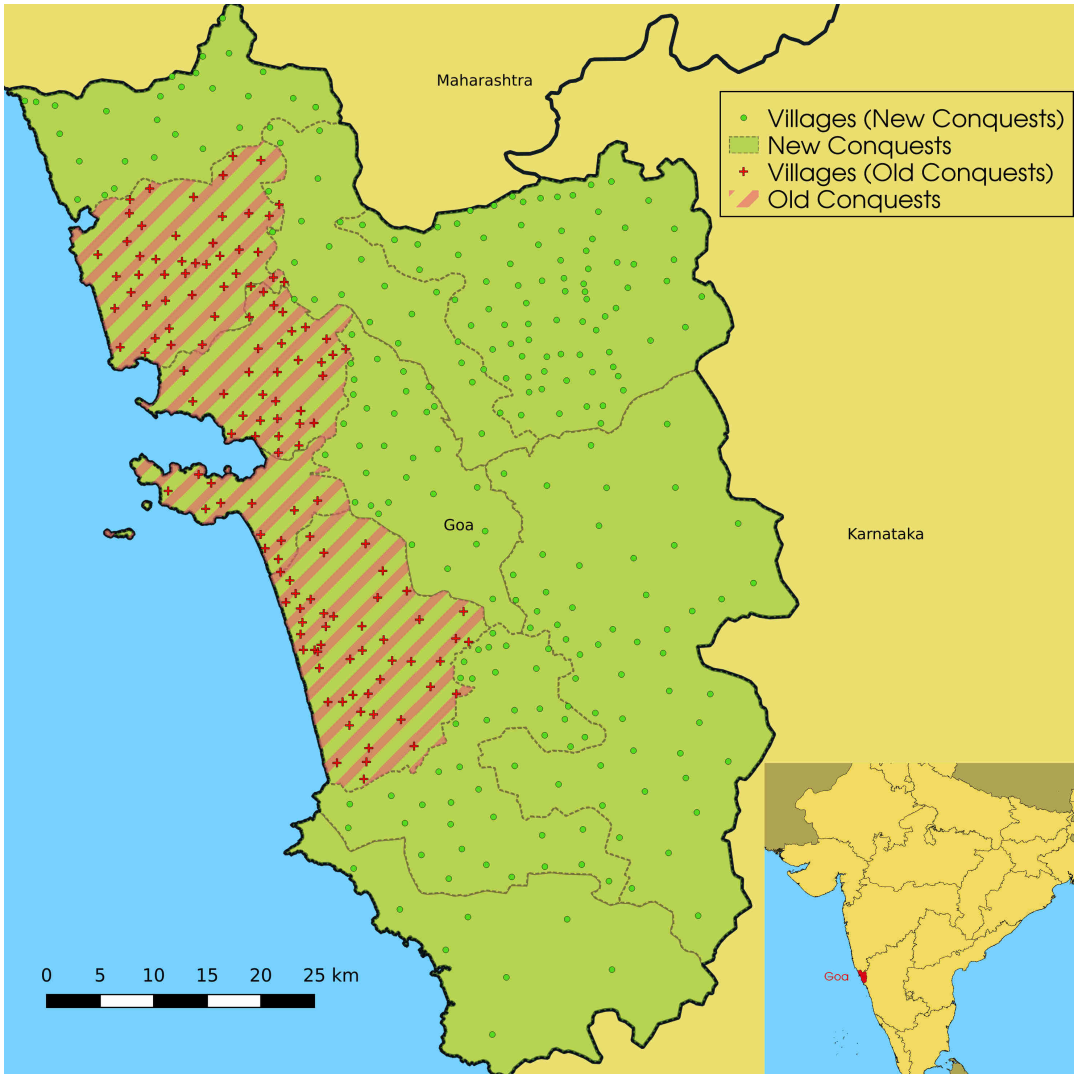


Figure 1: The location of Goa on the Indian west coast. The dots refer to the effective sample in 2011.

## 2.1 Portuguese Conquest

The Portuguese were the first European power to arrive and the last one to depart from the subcontinent of India. Their 450-year-long stay thus marks one of the longest uninterrupted periods of colonization in recent history. The lusitanian operation in the Indian Ocean starts in 1498 when Vasco da Gama lands in the flourishing port of Calicut with the famous first sentence *"We are looking for Christians and spices!"*. Later, in 1510, Alfonso de Albuquerque captured the islands of Goa (its territory roughly equivalent to today's taluka of Tiswadi) from the Sultan of Bijapur. It is not entirely clear why the Portuguese decided to capture Goa, as it was not one of their prime targets. The reason being that there were many far wealthier towns along the Indian west coast.

Beltrán Tapia and Gallego-Martínez2017].

[20]The Portuguese seaborne empire experienced a sharp decline starting from the early 17th century – if not earlier [see, e.g., Pearson1988; Russell-Wood1992; Subrahmanyam1993, for detailed discussions]. See [Subrahmanyam and Thomaz1991] for a more detailed treatment of the models of imperial organization used by the Portuguese and how they were applied non-uniformly across their overseas territories.

Most probably Albuquerque was summoned by local Hindus who were unhappy with the Muslim occupiers from Bijapur who conquered the land from the Empire of Vijayanagara several years before [Shastri1978; Pearson1988]. By 1543, the Portuguese had annexed the adjoining lands of Bardez in the north and Salcete (including today's taluka of Mormugao) in the south. These three territories constitute the *Velhas Conquistas*, or Old Conquests.

Goa soon became the capital of the Portuguese *Estado da Índia* and evolved into an important trading post that connected China, Japan, the Moluccas (often referred to as the "Spice Islands"), and India with Europe. It was also referred to as *Goa Dourada*, the golden Goa, and supposedly was comparable in size to the major cities in Europe back then [Srivastava1990].[21]

One of the distinct features of the Portuguese colonization strategy was their zeal to convert the local populace to Christianity and their enmity towards Muslims. Mass conversion campaigns were flanked by the destruction of temples and mosques. In Goa, the result was a rising number of Christians who soon became the majority. The earliest converts were upper-caste Brahmins. Christianization, however, was not a caste-leveling process. Converts retained all the social rights of Hinduism, and all caste prerogatives were transmitted [see, e.g., Gerson Da Cunha1881].[22] Muslims were subject to hostilities and many fled early on. From 1560 onwards, during the Goa Inquisition, they were persecuted, forced to convert, killed, or exiled.

The centuries-old village institutions, the so-called *Gaunkaris* or *Communidades*, around which economic and social life was organized, were left intact because the European colonizers realized their importance in controlling affairs in the rural economy (see the discussion in Section 2.2). In fact, it has been noted that the relationship between Christianization and the conservation of the power of local elites constitutes one of the main features of Portuguese imperialism in these territories [Barreto Xavier2022]. The only requirement was that taxes and tributes were collected by the *Gaunkars* and transferred to the viceroy in Goa. This institutional set-up was continually in place until independence in 1961 in all the Goan territory, not just the Old Conquests [D'Souza2012]. Its origins are known to exist since before any modern state ever came into existence in this broader area [Gomes2005; Robinson2004; Rao2022].

Most historians agree that the process of Christianization in Goa was crucial to preserve the Portuguese empire in the region. Some argue that the majority of the population of the villages in the Old Conquests consented to live under Portuguese imperial rule [see, e.g., Barreto Xavier2022]. Even if they did not convert, pre-existent local elites adjusted to the demands of the new imperial order to retain their power. The dominant native elite was the Saraswat brahmins. This position apparently continued until the end of Portuguese rule in 1961 [Pearson1988].

The key feature of the Portuguese colonizing strategy – as opposed to all other European

[21] The extensive prosperity was caused by trade, mainly with spices, and was facilitated by naval superiority for which the foundation was essentially laid by Henry the Navigator and his successors in the 15th century [Russell-Wood1992; Boxer1969]. They managed to prevent the secrets of the demanding maritime navigation alongside the African coasts and in the Indian Ocean from spreading to other European nations for around 100 years. Only when the Dutch traveler and later secretary to the viceroy in Goa, Jan Huyghen van Linschoten, copied all the information and published it in his *Itinerario* in 1596 [see, e.g., Russell-Wood1992], details about the difficult and dangerous journey to India leaked for the first time. Due to this catch-up in knowledge by the ascending Dutch provinces, the Portuguese quickly lost their pre-eminence in the Indian Ocean around 1600. The appearance of the newly formed Dutch East India Company, the so-called Vereinigde Oostindische Compagnie (VOC), marked the beginning of a sharp decline of the whole Portuguese seaborne empire in general and of its capital Goa in particular. Most scholarship on Goa focuses on the urban centers on the coast. An early thorough account of the socio-economic history of rural Goa can be found in [de Souza1979].

[22] It is worth noting that early Missionaries seem to, in fact, have admired the caste system: *"The people of India are very clean in their habits, true in speech, and eminent in justice, maintaining carefully the privileges of every man according to his degree, as they have come down from old times."* writes a certain Friar Jordan [Moraes1964, p. 278]

usurpers in the Indian Ocean – was that they always encouraged their men to intermarry with local, in this case Hindu, women. The aim was to generate a local populace that was loyal to the colonial government and thus reduce the potential for uprisings and revolts.[23] Upon marriage with a Portuguese *soldado*, which made him a *casado* then, women were granted property rights. Thus, their position in society was strengthened and they could inherit in case their husband died. They were also allowed to remarry. Prior to that, women were burned on the pyre of their dead husbands. This ancient Hindu practice called sati (or suttee) was immediately banned by Albuquerque upon his arrival in 1510, although it continued for a while in the region [Da Silva Gracias1996].

### 2.1.1 The New Conquests of Goa

Even though the seaborne empire was in decline since around 1600 [Newitt2005], the Portuguese managed to extend their territory in the late 18th century. These expansions were not necessarily due to military power but rather because of several fortuitous incidents that made them attainable: the Marathas to the north receiving pressure from the expanding Mughal Empire and skirmishes of the territories in the neighboring south and east with the Kingdom of Mysore and Kolhapur. The expansion, which happened between 1746 and 1782, is described in detail in [de Oliveira Boléo1961].

By the late 18th century, the modern territorial boundaries of Goa had been chalked out, and the taluks of Pernem, Bicholim, Sattari, Ponda, Sanguem, Quempem, and Canacona were added. The new parts were termed as the *Novas Conquistas* (New Conquests) and were around five times larger than the Old Conquests. They extended the area of Goa to the north, south, and east; the Old Conquests make up about 785 square kilometers, and the New Conquests a little under 3,000. The New Conquests have, on average, a lower population density because they contain a vast amount of uninhabited hinterland stretching up until the Western Ghats. In addition, the religious composition differs from that of the Old Conquests. The latter had a majority Christian population, while the New Conquests were, to a large extent, comprised of Hindus [de Matos2011].

The attitude towards the autochthonous people was quite different than during the 16th century. Most importantly, Hindus were guaranteed religious freedom. One reason for this change of sentiment was the fact that Goa was dependent on agricultural production from these areas and thus did not want to upset the local landowners. What is more, the main proponents of the proselytism in the 16th century, that is, the religious orders, were not present anymore: the Jesuits were expelled in 1759 due to exogenous events in Europe, and all other remaining orders were forbidden in 1835 by the crown [de Souza1990; Gomes2003, p 107]. Even though the orders returned to Goa in the 20th century, none of their activities were carried out in the New Conquests.

Importantly, after the New Conquests were added, the former border to the Old Conquests had no meaning anymore since then. The only border within Goa that has some political implications is the one between the two districts of North and South Goa – which were formed after the Portuguese left. This border runs perpendicular to the abandoned border between the Old and New Conquests, however. Goa remained Portuguese until 1961 when the Indian Army drove out the colonizers with Operation Vijay. Thus Goa today marks the territory of the longest-held European colony in all of Asia, if not the world.

[23] [Subrahmanyam1993] further clarifies this: *"The reason for the decision was at least partly pragmatic: since the extent of female migration from Portugal to Asia remained low throughout the sixteenth century, a married settler population could not reasonably be created while insisting on racial exclusivity."*

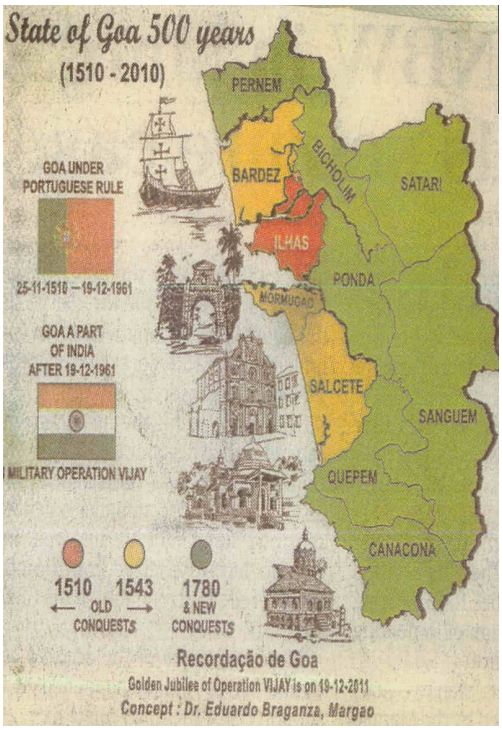


Figure 2: The expansion of Goa

## 2.2 Key Aspects of the Historical Impacts of the Portuguese

As already mentioned above, the Portuguese cultural imprint was almost exclusively restricted to the Old Conquests, even though the New Conquests were formally under their rule for almost 200 years. It has been well documented by historians that the gradual cultural transformation of the lives of 16th-century Goans had profound impacts on their descendants' identities and behaviors, which in turn was crucial for the conservation of Portuguese imperial power [Barreto Xavier2022]. Many scholars noted the survival of elements of Portuguese society even after their colonial power had vanished [e.g., Boxer1965]. The clear differences between life in the Old Conquests and life in the neighboring areas of Konkan – including the New Conquests – are widely acknowledged by historians [see, e.g., Pearson1981].

The institutional setting, however, was virtually the same across all of Goa. At its core were the century-old village communities that date back far before European colonizers arrived. They can be described as associative communitarian institutions and had strong elements of direct democracy [Fernandes2008]. These ancient rules and customs were later codified by the Portuguese in 1526 as *Foral de usos e costumes dos gauncares* (Charter of the Practices and Customs of the Gauncares) and the village units were referred to as *communidades*. While the Portuguese brutally replaced the temples – which were at the heart of the village system – with churches, they left the core of the institutional system unaltered.[24]

[24] For example, [Vanjari1969] writes: *"The rural set-up was feudal and oligarchic and since the Portuguese did not interfere much with the internal social structure of the villages, it survives to this day in a decadent form."* Generally, the Portuguese operated a hands-off policy. This policy was codified in Meixa's famous Charter of 1526, which aimed to preserve what he took to be pre-Portuguese practice. Decisions continued to be made by the gaunkars within the villages, or in taluka-wide assemblies of village representatives [Pearson1988]. Already in the early days of Portuguese

The institutional setting was renewed in 1871 across all of Goa based on the Portuguese Civil Code of 1867. Notably, this set of civil laws is based on the Napoleonic Code and is still in place today. It makes Goa the only state in India to date to have a uniform civil code that applies invariably to *all* people, independent of religion or gender.

The Portuguese had the most profound impact along two domains – education and the position of women in society – and the missionaries played a crucial role in the dissemination to all villages in the hinterlands of the Old Conquests [Pearson1988; Borges1994; Malvankar2015]. Their expulsion – the Jesuits by a papal bull from Rome, all others by an order of the crown several decades later – had not much to do with local events and left a temporary void in Goa [dos Martires Lopes1994]. A more detailed discussion of the Portuguese impact on women and the channels through which education was made more salient can be found in the appendix (Section 9).

### 2.3 What happened after the expulsion of the Missionaries? (c. 1800 until 1961)

There seems to be a consensus amongst historians that the exit of the missionary orders created a void in Goa, especially when it comes to education [see, e.g., Boxer1961]. After the expulsion of the Jesuits by the papal bull in the late 18th century, their facilities were taken over by other religious orders. After all remaining orders were forbidden by the crown in Portugal in 1835, the government took direct control of educational institutions [Varde1977]. This secularization came at a cost, though, as the tenure of governors was short and incentives were ill-conceived. Thus, policies were inconsistent, and sometimes educational facilities were even closed because they were deemed too expensive [Varde1977].

Private entrepreneurship in setting up schools was encouraged [see, e.g., Coutinho1975]. The distribution of schools was always uneven: they were concentrated closer to the coast in the Old Conquests while the hinterlands were neglected – on both sides of the border between the Old and New Conquests.[25] Upon liberation in 1961, it became clear that educational provision in Goa has been insufficient [Coutinho1975] – this can also be inferred from the quantitative estimates in this study using the 1961 census data. Given the historical narrative, it seems reasonable to believe that part of the large discontinuity in literacy rates in 1961 documented in Section 5 was driven by the non-availability of public education in the New Conquests – private educational opportunities typically existed, however, to a large part because of efforts to increase Marathi education after 1910

Goa, Albuquerque issued orders that local landholders and village authorities were not to be disturbed [Pearson1988]. After the decline of the trading empire, apparently, some efforts were made by Europeans to obtain gaunkar rights in the villages in order to increase revenue. As a reaction, the Portuguese king even explicitly forbade this practice of interference in 1628 [Pearson1988, p.112].

Despite numerous studies dedicated to the subject, there is a recent debate in the literature regarding the uniformity of the gaunkari across all villages [see Barreto Xavier2024, for a detailed discussion]. This does not interfere with the outlined mechanisms so far because in the relevant domains when it comes to legal, agricultural, and economic organization, there is agreement that there were more commonalities than differences. For example, privileges associated with the lineages of gaunkars and other officers concerning the villages' land, authority to make decisions affecting the entire village, and judicial powers – among other things [Barreto Xavier2024, p. 83]. Many have noted that the legal system worked well throughout the years and that the Portuguese tried to keep as many disputes as possible at the village level [see, e.g., de Souza1994].

[25]Growth of schools in the New Conquests had begun only at the end of the 18th century at a very slow pace [Varde1977]. The New Conquests were generally neglected in terms of educational provision until the start of the republican period in 1910 [Malvankar2002]. From 1910, the situation for Hindus in Goa improved substantially. For example, for the first time, they were granted equal political rights.

[Malvankar2002].[26] To my knowledge, there is, unfortunately, no data existing at a fine enough level to assess whether there was a discontinuity at the border between the Old and New Conquests in the availability of schools – both private and public – during the last decades of Portuguese rule.[27]

### 2.4 The situation after the Portuguese left in 1961

Since the Portuguese government was not willing to give up on Goa, the Indian government decided to take it over by force. Operation Vijay, the military takeover of Goa by the Indian army, can be described as a success in the sense that the number of casualties was very low and the later transition towards "normality" took place comparatively smoothly – especially when taking into account that the territory was ruled for 450 years by a European power.

With special bills enacted by the Indian parliament, Goa became a Union Territory together with Daman and Diu, having two elected representatives to Parliament and a local assembly of 30 elected members.

Goa back then can be described as one of the poorest regions in India: the number of schools was low and only less than 5% of the villages had electricity.

Once India took over, transfers in the form of infrastructural investments were flowing from the government in Delhi. This was especially true for the construction of primary and secondary schools [Varde1977; Malvankar2015]. As the later census data suggests, these investments were highly successful and were one of the reasons for Goa's immense catch-up and also the reason for the disappearance of discontinuities in education – as I will argue later.

In its efforts, the government did not preferentially treat the Old Conquests. Rather the opposite was true: it was well-known that the New Conquests were disadvantaged on average, especially the parts in the far hinterland close to the mountain range. A goal was thus to harmonize the regions and the New Conquests received more rather than fewer investments from the time when the Maharashtrawadi Gomantak Party, representing lower castes and social classes, came into power in 1962.

**Demographics.** It is true that there was a large influx of migrants throughout the last decades in Goa. This, however, does not interfere with my identification strategy as this population inflow was concentrated in the urban areas and, most importantly, into the port town of Vasco. Even if there were small inflows of non-natives into the rural villages around the old border between the Old- and New Conquests, there is no evidence whatsoever that it took place selectively on only one side.

Similarly, when it comes to the outmigration of Goans, there is no evidence that it selectively happened more or less on either side of the former border between the Old and the New Conquests. There are, unfortunately, only historical narratives to rely on and no data to illustrate this quantitatively. However, it seems appropriate to assume that none of the estimated discontinuities are driven by migration patterns.

[26] [Khamat2002] reports that in 1910 there were 161 Portuguese primary teachers available. The number of Marathi primary teachers was 166 – all of which were employed by private schools.

[27] These data are only reported at a sub-district level. It is reasonable to assume, however, that there was a discontinuity in schooling availability in the late 19th and early 20th century.

The historical literature on education in Goa also discusses the language of instruction as an important channel through which educational inequality manifested itself [Coutinho1975; Varde1977; Malvankar2002; Khamat2002; Malvankar2015]. The Portuguese government mandated instruction to be in Portuguese – which was not spoken by the majority of Goans in the 20th century. After 1910, it became legal to establish private schools with Marathi as the language of instruction.

## 3 Data

The main arguments of the present study are based on census data at the village and town level. I gathered, digitized, geolocalized, and finally cross-linked various contents from the official Indian censuses of 1961 (the first one after Goa became independent), 1991 (the first one after Goa became a state, having been in a Union Territory (UT) before together with Daman & Diu), 2001, and the most recent one in 2011.[28] The geolocalization was carried out with India Place Finder [Mizushima Laboratory2013]. As a sanity check, I can also rely on a Portuguese colonial census at the village level from 1851. For balancing and robustness checks, in some cases also as control variables, I use a multitude of spatial data at the gridcell level. Most importantly variables that relate to climate and geography, but also satellite night light data to demonstrate that the Portuguese "cultural treatment" did not induce a jump in incomes at the boundary that I use as an RD cutoff.

My sample consists of 70 towns and 335 villages in 2011. The total sample size in earlier years is slightly lower because several villages were created over time as the population of Goa grew. These new villages appeared mostly in the far hinterlands to the east, however, and thus do not have any impact on my RD design in which only a small subset of villages and towns within a narrow bandwidth around the RD cutoff enter the sample used for estimation. The data from 2011 is then matched to the censuses of 2001 [with assistance of NASA-SEDAC data; Meiyappan et al.2018] and 1991 using unique census identifiers. The latter was the first census where Goa was included as a full state after its transition from a Union Territory. The first existing post-colonial census from 1961 was merged with the previous censuses by matching village names and cross-referencing these names with Portuguese maps from the time and the official maps in the General Population Tables [Almeida1961b]

The respective Primary Census Abstracts contain the number of male and female individuals for each village or town, whether they are literate, among other things. This allows me to compute a sex ratio and literacy rates for each unit of observation. The religious composition, unfortunately, cannot be observed for villages, and is only available at the (statutory) town, taluka (sub-district), and state level. To compensate for the lack of this descriptive statistic at a disaggregated level, I report estimates for religious compositions at the voting booth level using an algorithm by [Susewind2015] in Section 3.3. From the so-called District Census Handbook (DHCB) I obtain village/town-level data on infrastructure, which I later use in placebo exercises to show that there is no discontinuity when it comes to the provision of important public goods such as schools or medical infrastructure.

For robustness checks I employ night light data from the DMSP-OLS program which have been shown to correlate highly with regional economic activity [Croft1978; Elvidge et al.1997; Chen and Nordhaus2011; Henderson, Storeygard, and Weil2012]. To further substantiate that there is no measureable difference in prosperity between the Old- and New Conquests, I also use microestimates of wealth from [Chi et al.2022]. Further robustness checks rely on the Socio Economic and Caste Census (SECC) from 2012 and the Economic Censuses of India from 1990, 1998, 2005, and 2013. All of these were obtained through the SHRUG database by [Asher et al.2021].

Geographic information (i.e. the respective geopackages/GeoJSON's/shapefiles) on the exact location of borders and (sub-)districts has been obtained from [Data{Meet}2016] which was cross-checked with exactly georeferenced maps and numerous historical sources, all of which are cited throughout the paper.

Historical information on the location of churches and parishes in the 18th century (before the expulsion of the missionaries) come partly from [Borges1994] and [Gomes2003]. A map of the location of Jesuit "sites" in Salcete and contemporary Mormugao & Tiswadi from [Borges1994]. The

[28] Unfortunately, I cannot extend the analysis to the 2021 census because it still has not been carried out as of 2024 [see Mallapaty2024, for a discussion].

digitization of the Portuguese colonial census from 1851 was done by [de Matos2013; de Matos2016]. Unfortunately this is the only census reporting statistics at the level of towns and villages for the whole area. All prior versions either report data only for selected towns or have numbers only at the district level.

For further descriptive statistics at aggregate levels such as the shares of religious groups, I use data from the so-called A-Series from the 2011 census. Unfortunately, outcome variables are not broken down by religious group for villages (e.g., literacy rates for Christians). These data are only available for the few towns in Goa. I use this sparse information later for some non-parametric statistical tests in Section 6 which are purely descriptive.

### 3.1 Descriptives & Average Effects

Table 1 provides descriptive statistics for the main outcome variables of interest throughout time. These are univariate regressions without any controls, reporting the averages inside and outside of the old border between the New Conquests and the Old Conquests, which was abandoned 250 years ago. The intercept, therefore, is interpretable and shows the average in the "non-treated" areas, i.e. the New Conquests. The units of observation here are the towns and villages which are then also used for the RDD. For more extensive descriptive statistics at different geographic aggregations, please see the balancing table in Section 4.1.

Table 1: Descriptive statistics at the village level for the main outcome variables: Old Conquests vs. New Conquests

| | *Dependent variable:* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1961 | 1991 | 2001 | 2011 | 1961 | 1991 | 2001 | 2011 |
| | | sex ratio (f/m) | | | | literacy rate | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $\mathbb{I}$(Old Conquests) | 0.214 | 0.050 | 0.062 | 0.056 | 0.161 | 0.154 | 0.078 | 0.057 |
| | (0.022) | (0.014) | (0.011) | (0.011) | (0.014) | (0.014) | (0.007) | (0.005) |
| Constant | 1.013 | 0.970 | 0.961 | 0.974 | 0.191 | 0.472 | 0.670 | 0.756 |
| | (0.013) | (0.008) | (0.005) | (0.006) | (0.009) | (0.010) | (0.006) | (0.004) |
| Moran's I (residual) | 3.41 | 9.52 | 8.69 | 9.85 | 4.65 | 13.93 | 16.97 | 15.34 |
| Observations | 230 | 323 | 381 | 383 | 229 | 323 | 381 | 383 |

*Note:* Table shows OLS regressions on the respective full samples at the village level without any control variables. The intercept therefore depicts averages in the *New Conquests*. Robust standard errors (HC1, [White1980]) are in parentheses. The Moran's I test for residual spatial autocorrelation reports the test statistic (KNN-20 matrix used), indicating the presence of spatial autocorrelation since all z-scores are well above conventional critical values. Later, it will be shown that spatial autocorrelation disappears once the discontinuity is controlled for, suggesting that it was almost entirely driven by the jump in outcomes at the border between the *Old- & New Conquests*. Nevertheless, going forward, I will also report spatial autocorrelation consistent standard errors for all main specifications.
Sex ratios in both parts are unusually high in 1961 as a result of temporary male out-migration due to a lack of economic opportunities in Goa (discussed further in Section 3.2.)

Literacy rates have been growing remarkably in Goa throughout the last decades. In addition, there was substantial convergence between the New- and Old Conquests. In 1961, when the first post-colonial census was reported, literacy rates where almost double in the Old Conquests at

around 35.2 percent. This gap was shrinking to less than five percent in 2011 with the literacy rate at the village level in the New Conquests rising almost four fold from 19.1 percent to 75.6 percent over a period of 50 years. Literacy rates in the New Conquests were also rising, but at a much slower speed, standing at around 81.3 percent in 2011. These numbers serve as a proxy for the impressive economic catch-up of Goa after its independence in 1961.

In both of the historical areas of Goa, sex ratios, on the other hand, have remained roughly constant over time. In the New Conquests this statistic stands at around 970 women for every 1000 men, while it is around 1020 in the Old Conquests.[29] The latter can be regarded as more or less in line with what demographers deem conventional,[30] while the former exhibits a clear bias in favor of men with the number being roughly in line with Indian averages.

These descriptives quantitatively illustrate the substantial difference between the two historical areas of Goa which had vastly different cultural experiences due to Portuguese colonialism.

### 3.2 Why are sex ratios in 1961 unusually high?

Sex ratios across villages in 1961 exhibited an extremely high female-biased value, which is driven by men temporary emigrating in search of better opportunities during times when Goa was economically destitute [as discussed by, e.g., Newman1984; Pearson1988, among others]. The official numbers recorded by the Portuguese administration in 1960 report a total number of 128,765 emigrants on a recorded population of 626,667, which amounts to a staggering 17% of Goans living abroad at the time [see Almeida1961a, D-II, Tables 1 and 2, p. 549]. This population movement was selective in the sense that mostly men left their villages – thus biasing sex ratios – for destinations in the Portuguese colonies in East-Africa, the Gulf, and, most importantly, Mumbai [see, e.g., Gandhe1971]. There was, however, also a non-neglible movement of men out of the New Conquests. Once the economy started to grow post-independence, Goans returned to their home and the migration pattern even reversed and Goa became a net-receiver in terms of population flows due to increased economic opportunities starting in the 1980ies and 1990ies. It shall be noted that this migration inflow is unlikely to interfer with my RD design since people moved to job opportunities in cities and the areas along the coast and not to the mostly small villages alongside the abandoned border I used for econometric identification.

### 3.3 Descriptive Statistics on Disaggregate Religious Estimates

Religious affiliation has undoubtedly played an important role when it comes to the basket of treatments that was described in Section 2. Conversion to Christianity was the first step for the Portuguese colonizers to impose cultural values on the local population. These values were then transmitted over time intergenerationally. However, it cannot be outruled that there was also a substantial amount of horizontal diffusion within villages – potentially across religious groups. Unfortunately, this is an untestable hypothesis because information about individuals within villages is not available. The results in Section 6 allude to the importance of spatial diffusion, however.

In addition to the unavailability of individual data, it is also difficult to obtain estimates for religious affiliation at a disaggregated level from official data in India. The shares of religious groups are reported down to the level of sub-districts, but this level of aggregation is too coarse to be useful

[29] I report sex ratios throughout this study as the number of women divided by the number of men, following the convention of the Indian census bureau. For convenience, I also report the opposite ratio when presenting the main results in Section 5.

[30] A typical value for an area without any gender bias would be around 1040 (which would translate into a sex ratio of around 0.96 when the fraction is flipped), implying 40 more women for every 1000 men due to the higher longevity of women.

for the small-scale analysis of this paper. Census India does not report data on religion broken down to the village level and I thus unfortunately cannot learn anything about the share of Christians that are dwelling in the villages alongside the border between the Old and New Conquests – let alone their change over time.

To overcome this data restriction, I am reporting religious classifications inferred from surnames based on an algorithm by [Susewind2015]. These names have been extracted from the official electoral rolls published by the government of Goa which are reported at the level of the polling booth. Since the geo-location of each polling booth is publicly available and voters are assigned to their nearest available polling booth, this allows me to construct a spatial measure for religious affiliation. The resulting map provides a cross-sectional snapshot into the religious distribution across the state – over 500 years after the Portuguese colonized Goa.

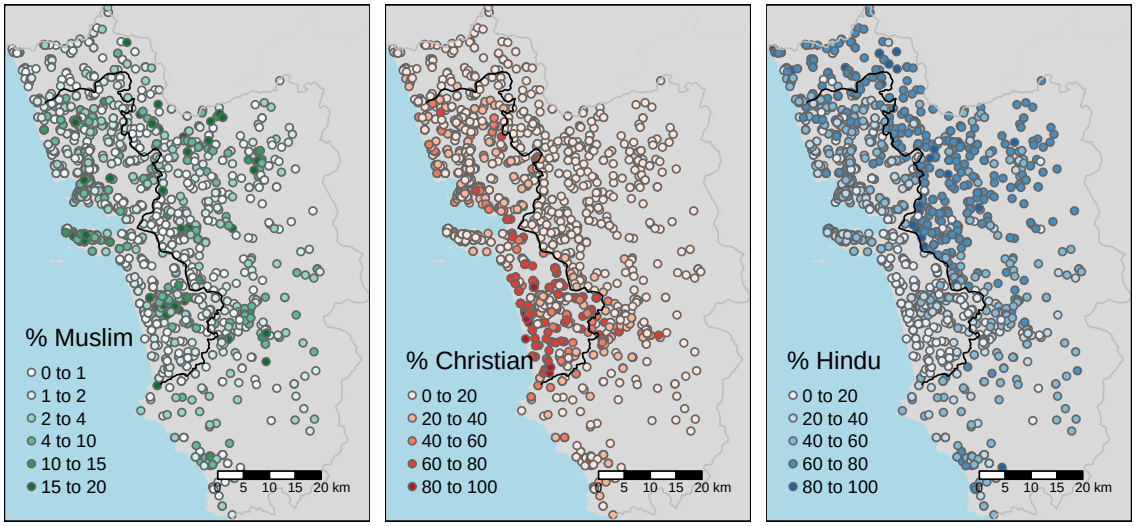


Figure 3: Estimates from surnames for all 1613 polling stations in Goa that confirm the historical narrative of a sharp cultural discontinuity at my identified RD cutoff. The "historical" Christian and Hindu groups align alongside this border. Muslims that have been migrating in only since a few decades are mostly in the urban centres.

These visualizations are intended to serve two purposes. First, they give the reader an impression of the religious distribution at an unusually fine-grained level. More importantly, the maps should serve as further evidence that this old "cultural boundary", described in detail in Section 2, actually persists to a degree such that it can be even detected visually. Given that this is a source independent of the data that are used for estimation, it demonstrates that a spatial RD design at this very boundary is actually a meaningful choice to answer the proposed research questions. Details on the classification algorithm can be found in the appendix and in [Susewind2015].

According to the 2011 Indian Census, the population of Goa comprises about 1.2 million people of whom 65 percent are Hindus, 27 percent are Christians, and 6 percent are Muslims. The share of Christians has been constantly declining throughout the last century, while the share of Hindus and Muslims was increasing.[31] From the polling station data in Figure 3 we can infer that there are around 20% Christians inside and around 10% outside the RD cutoff. For Hindus, these numbers are around 34% and 56%, respectively. Within a bandwidth of 5 kilometers around this old border,

[31] According to Census India, in 1900 there were 52% Christians and 47% Hindus while in 1971 the shares are 32% and 64% respectively [Gandhe1971, p. 118, p. 120].

these shares are very similar, while at the same time, there are very few Muslims within this narrow band.

Religion, as suggested by the historical narrative (e.g. economic incentives being the same: dowry, caste system, etc.), in this context should be seen as a mediating variable rather than as a confounder.

### 3.4 Earliest Evidence for Son Preference: Colonial Census of 1851

Structured census data at the village level before the liberation of Goa by India is scant. In order to provide a disaggregated snapshot of the colonial period, I analyze the Portuguese colonial census of 1851. It was the first one taken across all villages and towns of Goa and was also recorded at that level. These data were recently digitized by a group of economic historians [de Matos2013; de Matos2016]. Unfortunately, the exact location of the reported villages is almost impossible to obtain since the names changed multiple times over the years and some villages were merged with each other. I thus cannot create a credible map to visualize these results. Also, a merge with the census data at the village- and town-level from 1961 through 2011 is infeasible, which means that an RD estimation, as carried out in the main part of the paper, is unattainable.

Because the colonial census of 1851 reports the taluk (sub-district) to which each village belongs, a categorization into Old- and New Conquests is therefore feasible. This allows me to carry out at least the minimal exercise of comparing the distribution of sex ratios between the two areas of Goa – without actually knowing which villages were close to the boundary. The exercise is thus somewhat compatible with how the analysis in the rest of the paper is carried out. Literacy was unfortunately not recorded in Portuguese colonial censuses.

The goal of this exercise is two-fold. First, it allows to assess whether there were meaningful (demographic) differences between the Old Conquests and the New Conquests already before the liberation in 1961. Second, it allows to understand the direction of the difference and its magnitude.

Figure 4 confirms that there was indeed a very stark difference between these two historical areas already in the 19th century. Surprisingly, the estimates in sex ratios hover around values that are not too different from the ones in the most recent censuses. In 1851, there were around 1,100 women per 1,000 men in the Old Conquests. For the New Conquests, this ratio was around 950 women per 1,000 men. This exercise therefore provides strong prima facie evidence for what has been outlined in Section 2, namely that there was a stark difference between these two areas.[32] This also alleviates concerns that observed contemporary differences could have been caused by something that happened within the last 200 years.

[32]These results confirm an early descriptive analysis of the demographic differences between the Old- and New Conquests by [Bauss1997], carried out with colonial census data at the district level.

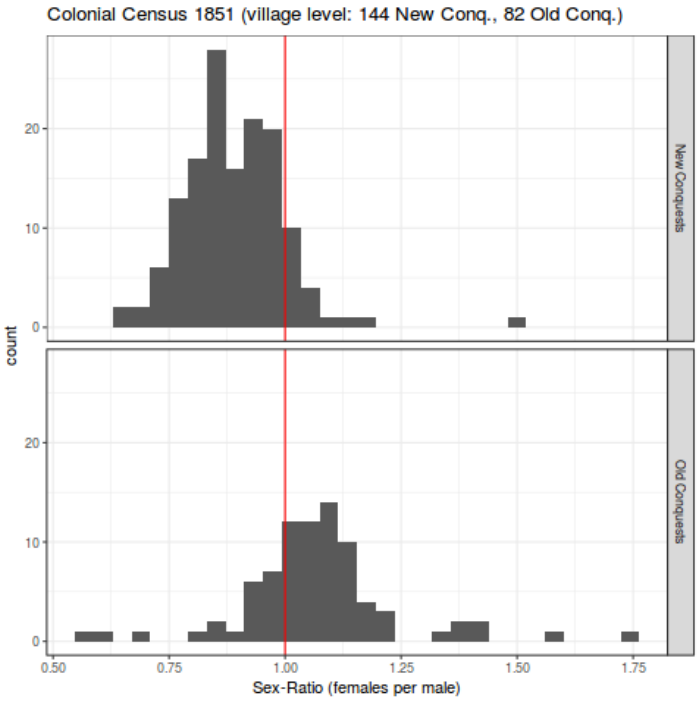


Figure 4: Sex ratios at the village level in 1851.

## 4 Econometric Specifications

To obtain an average, boundary-wide RD treatment effect, I estimate the following regression specification on the subset of observations that falls within the flexibly chosen RD bandwidth:

$$y_i = \alpha + \beta_1 \, OldConquests_i + \beta_2 \, distborder_i + \beta_3 \, OldConquests_i \times distborder_i + \sum_{j=1}^{J} \gamma_j \, SEGMENT_{ji} + \mathbf{v_i'} \, \delta + \varepsilon_i, \tag{1}$$

where $\beta_1$ is the parameter of interest, capturing the discontinuous jump at the RD cutoff [see, e.g., Lehner2024, for a discussion of commonly applied estimators]. Importantly, this specification allows for a different slope of the conditional expectation function on either side of the cutoff. Variable $y_i$ is the outcome of interest for village $i$ and $distborder_i$ is the RD running variable, measuring the distance to the RD boundary in kilometers. $OldConquests_i$ denotes an indicator variable that represents the "treatment status", equaling 1 if the village is inside the old, non-existing border and was exposed to early Portuguese colonial rule and missionary influence. Finally, $\mathbf{v_i'}$ contains a set of geographic control variables and $SEGMENT_{ji}$ represents an indicator, equaling 1 if village $i$ has segment $j$ as its closest segment. This regression then produces a convex average over all border segments. These are the equivalent to a set of boundary segment fixed effects and are meant to capture geographic heterogeneity and ensure that we only compare villages close to each other. My preferred specifications do not include control variables as they are not required for RD identification and I find that they improve efficiency only marginally without changing the RD point estimates. When it comes to the segment fixed effects, I illustrate robustness by including sets of fixed effects with different lengths. They have been created with the SpatialRDD package [Lehner2023], and for full transparency they are plotted in Figure 5.

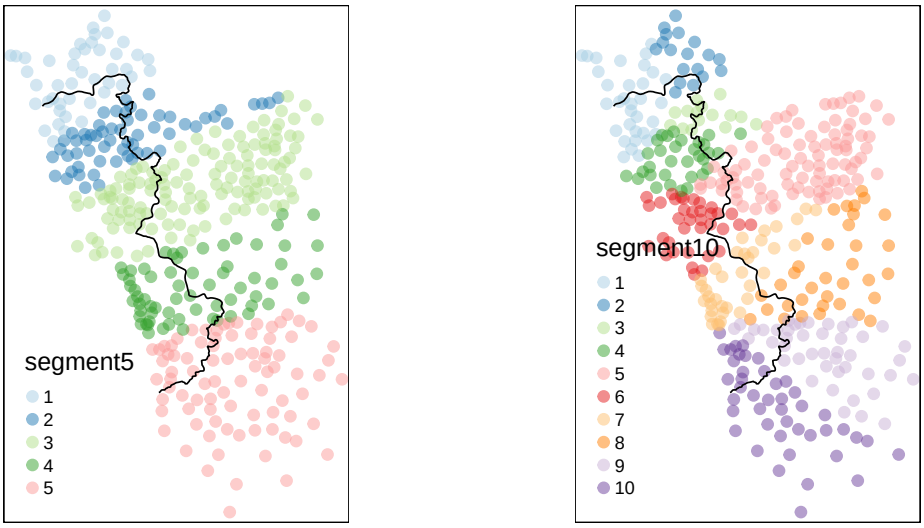


Figure 5: Illustration of the two sets of segment fixed effects that are used for estimation. The baseline uses five segments (each roughly 26km long), while the ten segments (roughly 13km each) are presented in robustness checks. The map shows all villages recorded in the 2011 census.

Note that Equation 1 delivers a numerically identical RD coefficient as "standard" RD estimation via local linear regression using an RD polynomial of degree one. My preferred RD bandwidth is MSE-optimal, allowing for different lengths on either side of the border [Calonico, Cattaneo, and Titiunik2015]. To show robustness towards the RD bandwidth choice, I additionally present estimates using the MSE-optimal bandwidth ("mserd") estimated through rdrobust as suggested by [Calonico, Cattaneo, and Titiunik2 Calonico, Cattaneo, and Titiunik2015], the optimal bandwidth as suggested by [Imbens and Kalyanaraman2012], and arbitrarily chosen 5 and 7 kilometer bandwidths.

Since regression discontinuity point estimates are affected by the bandwidth choice, this is a meaningful exercise to examine their robustness. Figure 6 indeed illustrates that juxtaposing multiple point estimates and their confidence bands next to each other helps to assess the robustness visually. This point is reinforced further by examining the placebo exercises with shifted boundaries (Figure 13, Figure 14), where it can be seen that isolated point estimates appear normal but only the full picture across multiple estimates illustrates the meaninglessness of the shifted boundaries.

## 4.1 RD Identification

Identification of the treatment effect requires that all relevant factors besides treatment vary smoothly at the RD border, otherwise we cannot be sure that villages on the opposite side are appropriate counterfactuals. In what follows, I illustrate that this is the case.

**"Pre-Treatment" – What happened before the Portuguese?** Initially, the Portuguese were only interested in the actual harbor of Goa. It was only three decades after the conquest in the early 16th century that they decided to create a buffer zone around the port city. This newly established border, which is also the line delineating the later conquered New Conquests, lies mostly alongside rivers and smaller streams of water. It was, however, introduced by the Europeans alone and had not existed before. Prior to their arrival, Goa changed hands frequently between the Muslim states of the Deccan and the Hindu state of Vijayanagar [Pearson1981]. This meant not just

Table 2: Showing Balancedness of Exogenous Characteristics

| | Full | | | 5km Bandwidth | | | RD (nonparam) | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | Old | New | SE | Old.bw | New.bw | SE.bw | RD.coef | RD.SE | Coefplot |
| **First Nature Geography** | | | | | | | | | |
| Elevation (meters) | 21.712 | 96.131 | 8.015 | 24.763 | 46.718 | 5.084 | 1.425 | 5.040 | |
| Ruggedness | 37.463 | 88.173 | 5.588 | 43.140 | 61.962 | 4.647 | -4.866 | 6.243 | |
| Potential Forest (Index 0-100) | 6.243 | 8.343 | 0.221 | 6.789 | 7.222 | 0.189 | 0.426 | 0.245 | |
| Ramankutty (Index 0-1) | 0.588 | 0.538 | 0.021 | 0.594 | 0.562 | 0.024 | -0.003 | 0.030 | |
| Cashew potential | 3573.706 | 3692.466 | 13.715 | 3583.172 | 3619.947 | 12.558 | 4.196 | 17.626 | |
| Wetrice potential | 3114.849 | 3155.689 | 6.163 | 3122.040 | 3134.725 | 6.028 | -3.074 | 8.028 | |
| **Climate** | | | | | | | | | |
| Annual Mean Temp. | 27.190 | 26.602 | 0.056 | 27.187 | 27.028 | 0.035 | -0.037 | 0.040 | |
| Mean Diurnal Range | 8.558 | 8.787 | 0.051 | 8.671 | 8.809 | 0.067 | 0.036 | 0.084 | |
| Isothermality | 60.231 | 58.736 | 0.150 | 60.117 | 59.713 | 0.129 | -0.090 | 0.149 | |
| Temp. Seasonality | 126.493 | 135.575 | 1.161 | 128.831 | 131.677 | 1.298 | 0.573 | 1.602 | |
| Temp. Annual Range | 14.211 | 14.965 | 0.094 | 14.424 | 14.757 | 0.124 | 0.082 | 0.154 | |
| Annual Precipitation | 3.036 | 3.189 | 0.032 | 3.089 | 3.186 | 0.037 | -0.021 | 0.046 | |
| Precipitation Seasonality | 144.684 | 145.211 | 0.373 | 144.745 | 144.857 | 0.421 | -0.669 | 0.639 | |
| **Village/Town Level Characteristics** | | | | | | | | | |
| Distance Velha Goa | 16.589 | 28.976 | 2.168 | 16.056 | 21.453 | 2.928 | 2.067 | 3.734 | |
| Distance Coastline | 5.684 | 20.096 | 1.270 | 8.211 | 12.742 | 1.175 | 1.129 | 1.547 | |
| Distance Nearest Stat. Town | 6.559 | 10.515 | 1.009 | 8.225 | 7.712 | 1.373 | 0.675 | 2.218 | |
| Village Area | 368.539 | 960.056 | 104.261 | 550.639 | 600.304 | 106.783 | 12.195 | 156.138 | |
| Village Population | 6027.308 | 2483.371 | 1112.276 | 3806.479 | 3618.818 | 655.281 | 1576.681 | 1083.510 | |
| Village No. Households | 1443.343 | 571.050 | 264.125 | 920.225 | 829.818 | 153.705 | 402.021 | 268.200 | |

*Note:*
The first two blocks give the mean of the variable on both sides of the RD border. The respective standard errors for the difference in means are spatial autocorrelation consistent [Conley, 1999]. The last block gives the estimated non-parametric RD coefficient with robust standard errors [Calonico, Cattaneo, Titiunik, 2014]. The plots of the standardized RD coefficients show the large overlaps with zero (pointrange depicts 95\% confidence interval).
[1] Sample size of RD estimation varies due to flexible bandwith selection

the port town but the whole hinterland up until the mountains and beyond.[33] There is no historical record indicating the existence of this border prior to the 16th century. It is thus highly unlikely that there was any sort of interference with my identification strategy due to unbalancedness of important economic variables alongside the RD cutoff in the 15th or 14th century or even earlier. The balancing table corroborates this interpretation, as there is no jump – let alone a meaningful difference in means within a 5km buffer – in any feature of first-nature geography, which we would typically expect to influence variables relevant to the present study.

**Balancing Checks.** From the balancing table it can be seen that the villages I am juxtaposing on both sides of the border are highly comparable when it comes to attributes of first nature geography. Also, their size, population, the number of households, and the share of people that work in agriculture are statistically indistinguishable from each other at the RD border.

Elevation and ruggedness are, of course, higher when the full extent of the New Conquests is

[33] According to the District Census Handbook of 2011: *"Before the advent of the Portuguese early in the 16th Century, the State covered very extensive areas which included towards the north, part of the Sindhudurg District of Maharashtra then known as Kudal and Rajapur Mahals up to the river Karepatan. The Southern limits extended towards Ankola and comprised the ancient Mahals of Supa, Halyal and Karwar now forming part of the Uttar Kannada district of Karnataka. Towards the east, it covered a large portion of the Belgaum district of Karnataka."*

considered because the mountain ridge of the Western Ghats is in the hinterland, and there is a smooth gradient in these variables going eastwards from the coastline. The existence of this geographic gradient is also why their means within a narrow bandwidth around the RD border appear to be different from each other. When testing for a jump at the cutoff, however, there is no discontinuity as illustrated by the RD point estimates in the last column. Also, the suitability for all relevant crops is similar on both sides of the border, as well as the more general Ramankutty suitability index [Ramankutty et al.2002]. What is more, other features of first nature geography, such as climate and rainfall, are similarly comparable. This table aims to illustrate the balancedness of fundamental factors to validate the assumptions of the RD design. The balancedness of other crucial economic characteristics of these villages is illustrated in the section on placebo checks, most importantly Table 5.

# 5 Empirical Results

This section discusses the RD estimates for literacy rates and sex ratios, separately for every available census at the village- and town level from 1961 (the first post-colonial census) until 2011 (the last available census).[34] The focus lies on my preferred specification with five boundary segment fixed effects and RD bandwidths that minimize the mean squared error (MSE) of the RD point estimator, allowing them to be different on either side of the cutoff (`"msetwo"` in `rdrobust` [Calonico, Cattaneo, and Titiunik2015]). This choice does not greatly impact the effect on point estimates, which is illustrated by a large set of robustness exercises depicted in Figure 6. The appendix then also shows the raw RD scatter plots for transparency.

The main results in this section can be categorized into two blocks. First, the point estimates in 1961 show the long-run effect of Portuguese colonialism in Goa at the time of independence. Second, the subsequent point estimates depict the differential persistence across two domains, education and gender. I show that gaps in literacy rates between the Old- and New Conquests are converging, albeit much slower so for women. Discontinuities in sex ratios, on the other hand, stay roughly constant over time with the exception of the anomaly in sex ratios in 1961 which was driven by temporary male out-migration as explained in Section 3.2. These results highlight that there is a differential degree of persistence. Once infrastructure investments universally started to provide educational opportunities in all of Goa, families started to send their children to school which led to the gradual disappearance of historical inequalities. Deeply rooted male child preferences as measured by the sex ratio, however, do not appear to be affected by these developments. The gender aspect can also be seen in the convergence pattern of literacy gaps, suggesting that the demand for female education historically was, and still is higher in the Old Conquests – inter alia driven by the historical contingencies outlined in Section 2.

The regression tables report three different standard errors for every point estimate (robust, clustered, spatial autocorrelation robust) in addition to tests for spatial autocorrelation for both the dependent variable and also for the residuals of each regression. This is important because spatial autocorrelation in the residual could increase the false positive rate beyond acceptable levels as it biases downward the standard errors, leading to spurious results. Not very surprisingly and consistent across all specifications, the regressand always exhibits spatial autocorrelation – indicating that villages close to each other are similar in observable characteristics. However, once segment fixed effects and the spatial discontinuity are taken account of, that is, Equation 1 is estimated, the pattern is gone – i.e. there is no spatial autocorrelation anymore in the residual.

[34] The 2021 census has not been carried out as of late 2024 [see Mallapaty2024, for a discussion].

This is reassuring and we can thus be confident that the significance of the reported point estimates is not spuriously driven by spatial patterns.

### 5.0.1 Literacy Rates

Table 3: Discontinuities in male literacy rates are converging faster.

| | female literacy | | | | male literacy | | | |
|---|---|---|---|---|---|---|---|---|
| | 1961 | 1991 | 2001 | 2011 | 1961 | 1991 | 2001 | 2011 |
| **I(Old Conquests)** | **0.138** | **0.072** | **0.046** | **0.031** | **0.154** | **0.034** | **-0.007** | **0.001** |
| | (0.034) | (0.033) | (0.018) | (0.014) | (0.040) | (0.023) | (0.014) | (0.011) |
| | [0.027] | [0.044] | [0.014] | [0.008] | [0.031] | [0.029] | [0.014] | [0.008] |
| | ([0.033]) | ([0.037]) | ([0.017]) | ([0.013]) | ([0.038]) | ([0.028]) | ([0.014]) | ([0.013]) |
| Observations | 106 | 104 | 157 | 144 | 116 | 108 | 158 | 135 |
| Obs [trt] | 43 | 46 | 49 | 61 | 43 | 47 | 53 | 55 |
| Obs [ctrl] | 63 | 58 | 108 | 83 | 73 | 61 | 105 | 80 |
| Moran's I [y] | 3.044 | 4.592 | 12.110 | 8.062 | 3.581 | 9.852 | 14.114 | 12.611 |
| Moran's I [resid] | 1.156 | 0.594 | 3.255 | 0.959 | 0.226 | 0.918 | 0.768 | 0.532 |
| Mean [ctrl] | 0.117 | 0.525 | 0.622 | 0.733 | 0.310 | 0.715 | 0.779 | 0.828 |
| Std.Dev. [y] | 0.117 | 0.118 | 0.085 | 0.057 | 0.135 | 0.092 | 0.070 | 0.040 |

*Note:* The shown point estimates refer to coefficient $\beta_1$ in Equation 1, depicting the local treatment effect at the cutoff. The specifications allow for different slopes of the conditional expectation functions on both sides of the cutoff. Chosen RD bandwidths minimize the MSE of the RD point estimator while allowing for different lengths on either side (`"msetwo"`, `rdrobust` [Calonico, Cattaneo, and Titiunik2015]). The three standard errors reported are (heteroskedasticity robust), [clustered at subdistrict level], ([SAC consistent ([Conley1999]), 5km bandwidth]).
The Moran's I test statistic for spatial autocorrelation was obtained using a 20-nearest-neighbor matrix. With a z-score roughly above 2 one can reject the null hypothesis of no spatial autocorrelation. Unsurprisingly, the raw outcome variables exhibit spatial autocorrelation, meaning that nearby villages are more similar to each other. Once the discontinuity is controlled for with the econometric specification in Equation 1 and the test carried out on the regression residual, spatial autocorrelation disappears (except for one instance in 2001).
The mean in the control group depicts the average of the outcome variable in the New Conquests for every census. The standard deviation of the outcome illustrates that the effects are sizeable.

Three main patterns stand out in Table 3. First, by looking at the mean of the "control," i.e., the New Conquests, it can be seen that there is a remarkable increase in education – as measured by literacy rates – starting from Goan independence in 1961. Second, this growth in literacy rates was faster in the New Conquests, which were historically not exposed to the educational network built by Christian missionaries in the early days of Portuguese colonialism. The decreasing RD point estimates are showcasing this fact. Third, the catch-up process was faster for male education, indicating that there was – or possibly still is – some degree of preferential treatment of sons over daughters when it comes to sending them to school.

Initially, in the years after independence, the difference in literacy between villages around the RD cutoff was substantial. For women, it was more than double in the Old Conquests with mean literacy rate of 25.5 percent compared to 11.7 percent on the other side of the border. For men, this difference in the first census of 1961 was around a third with a point estimate of 15.4 percentage points compared to a 31 percent literacy rate in the villages of the New Conquests within the RD bandwidth.

Both female and male literacy rates show a strong increase from independence in 1961 until the most recent census in 2011, where rates stand at around 75 and 84 percent, respectively, within the chosen RD bandwidth. The discontinuity in female literacy rates diminished to a mere three

percentage points from being 14 percentage points in the first study period. In all periods this jump at the RD cutoff explains around half a standard deviation and is thus substantial.

The male literacy, on the other hand, converged much faster and is barely observable anymore 30 years after independence in 1991. From 2001 onwards it vanished completely, with tiny point estimates that are indistinguishable from zero. Figure 6 helps to visually depict this differential convergence process. It also helps interpret the point estimate for the discontinuity in male literacy in 1991, which is not quite significant according to conventional hypothesis testing standards since it is less than two standard deviations away from zero. One way of interpreting this coefficient is taking into account the whole convergence process over the years as depicted in the middle panel of Table 3. In doing so, one can come to the conclusion that it seems plausible to interpret this effect as being above zero in reality, but the statistical power to reject the null hypothesis of no effect is just too low due to the small sample size. Convergence was, therefore, most likely achieved a few years after the census of 1991.

### 5.0.2 Sex Ratios

In this section, the regression table reports the sex ratio in both variants to make it more interpretable for readers who are used to the convention which divides the number of men by the number of women. In general, this paper follows the convention of Census India by dividing the number of women by the number of men in every village.

The first column of Table 4 reports the anomalously high sex ratios of the census year 1961. The magnitude of the effect is not plausible due to temporary male out-migration driven by weak economic conditions in Goa. This has been explained already in detail in Section 3 and Section 2. This mobility was not entirely concentrated amongst Christian men who happened to live mostly inside the Old Conquests. Also, men in the New Conquests tended to emigrate in search of work, as can be seen by the relatively high sex ratio of 1,037 women per 1,000 men within the RD bandwidth on the side of the New Conquests.

The following three columns in Table 4 show roughly equal point estimates from 1991 until 2011. Even though they do vary slightly, their confidence intervals overlap to a large extent and the observed variation in point estimates can thus be thought of as being due to imprecise estimation rather than an actual differential effect. Figure 6 further illustrates the large overlap of confidence intervals. It also lends credence to the interpretation that the discontinuity in sex ratios remained roughly unchanged over time by averaging over all 15 specification choices of different segment fixed effects and RD bandwidths for every census year from 1991 to 2011.

Looking at the standard deviation in the raw data, we see that also, in the case of sex ratios, the discontinuity of roughly 60 to 80 more women per 1000 men explains a substantial part of the observed variation.

In 1991 and 2001, the sex ratio within the RD bandwidth on the side of the New Conquests exhibits values of around 970 women per 1000 men, which is roughly in line with the averages across all of India. In 2011, this estimate increased slightly to 991, but again, with confidence bands overlapping with values from prior censuses – therefore not warranting the conclusion of a significantly increased sex ratio in the New Conquests close to the cutoff.

Table 4: Male child preference as measured by sex ratios stays roughly constant over time.

| | sex ratio (f/m) | | | | sex ratio (m/f) | | | |
|---|---|---|---|---|---|---|---|---|
| | 1961 | 1991 | 2001 | 2011 | 1961 | 1991 | 2001 | 2011 |
| **I(Old Conquests)** | **0.309** | **0.086** | **0.055** | **0.069** | **-0.220** | **-0.075** | **-0.055** | **-0.066** |
| | (0.071) | (0.028) | (0.032) | (0.026) | (0.070) | (0.027) | (0.027) | (0.022) |
| | [0.094] | [0.019] | [0.022] | [0.028] | [0.083] | [0.022] | [0.022] | [0.023] |
| | ([0.083]) | ([0.023]) | ([0.032]) | ([0.023]) | ([0.088]) | ([0.022]) | ([0.027]) | ([0.019]) |
| Observations | 100 | 143 | 135 | 147 | 119 | 151 | 134 | 152 |
| Obs [trt] | 36 | 56 | 56 | 58 | 38 | 52 | 55 | 64 |
| Obs [ctrl] | 64 | 87 | 79 | 89 | 81 | 99 | 79 | 88 |
| Moran's I [y] | 0.866 | 1.544 | 3.783 | 6.568 | 0.287 | 1.373 | 4.528 | 6.281 |
| Moran's I [resid] | -0.921 | 0.536 | -0.229 | 0.987 | -0.212 | 0.143 | -0.433 | 0.810 |
| Mean [ctrl] | 1.037 | 0.964 | 0.970 | 0.991 | 0.998 | 1.049 | 1.036 | 1.016 |
| Std.Dev. [y] | 0.181 | 0.093 | 0.094 | 0.090 | 0.212 | 0.102 | 0.090 | 0.086 |

*Note:* The outcome variable is reported in two ways: the number of women divided by the number of men in a village (following the Indian census) and the number of men divided by the number of women (more often seen in the demographic literature). See the text for a discussion of the unusually high numbers in 1961. The shown point estimates refer to coefficient $\beta_1$ in Equation 1, depicting the local treatment effect at the cutoff. The specifications allow for different slopes of the conditional expectation functions on both sides of the cutoff. Chosen RD bandwidths minimize the MSE of the RD point estimator while allowing for different lengths on either side (`"msetwo"`, `rdrobust` [Calonico, Cattaneo, and Titiunik2015]). The three standard errors reported are (heteroskedasticity robust), [clustered at subdistrict level], ([SAC consistent ([Conley1999]), 5km bandwidth]).
The Moran's I test statistic for spatial autocorrelation was obtained using a 20-nearest-neighbor matrix. With a z-score roughly above 2 one can reject the null hypothesis of no spatial autocorrelation. Unsurprisingly, the raw outcome variables exhibit spatial autocorrelation, meaning that nearby villages are more similar to each other. Once the discontinuity is controlled for with the econometric specification in Equation 1 and the test carried out on the regression residual, spatial autocorrelation disappears.
The mean in the control group depicts the average of the outcome variable in the New Conquests for every census. The standard deviation of the outcome illustrates that the effects are sizeable.

## 5.1 RDD Identification

The defining feature of any RD design is that the probablity of receiving treatment changes discontinuously at the RD cutoff. In the case of this study, the treatment is comprised of a set of measures by the Portuguese which changed the position of women in society at an early stage and the establishment of a network of parishes and schools, among other things. The discontinuous nature of these factors has been extensively discussed in Section 2. It has also been illustrated that the border appeared in an unplanned way in the 16th century and that it did not exist prior to Portuguese arrival. Furthermore, its removal, i.e. the expansion by the New Conquests, happened due to several exogenous peculiar events. This helps strengthen the argument that one does not have to worry about a compound treatment effect, i.e. that another event or policy happening exactly alongside this boundary could have caused the documented effects.

The other key identifying assumption is that pre-determined characteristics such as first nature geography and climatic conditions do not exhibit a discontinuity but change continuously at the RD boundary. The balancing table in Section 4 has illustrated the validity of this assumption. Due to a historically unequal treatment by the Portuguese colonial government of the New Conquests (no structured investments in infrastructure, religious freedom, among other things), it is plausible that during the 19th or 20th century there was a discontinuity in, for example, the number of schools at the border between the Old- and New Conquests. I cannot test this since these statistics have

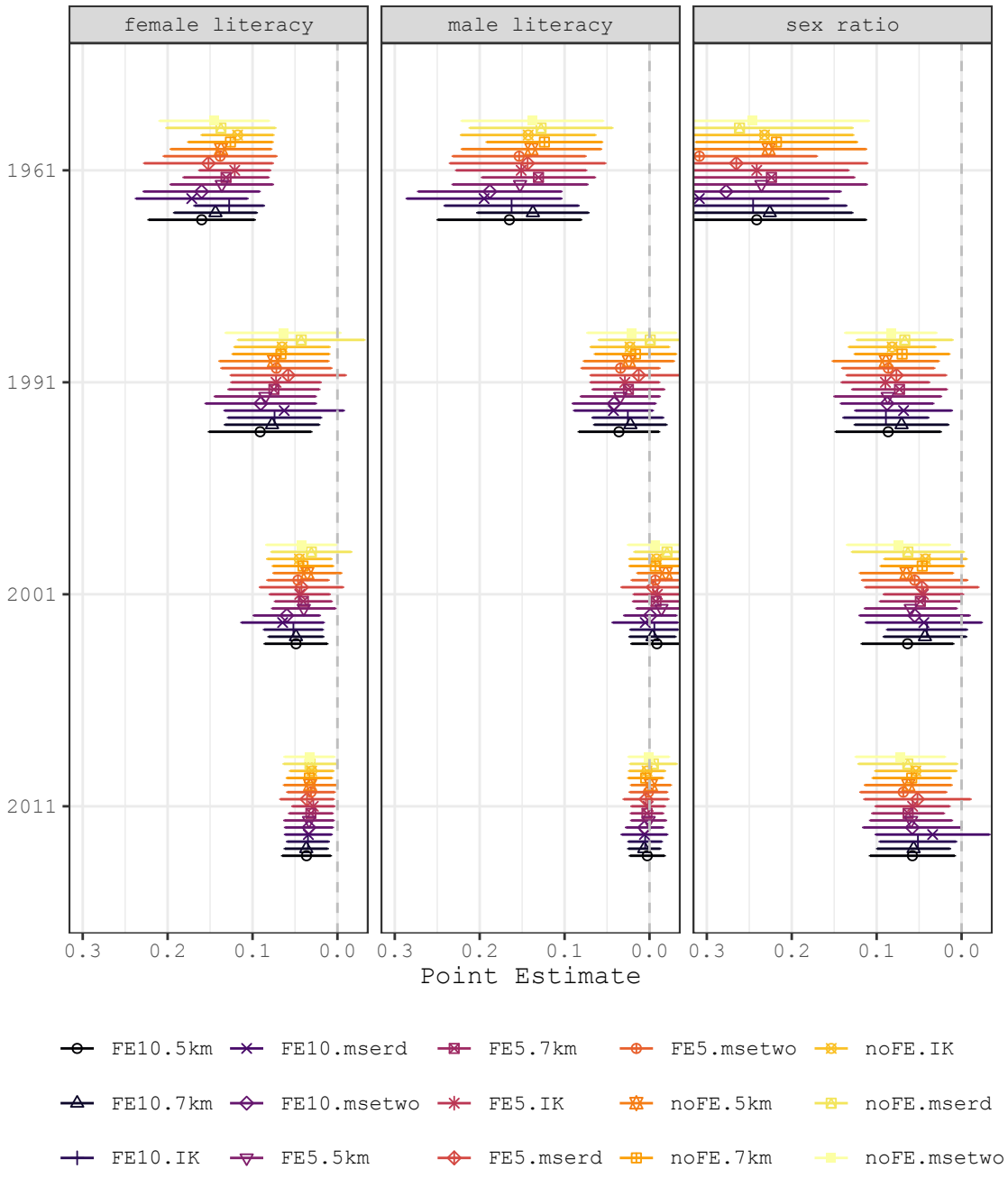


Figure 6: Point estimates of various specifications combined (95% confidence intervals using [Conley1999] standard errors), illustrating the robustness of Equation 1 to segment fixed effect and RD bandwidth choices. Specifications without segment fixed effects (`"noFE"`) are not preferrable and added for illustrative purposes only. The RD bandwidths that minimize the mean squared error (MSE) of the RD point estimator while forcing it to be of the same length on each side of the cutoff (`"mserd"`) are generally the smallest (usually below 4km) and thus often lead to greater imprecision.
The figure illustrates the convergence of discontinuities in literacy rates and the seemingly stagnant discontinuity in sex ratios (except for the anomalous year of 1961 – as explained in the text).

been reported at most aggregated at the sub-district level until the first census after Goa became a

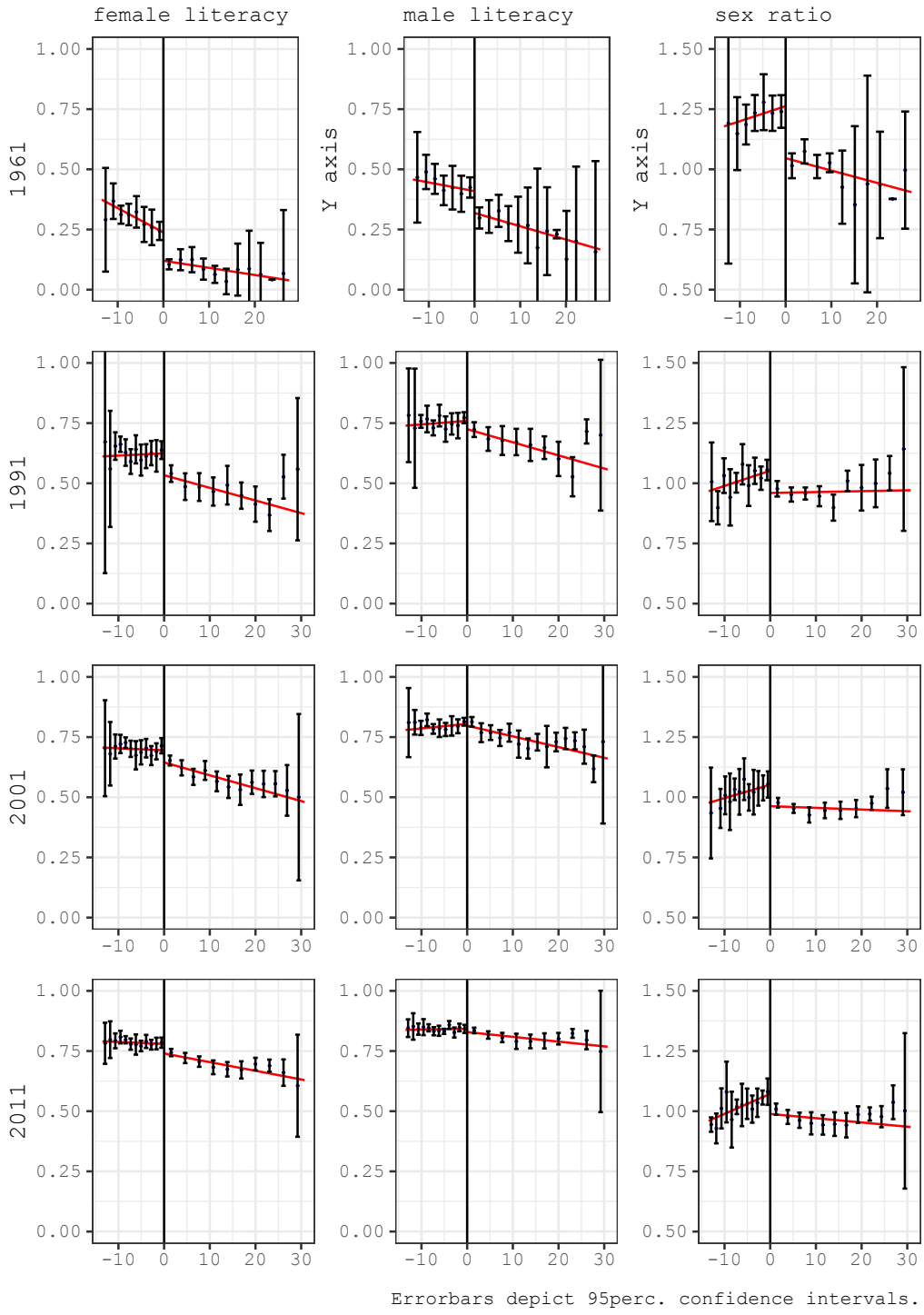


Figure 7: Binned RD plots across all variables and time periods, illustrating both the change in levels and discontinuities over time. The red linear conditional expectation functions are not the ones from the actual estimation but are drawn just for illustrative purposes across the whole support of the running variable. See the appendix for the same picture illustrating the raw RD cloud without binning.

state (1991). What is more, such a discontinuity should be viewed as a function of the treatment –

as described in Section 2 – rather than being a concern for RD identification. In the next section, the placebo checks show that there was no difference anymore in terms of educational provision as measured by the number of schools per village across the last three censuses.

Another concern for the general validity of RD designs is the potential for individuals to sort around the threshold. [Keele and Titiunik2015] highlight that this is a concern, especially in the context of geographic RDs, as agents may sort very precisely around the cutoff in order to, for example, exploit discontinuous changes in rules or regulations. In practice, the presence of sorting is difficult to assess and test. In the context of the old border between the Old- and New Conquests in Goa this is not a concern, however, since the border is not existing anymore since the 19th century. The current sub-district (taluk) boundaries do coincide with the old border, no rules or regulations change at this small-scale administrative level, however. The border between the two administrative districts of North- and South Goa, which are also the electoral districts, runs practically orthogonal to the old colonial border and is thus unlikely to interfere with RD identification.

### 5.2 Examining Channels and Placebo Outcomes

In order to rule out different channels through which the described treatment effects could have operated, I first illustrate that income does not seem to play a role. Prima facie evidence for this was provided already through the balancing tables in Section 4, where features of first nature geography such as soil suitability or terrain ruggedness – which typically correlate with income – have been shown to exhibit no discontinuity. Also, the occupational structure at a village level suggests that there is no discontinuous change, showing that roughly 10% of the workforce on both sides of the border worked in the agricultural sector in 2011. Figures for the share of workers in the household sector, which is the second sector that can be clearly distinguished in the census data, are roughly the same.

The currently most reliable way to explicitly investigate income at a very disaggregated level are satellite data capturing light intensity at night. These have been shown to correlate well with GDP [Henderson, Storeygard, and Weil2012; Chen and Nordhaus2011]. I use data from the well-known U.S. Air Force Defense Meteorological Satellite Program (DMSP) [Elvidge et al.2001] which is available from 1992 to 2013. The grids are provided at a 30-arc-second resolution, which translates to around 0.001 degrees or roughly 900 meters for the latitude in which Goa is located. Figure 8 illustrates these spatially fine-grained data over the full range of the RD score.

Two main things can be immediately inferred from Figure 8. First, areas close to the coast have more economic activity and higher population density, and the Old Conquests are, on average, richer than the New Conquests. This is not surprising because the major sources of economic activity in Goa are ports and tourism. Distance to the coastline is thus expected to be a very strong predictor of income at the local level. Second, the degree of economic activity smoothly declines as one moves away from the coastline and, most importantly, this decline continues far into the hinterland without exhibiting a discontinuity at the RD cutoff. Once the mountain ridge of the Western Ghats in the East of Goa is reached, economic activity is essentially zero.

Table 5 shows an additional set of placebo outcomes taken from the village directory of the last three censuses and digitized by [Asher et al.2021]. It is shown that there are no jumps when it comes to the availability of education as measured by the number of primary-, middle-, and secondary schools. Unfortunately, in earlier censuses for Goa the number of schools has not been reported at the village, but only at the sub-district level. I, therefore, cannot run this exercise to verify whether there was a discontinuity in school provision at the village level prior to 1991. Throughout the colonial period, the New Conquests certainly had a smaller number of government schools. Since the early 20th century this imbalance equalized more and more. While the far

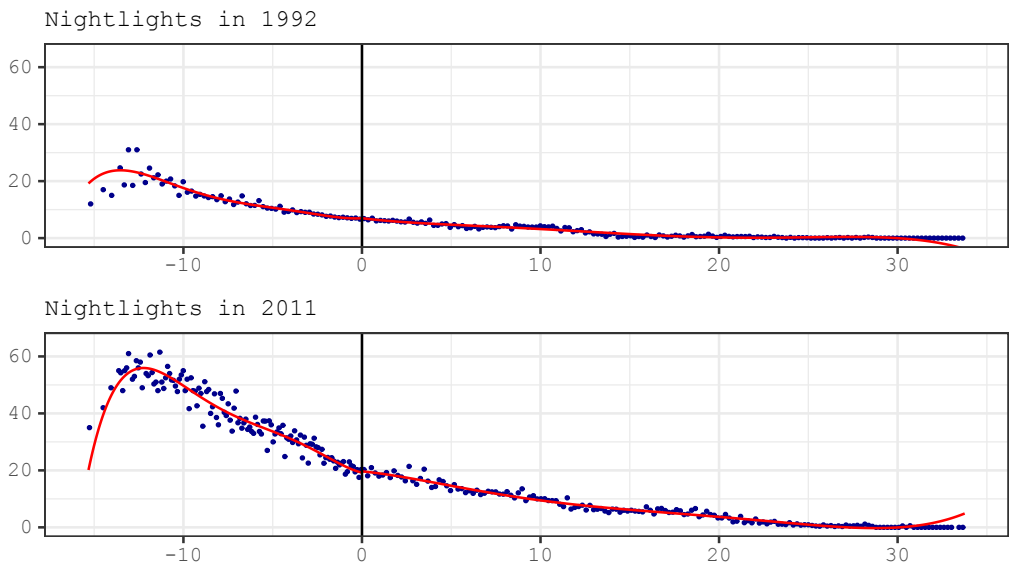


Figure 8: There is no jump in income at the RD cutoff.

hinterland of Goa was certainly disadvantaged also from 1910 until 1961, this is less clear for the areas on both sides of the RD border. In the years after 1961, the provision of schools was certainly equalized. See Section 2 for a more detailed discussion.

The appendix illustrates a large set of additional placebo checks covering infrastructure, medical coverage, and employment structure from the series of economic censuses of 1990, 1998, 2005, and 2013. Data from the Socio Economic and Caste Census (SECC) of 2012 illustrates the similarity of villages in terms of socioeconomic outcomes such as private ownership and income sources.

### 5.2.1 Placebo RD Boundaries

The robustness to many different bandwidth sizes and fixed effects categories has already been demonstrated in Figure 6. As a final robustness check, I pivot the RD border by just a few kilometers inwards and outwards as depicted in Figure 9. The operations have been carried out again with the SpatialRDD package [Lehner2023]. It can be seen that just a few villages change "treatment status" in this exercise. Showing continuity of the conditional expectation function away from the cutoff is neither sufficient nor necessary for the validity of an RD design. As pointed out by [Cattaneo, Idrobo, and Titiunik2019] and others, however, the presence of discontinuities away from the cutoff can be interpreted as potentially casting doubt on the RD design.

The right panel of Figure 9 illustrates the newly created treatment polygons which were used to assign the new "placebo treatment status" at the village level for each shift. Figure 13 and Figure 14 in the appendix show the placebo estimates and confidence intervals for the leftward and rightward shift, respectively. These were carried out using the same specification as in Section 5 with the exact same combinations of bandwidth and border segment fixed effects choices as in Figure 6 across all census years.

It can be seen that across all outcomes and periods, point estimates are erratic and are not coinciding anymore with each other as was the case in Figure 6. They often even switch sign within the same outcome-censusyear pair. On top of that, confidence intervals are generally wide and, for most specifications, overlap with zero. There is, therefore, no evidence for a discontinuity at any

Table 5: No difference in the number of schools across censuses.

| | prim schools | | | middle schools | | | secondary schools | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1991 | 2001 | 2011 | 1991 | 2001 | 2011 | 1991 | 2001 | 2011 |
| **I(Old Conquests)** | **-1.314** | **1.031** | **0.249** | **-0.357** | **-0.306** | **-0.329** | **0.159** | **-0.227** | **-0.483** |
| | (1.161) | (1.778) | (1.237) | (0.366) | (0.379) | (0.404) | (0.302) | (0.284) | (0.307) |
| | [0.641] | [0.985] | [0.628] | [0.221] | [0.262] | [0.329] | [0.106] | [0.179] | [0.208] |
| | ([1.141]) | ([1.517]) | ([1.081]) | ([0.352]) | ([0.343]) | ([0.373]) | ([0.280]) | ([0.268]) | ([0.284]) |
| Observations | 110 | 83 | 73 | 96 | 93 | 82 | 102 | 104 | 89 |
| Obs [trt] | 54 | 39 | 34 | 45 | 45 | 40 | 51 | 53 | 45 |
| Obs [ctrl] | 56 | 44 | 39 | 51 | 48 | 42 | 51 | 51 | 44 |
| Moran's I [y] | 0.783 | -0.042 | -0.602 | -0.059 | -0.086 | -1.071 | 0.518 | -0.405 | -1.465 |
| Moran's I [resid] | -0.934 | -1.933 | -1.247 | -0.454 | -0.516 | -0.914 | -0.766 | -1.868 | -2.027 |
| Mean [ctrl] | 5.411 | 5.477 | 3.205 | 1.137 | 1.042 | 0.952 | 0.765 | 0.843 | 0.795 |
| Std.Dev. [y] | 4.262 | 4.474 | 3.138 | 1.177 | 1.113 | 1.075 | 0.886 | 0.918 | 0.979 |

*Note:* The shown point estimates refer to coefficient $\beta_1$ in Equation 1, depicting the local treatment effect at the cutoff. The specifications allow for different slopes of the conditional expectation functions on both sides of the cutoff. Chosen RD bandwidths minimize the MSE of the RD point estimator while allowing for different lengths on either side (`"msetwo"`, `rdrobust` [Calonico, Cattaneo, and Titiunik2015]). The three standard errors reported are (heteroskedasticity robust), [clustered at subdistrict level], ([SAC consistent ([Conley1999]), 5km bandwidth]).
The Moran's I test statistic for spatial autocorrelation was obtained using a 20-nearest-neighbor matrix. With a z-score roughly above 2 one can reject the null hypothesis of no spatial autocorrelation.

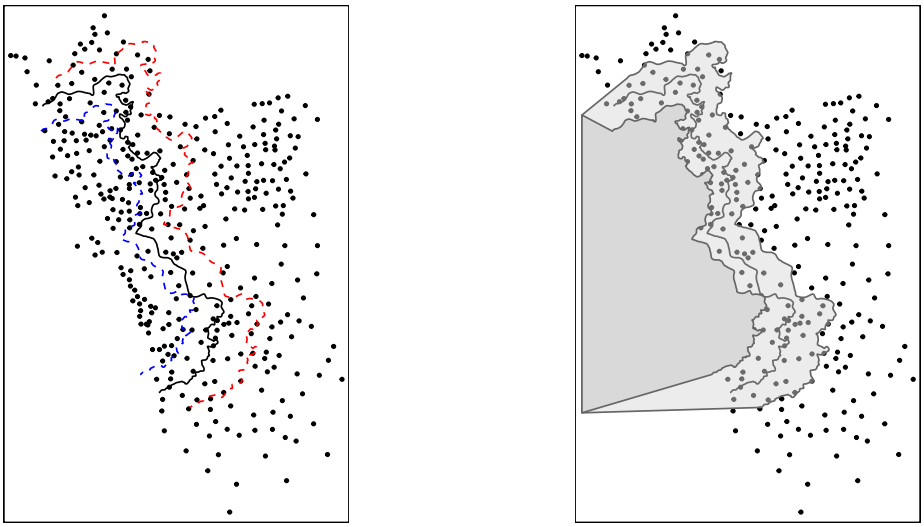

Figure 9: Illustration of the two placebo borders. The border to the left was shifted down by 4km and left by 2km, while the same shifts were applied to the outer placebo in opposite directions. Both were then rescaled accordingly. As essentially only the closest villages to the border on each side switch treatment status, this practically represents the most minimal shift that is meaningful at the same time.

border other than the old colonial boundary between the Old- and New Conquests of Goa.

## 6 The Persistent Effects: Mechanisms

In what follows, I shed light on possible channels that might have caused the persistent differences in education and gender preferences. The historical background in Section 2 has outlined that the Portuguese colonizers were always accompanied by religious orders. From the historical narrative it is apparent that without them, the administrators and soldiers sent by the Portuguese crown would not have been able to establish their cultural footprint across the whole area – especially not the smaller villages in the hinterland. By far, the most important order was the Jesuits, and their activities are well-documented in numerous works by historians [see, e.g., Alden1996; Gomes2003].

To examine this channel, I digitize and geo-localize a map from [Borges1994] that shows all Jesuit historical sites (Figure 10). These are situated exclusively in the Old Conquests since, as explained in detail in Section 2, the Jesuits were expelled before Portuguese Goa was expanded by the New Conquests.


Figure 10: Geo-localized map of historical Jesuit sites from [Borges1994].

First, I will show that distance to these old Jesuit sites is still a predictor of education and gender preferences. Second, I estimate a set of regressions where a buffer around each village is drawn to count the number of Jesuit sites in their vicinity. This exercise serves to illustrate the very localized nature of the Jesuit effect. In addition, both of these exercises confirm some of the main results from the RD regressions: the persistent effect is declining over time and is not detectable anymore for male literacy in the most recent census. For sex ratios, on the other hand, there does not seem to be a convergence pattern over time.

I present these estimates with caution as they can not be interpreted as causal effects, most importantly because the location choice by the Jesuits likely was not random.[35] The results can be viewed as complementary to the historical narrative outlined earlier, pointing to the importance of religious orders for Portuguese colonial efforts. The evidence is certainly compatible with an

[35]There is, however, no strong evidence that the Jesuits preferred specific locations because of better observable features.

interpretation that spatial spillovers are an important part of the process. What is more, the dampening of the persistent effect over time lends support to the results from the main section of the paper.

## 6.1 Horizontal diffusion

To establish a correlation between the outcome variables examined so far in this study – namely female literacy, male literacy, and sex ratios – and the distance to historical Jesuit sites, I estimate various forms of the following regression separately for every census year:

$$y_{ij} = \alpha + \beta_1 \; distjesuit_{ij} + \mathbf{v'_{ij}} \; \delta + \phi_j + \varepsilon_{ij}, \tag{2}$$

where $y_{ij}$ is outcome $y$ in village $i$ located within sub-district (taluk) $j$ and $distjesuit_{ij}$ is the distance to the closest Jesuit site for every village – rescaled to measure tens of kilometers. Vector $\mathbf{v_{ij}}$ contains a set of control variables, and $\phi_j$ are sub-district fixed effects to absorb unobserved location characteristics that may lead all villages in a given sub-district to have higher outcomes. Standard errors are heteroskedasticity robust, clustered at the sub-district level, and spatial autocorrelation consistent with a 10km distance cutoff.

Table 6: Distance regressions without controls and fixed effects

| | female literacy | | | | male literacy | | | | sex ratio (f/m) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1961 | 1991 | 2001 | 2011 | 1961 | 1991 | 2001 | 2011 | 1961 | 1991 | 2001 | 2011 |
| **DistJesuit** | **-0.093** | **-0.050** | **-0.051** | **-0.036** | **-0.053** | **-0.030** | **-0.024** | **-0.012** | **-0.069** | **-0.006** | **-0.023** | **-0.027** |
| | (0.008) | (0.008) | (0.005) | (0.003) | (0.011) | (0.007) | (0.004) | (0.003) | (0.014) | (0.008) | (0.006) | (0.005) |
| | [0.011] | [0.016] | [0.008] | [0.007] | [0.021] | [0.012] | [0.007] | [0.005] | [0.033] | [0.020] | [0.015] | [0.014] |
| | ([0.011]) | ([0.014]) | ([0.008]) | ([0.005]) | ([0.015]) | ([0.012]) | ([0.006]) | ([0.004]) | ([0.018]) | ([0.014]) | ([0.011]) | ([0.009]) |
| Observations | 229 | 323 | 381 | 383 | 230 | 323 | 381 | 383 | 230 | 323 | 381 | 383 |
| Moran's I [y] | 22.323 | 24.995 | 28.441 | 30.371 | 13.389 | 24.434 | 21.929 | 18.801 | 11.304 | 9.866 | 12.614 | 12.735 |
| Moran's I [resid] | 17.099 | 21.221 | 21.296 | 23.118 | 14.343 | 22.932 | 19.708 | 17.493 | 10.485 | 10.127 | 9.836 | 9.409 |
| Mean [y] | 0.195 | 0.534 | 0.629 | 0.732 | 0.355 | 0.700 | 0.768 | 0.821 | 1.119 | 0.989 | 0.983 | 0.995 |

*Note:* The shown point estimates refer to coefficient $\beta_1$ in Equation 2, reflecting the extent to which villages benefit from being closer to a historic Jesuit site. The three standard errors reported are (heteroskedasticity robust), [clustered at subdistrict level], ([SAC consistent ([Conley1999]), 10km bandwidth]).
It can be seen that a large amount spatial autocorrelation is present, which is reflected by the fact that confidence bands often more than double when appropriate standard errors are used. The Moran's I test statistic for spatial autocorrelation was obtained using a 20-nearest-neighbor matrix. With a z-score roughly above 2 one can reject the null hypothesis of no spatial autocorrelation. The mean depicts the average of the outcome variable across all villages for every census year. The standard deviation of the outcome illustrates that the effects are sizeable.

Table 6 reports the results of my preferred version of Equation 2 without the usage of fixed effects and controls. The results with the inclusion of control variables and sub-district fixed effects are qualitatively similar and shown in Table 10 and Table 11.

The importance of being close to a Jesuit site declines over time for female and male literacy. For sex ratios, this is less clear. Given the selective migration pattern of males in 1961 as illustrated in Section 2, however, it seems warranted to say that the correlation between sex ratios at the village level and distance to the closest Jesuit historical site stayed roughly constant over time.

The estimated coefficient in column one of Table 6 suggests that in 1961, being ten kilometers away from a historical Jesuit site is associated with a 9.3 percentage points lower female literacy rate. In 2011, this correlation declined to 3.6 percentage points on an also much increased average female literacy rate.

For male education, as measured by the literacy rate, this effect was much lower in 1961, with an estimated coefficient of 5.3 percentage points. This correlation has declined to a mere 1.2 percentage points in the most recent census of 2011.

### 6.2 Evidence for the localized nature of the effect

I now assess the distances over which the persistent effects operate and whether this range or the magnitude of the effect is declining over time. In order to do so, I estimate a series of simple nested models that expand a buffer radius that is drawn around every village. For every radius, $r$, I then count the number of Jesuit sites within the buffer for every village. The specification takes the following familiar form:

$$y_{ij} = \alpha + \beta_1 \; njesuit_{ij}^{r} + \varepsilon_{ij}, \tag{3}$$

where $njesuit_{ij}^{r}$ is the number of historical Jesuit sites within a radius of length $r$ drawn around every village $i$ in sub-district $j$. This series of regressions is estimated separately for each variable in every year the census data is available – as with all the previous specifications. Fixed effects are omitted because the buffers would overlap with neighboring sub-districts in most cases. Standard errors are clustered at the sub-district level since the previous specifications have shown that these deliver the most conservative confidence bands.

The regression results are succinctly summarized in Figure 11. Three striking things can be inferred from these figures. First, the results suggest that the effect of being close to a Jesuit site is very localized in nature. The effect of having an additional site within the radius around the villages fades out between five and ten kilometers. Second, the persistent effects are declining over time, with effects for male literacy not being detectable anymore from 2001 onwards – in line with all previous results.

Third, the pattern of differential persistence seemingly is also present here. While the effects on male and female literacy become more and more muted over time, for sex ratios they stay roughly the same across all periods.

In summary, the different exercises in this section have demonstrated quantitative evidence suggesting that religious orders played a crucial role in the colonization of Goa. Their persistent effect is declining over time, but still can be measured in recent years. These results are in line with studies on religious orders by [Valencia Caicedo2019b] and [Waldinger2017], but also with episodes of human capital persistence in general [e.g. Rocha, Ferraz, and Soares2017].

## 7 Conclusion

In this study, I have documented several findings that can be grouped into two major blocks. First, looking at data from 1961, I illustrate the persistent effect of Portuguese colonization by exploiting variation in culture within their territories, which allows me to hold geography, institutions, and many other potential confounders constant. The Portuguese colonizers culturally interfered by, inter alia, significantly altering the position of women in society at a very early stage in history. In addition, they introduced what I call a "taste for education," which affected both men and women through several channels. Their accompanying missionaries established a network of parish schools alongside their churches, founded a college, and even brought the printing press.

Second, and more importantly, I show that not all inequalities induced by history are equally persistent. By cross-linking census data for several decades after the liberation of Goa by India in

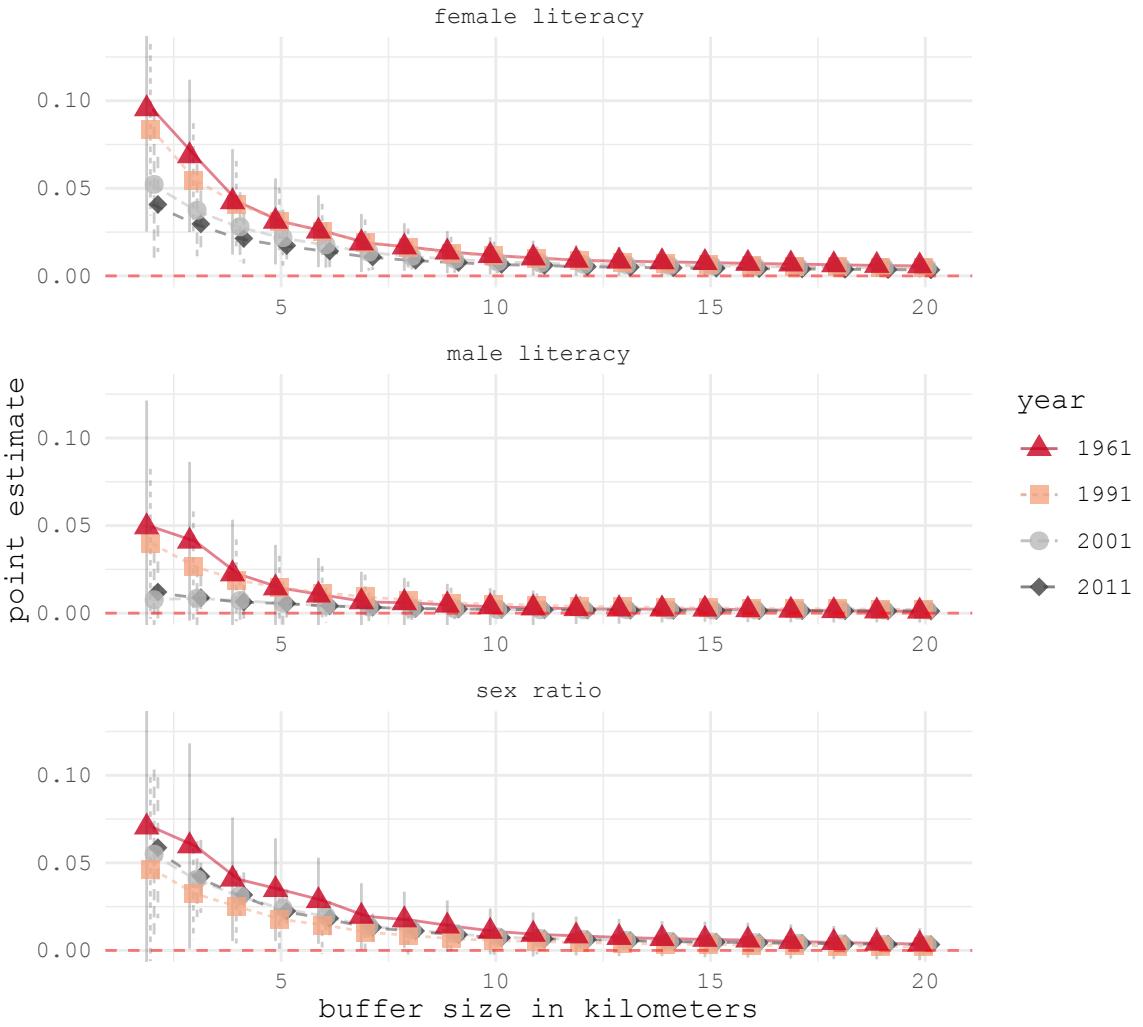


Figure 11: Series of point estimates from the nested model in Equation 3 where each dot represents the point estimate $\beta_1$, depicting the effect of an additional Jesuit site within radius $r$ around each village.

1961, I demonstrate that there is differential persistence across two important domains. Gaps in education can be overcome, albeit slower for women. Differences in sex ratios, on the other hand, stay roughly constant over time.

To identify causal effects, I rely on a territorial expansion that happened for plausibly exogenous reasons approximately 250 years ago. This expansion coincidentally occurred in combination with the exogenous expulsion of Catholic orders, which were the catalyst for the diffusion of Lusitanian culture and ensured the construction of parish schools, and the fact that the New Conquests were granted religious freedom, regardless of religion or gender. The same institutional system has been in place in the whole territory already since pre-colonial times.

Quantitatively analyzing these historical peculiarities, I show that culture greatly contributes to observed gender disparities, holding institutions, income, and geography constant. I find that son preferences, as measured by male-biased sex ratios, seem to be extremely persistent and difficult to overcome. However, gaps in female education, as measured in terms of female literacy, seem

to be less rigid as they started to converge once the Indian government equalized public goods provision after 1961 when Goa was annexed. On the other hand, the discontinuity in male literacy rates – which where the result of differential cultural influence in the two territories of Goa – vanished within roughly one generation and is no longer observable today. My results highlight the differential degree of persistence of deeply rooted preferences and the multi-dimensionality of culture.

This paper is novel in isolating the effect of culture while holding geography constant. Also institutions were no more or less extractive on either side of the RD boundary. In addition, the identification device allows for the exploitation of a time dimension to ask under which conditions historical inequalities persist and, if they vanish, at what speed they do so. The paper is important because it suggests that differences in deeply rooted preferences are hard to overcome and persist even after a drastic increase in prosperity in an area where individuals are ethnically and linguistically homogeneous. Surprisingly, also income is not predictive of gaps in sex-ratios. Educational disparities induced by historical experiences, on the other hand, can seemingly be overcome by uniform public goods provision.

## References

[Abrevaya2009] Abrevaya, Jason. 2009. Are There Missing Girls in the United States? Evidence from Birth Data. American Economic Journal: Applied Economics 1 (2): 1–34 (April).

[Acemoglu, Johnson, and Robinson2001] Acemoglu, Daron, Simon Johnson, and James A Robinson. 2001. The Colonial Origins of Comparative Development: An Empirical Investigation. American Economic Review 91 (5): 1369–1401 (December).

[Alden1992] Alden, Dauril. 1992. The Making of an Elite Enterprise: The Jesuits in the Portuguese Assistancy, 16th to 18th Centuries. James Ford Bell Library Minneapolis, Minn: The James Ford Bell Lectures. Associates of the James Ford Bell Library, University of Minnesota.

[Alden1996] Alden, Dauril. 1996. The Making of an Enterprise: The Society of Jesus in Portugal, Its Empire, and beyond, 1540-1750. Stanford University Press.

[Alesina and Giuliano2015] Alesina, Alberto, and Paola Giuliano. 2015. Culture and Institutions. Journal of Economic Literature 53 (4): 898–944.

[Alesina, Giuliano, and Nunn2013] Alesina, Alberto, Paola Giuliano, and Nathan Nunn. 2013. On the Origins of Gender Roles: Women and the Plough. The Quarterly Journal of Economics 128 (2): 469–530 (May).

[Alesina, Giuliano, and Nunn2018] Alesina, Alberto, Paola Giuliano, and Nathan Nunn. 2018. Traditional Agricultural Practices and the Sex Ratio Today. PLOS ONE 13 (1): e0190510 (January).

[Alfano2017] Alfano, Marco. 2017. Daughters, Dowries, Deliveries: The Effect of Marital Payments on Fertility Choices in India. Journal of Development Economics 125 (March): 89–104.

[Almeida1961a] Almeida, Jose C. 1961a. General Economic Tables, Social, Cultural and Migration Tables, Housing and Establishment Tables, Subsidiary Tables, Part, II-B, C, IV, I-C, Vol-XXVII. Census Library, India. Accepted: 2017-04-10T10:26:47Z

[Almeida1961b] Almeida, Jose C.. 1961b. General Population Tables, Part II-A, Vol-XXVII. Census Library, India. Accepted: 2017-04-10T10:26:49Z

[Almond, Edlund, and Milligan2013] Almond, Douglas, Lena Edlund, and Kevin Milligan. 2013. Son Preference and the Persistence of Culture: Evidence from South and East Asian Immigrants to Canada. Population and Development Review 39 (1): 75–95.

[Ambrus, Field, and Gonzalez2020] Ambrus, Attila, Erica Field, and Robert Gonzalez. 2020. Loss in the Time of Cholera: Long-Run Impact of a Disease Epidemic on the Urban Landscape. American Economic Review 110 (2): 475–525 (February).

[Anderson2007] Anderson, Siwan. 2007. The Economics of Dowry and Brideprice. The Journal of Economic Perspectives 21 (4): 151–174.

[Anderson and Ray2010] Anderson, Siwan, and Debraj Ray. 2010. Missing Women: Age and Disease. The Review of Economic Studies 77 (4): 1262–1300.

[Asher et al.2021] Asher, Sam, Tobias Lunt, Ryu Matsuura, and Paul Novosad. 2021. Development Research at High Geographic Resolution: An Analysis of Night Lights, Firms, and Poverty in India Using the SHRUG Open Data Platform. The World Bank Economic Review.

[Asher, Novosad, and Rafkin2024] Asher, Sam, Paul Novosad, and Charlie Rafkin. 2024. Intergenerational Mobility in India: New Measures and Estimates across Time and Social Groups. American Economic Journal: Applied Economics 16 (2): 66–98 (April).

[Banerjee and Iyer2005] Banerjee, Abhijit, and Lakshmi Iyer. 2005. History, Institutions, and Economic Performance: The Legacy of Colonial Land Tenure Systems in India. American Economic Review 95 (4): 1190–1213.

[Barreto Xavier2022] Barreto Xavier, Ângela. 2022, September. Religion and Empire in Portuguese India: Conversion, Resistance, and the Making of Goa. Albany: State Univ of New York Pr.

[Barreto Xavier2024] Barreto Xavier, Ângela. 2024. Three Ways of Consenting in Sixteenth-Century Goa. Ler História, no. 84 (March): 79–102.

[Basu1993] Basu, Aparna. 1993. Mary Ann Cooke to Mother Teresa: Christian Missionary Women and the Indian Response. In Women and Missions: Past and Present, edited by Fiona Bowie, Deborah Kirkwood, and Shirley Ardener, 187–208. Berg Publishers.

[Bauss1997] Bauss, Rudy. 1997. A Demographic Study of Portuguese India and Macau as Well as Comments on Mozambique and Timor, 1750-1850. The Indian Economic & Social History Review 34 (2): 199–216 (June).

[Becker et al.2016] Becker, Sascha O., Katrin Boeckh, Christa Hainz, and Ludger Woessmann. 2016. The Empire Is Dead, Long Live the Empire! Long-Run Persistence of Trust and Corruption in the Bureaucracy. The Economic Journal 126 (590): 40–74.

[Becker, Rubin, and Woessmannming] Becker, Sascha O., Jared Rubin, and Ludger Woessmann. forthcoming. Religion and Growth. Journal of Economic Literature.

[Becker and Won2021] Becker, Sascha O., and Cheongyeon Won. 2021. Jesus Speaks Korean: Christianity and Literacy in Colonial Korea. Rivista di storia economica, no. 1/2021.

[Beltrán Tapia2019] Beltrán Tapia, Francisco J. 2019. Sex Ratios and Missing Girls in Late-19th-Century Europe. EHES Working Paper, p. 30.

[Beltrán Tapia and Gallego-Martínez2017] Beltrán Tapia, Francisco J., and Domingo Gallego-Martínez. 2017. Where Are the Missing Girls? Gender Discrimination in 19th-Century Spain. Explorations in Economic History 66 (October): 117–126.

[Bhalotra, Brulé, and Roy2020] Bhalotra, Sonia, Rachel Brulé, and Sanchari Roy. 2020. Women's Inheritance Rights Reform and the Preference for Sons in India. Journal of Development Economics 146 (September): 102275.

[Bhalotra et al.2019] Bhalotra, Sonia, Abhishek Chakravarty, Dilip Mookherjee, and Francisco J. Pino. 2019. Property Rights and Gender Bias: Evidence from Land Reform in West Bengal. American Economic Journal: Applied Economics 11 (2): 205–237 (April).

[Bhaskar and Gupta2007] Bhaskar, V., and Bishnupriya Gupta. 2007. India's Missing Girls: Biology, Customs, and Economic Development. Oxford Review of Economic Policy 23 (2): 221–238.

[Bisin and Verdier2024] Bisin, Alberto, and Thierry Verdier. 2024. On the Joint Evolution of Culture and Political Institutions: Elites and Civil Society. Journal of Political Economy 132 (5): 1485–1564 (May).

[Blau et al.2020] Blau, Francine D., Lawrence M. Kahn, Peter Brummund, Jason Cook, and Miriam Larson-Koester. 2020. Is There Still Son Preference in the United States? Journal of Population Economics 33 (3): 709–750 (July).

[Bocarro1992] Bocarro, A. 1992. O Livro Das Plantas de Todas as Fortalezas, Cidades e Povoações Do Estado Da Índia Oriental: Transcrição. O Livro Das Plantas de Todas as Fortalezas, Cidades e Povoações Do Estado Da Índia Oriental. Imprensa Nacional.

[Bongaarts and Guilmoto2015] Bongaarts, John, and Christophe Z. Guilmoto. 2015. How Many More Missing Women? Excess Female Mortality and Prenatal Sex Selection, 1970–2050. Population and Development Review 41 (2): 241–269.

[Borges1994] Borges, Charles J. 1994. The Economics of the Goa Jesuits, 1542-1759: An Explanation of Their Rise and Fall. Concept Publishing Company, New Delhi.

[Boxer1965] Boxer, C. R. 1965, January. Portuguese Society in the Tropics: Municipal Councils of Goa, Macao, Bahia and Luanda, 1510-1800. 1st edition. University of Wisconsin Press.

[Boxer1961] Boxer, Charles Ralph. 1961. Four Centuries of Portuguese Expansion, 1415-1825: A Succinct Survey. Witwaterstrand University Press, Johannesburg.

[Boxer1969] Boxer, Charles Ralph. 1969. The Portuguese Seaborne Empire, 1415-1825. The History of Human Society. Hutchinson, London.

[Bruhn and Gallego2012] Bruhn, Miriam, and Francisco A. Gallego. 2012. Good, Bad, and Ugly Colonial Activities: Do They Matter for Economic Development? Review of Economics and Statistics 94 (2): 433–461.

[Cagé and Rueda2016] Cagé, Julia, and Valeria Rueda. 2016. The Long-Term Effects of the Printing Press in Sub-Saharan Africa. American Economic Journal: Applied Economics 8 (3): 69–99.

[Calonico, Cattaneo, and Titiunik2014] Calonico, Sebastian, Matias D. Cattaneo, and Rocío Titiunik. 2014. Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs. Econometrica 82 (6): 2295–2326.

[Calonico, Cattaneo, and Titiunik2015] Calonico, Sebastian, Matias D. Cattaneo, and Rocío Titiunik. 2015. Rdrobust: An R Package for Robust Nonparametric Inference in Regression-Discontinuity Designs. R Journal 7 (1): 38–51.

[Calvi, Hoehn-Velasco, and Mantovanelli2022] Calvi, Rossella, Lauren Hoehn-Velasco, and Federico G. Mantovanelli. 2022. The Protestant Legacy: Missions, Gender, and Human Capital in India. Journal of Human Resources 57 (6): 1946–1980 (November).

[Carvalhal, Lucassen, and De Zwart2024] Carvalhal, Helder, Jan Lucassen, and Pim De Zwart. 2024. After Da Gama: Real Wages in Western India, c. 1500–c. 1650. European Review of Economic History 28 (3): 311–334 (August).

[Casey and Klemp2021] Casey, Gregory, and Marc Klemp. 2021. Historical Instruments and Contemporary Endogenous Regressors. Journal of Development Economics 149 (March): 102586.

[Castelló-Climent, Chaudhary, and Mukhopadhyay2018] Castelló-Climent, Amparo, Latika Chaudhary, and Abhiroop Mukhopadhyay. 2018. Higher Education and Prosperity: From Catholic Missionaries to Luminosity in India. The Economic Journal 128 (616): 3039–3075.

[Cattaneo, Idrobo, and Titiunik2019] Cattaneo, Matias D., Nicolás Idrobo, and Rocío Titiunik. 2019. A Practical Introduction to Regression Discontinuity Designs: Foundations. Elements in Quantitative and Computational Methods for the Social Sciences, November.

[Chaudhary and Garg2015] Chaudhary, Latika, and Manuj Garg. 2015. Does History Matter? Colonial Education Investments in India. The Economic History Review 68 (3): 937–961.

[Chen and Nordhaus2011] Chen, Xi, and William D. Nordhaus. 2011. Using Luminosity Data as a Proxy for Economic Statistics. Proceedings of the National Academy of Sciences 108 (21): 8589–8594 (May).

[Chi et al.2022] Chi, Guanghua, Han Fang, Sourav Chatterjee, and Joshua E. Blumenstock. 2022. Microestimates of Wealth for All Low- and Middle-Income Countries. Proceedings of the National Academy of Sciences 119 (3): e2113658119 (January).

[Conley1999] Conley, T. G. 1999. GMM Estimation with Cross Sectional Dependence. Journal of Econometrics 92 (1): 1–45 (September).

[Conley and Kelly2025] Conley, Timothy G., and Morgan Kelly. 2025. The Standard Errors of Persistence. Journal of International Economics 153 (January): 104027.

[Costa, Palma, and Reis2015] Costa, Leonor Freire, Nuno Palma, and Jaime Reis. 2015. The Great Escape? The Contribution of the Empire to Portugal's Economic Growth, 1500–1800. European Review of Economic History 19 (1): 1–22 (February).

[Coutinho1975] Coutinho, Verissimo. 1975. Goa's History of Education: A Case Study of Portuguese Colonialism. PhD Thesis, Loyola University Chicago.

[Croft1978] Croft, Thomas A. 1978. Nighttime Images of the Earth from Space. Scientific American 239:86–98.

[Das Gupta2017] Das Gupta, Monica. 2017. Return of the Missing Daughters. Scientific American 317 (September): 80–85.

[Da Silva Gracias1994] Da Silva Gracias, Fatima. 1994. Health and Hygiene in Colonial Goa, 1510-1961. Concept Publishing Company, New Delhi.

[Da Silva Gracias1996] Da Silva Gracias, Fatima. 1996. Kaleidoscope of Women in Goa 1510-1961. Concept Publishing Company, New Delhi.

[Data{Meet}2016] Data{Meet}. 2016. Indian Village Boundaries Project. Technical Report, Data{Meet}, http://projects.datameet.org/indian_village_boundaries/.

[D'Costa2007] D'Costa, Lillian. 2007. Women in Post-1961 Goa: Problems and Challenges. Campus Social - Revista Lusófona de Ciências Sociais, no. 3/4:249–255.

[de Matos2013] de Matos, Paolo Teodoro. 2013. Population Censuses in the Portuguese Empire, 1750- 1800. Research Notes. Romanian Journal of Population Studies 7 (1): 5–25.

[de Matos2011] de Matos, Paulo Teodoro. 2011. The Population of the Portuguese Estado Da Índia, 1750–1820: Sources and Demographic Trends. In Portuguese and Luso-Asian Legacies in Southeast Asia, 1511–2011, Vol. 1: The Making of the Luso-Asian World: Intricacies of Engagement, Lectures, Workshops, and Proceedings of International Conferences, 155–177. ISEAS–Yusof Ishak Institute.

[de Matos2016] de Matos, Paulo Teodoro. 2016. Counting Portuguese Colonial Populations, 1776–1875: A Research Note. The History of the Family 21 (2): 267–280 (April).

[de Oliveira Boléo1961] de Oliveira Boléo, José. 1961. A Incorporação Das "Novas Conquistas" No Estado Da Índia. Studia 8:335–390.

[de Souza1979] de Souza, Teotonio R. 1979. Medieval Goa: A Socio-Economic History. Concept Publishing Company, New Delhi.

[de Souza1990] de Souza, Teotonio R.. 1990. Rural Economy and Life. In Goa through the Ages - Volume II: An Economic History, edited by Teotonio R. de Souza, Goa University Publications Series no. 6, 78–116. Concept Publishing Company, New Delhi.

[de Souza1994] de Souza, Teotonio R.. 1994. Goa to Me. Concept Publishing Company, New Delhi.

[Dell2010] Dell, Melissa. 2010. The Persistent Effects of Peru's Mining Mita. Econometrica 78 (6): 1863–1903.

[Dell and Olken2020] Dell, Melissa, and Benjamin A Olken. 2020. The Development Effects of the Extractive Colonial Economy: The Dutch Cultivation System in Java. The Review of Economic Studies 87 (1): 164–203 (January).

[Desmet, Ortuño-Ortín, and Wacziarg2017] Desmet, Klaus, Ignacio Ortuño-Ortín, and Romain Wacziarg. 2017. Culture, Ethnicity, and Diversity. American Economic Review 107 (9): 2479–2513 (September).

[Dhar, Jain, and Jayachandran2018] Dhar, Diva, Tarun Jain, and Seema Jayachandran. 2018. Intergenerational Transmission of Gender Attitudes: Evidence from India. The Journal of Development Studies 0 (0): 1–21 (October).

[Doepke and Tertilt2009] Doepke, Matthias, and Michèle Tertilt. 2009. Women's Liberation: What's in It for Men? The Quarterly Journal of Economics 124 (4): 1541–1591 (November).

[Doepke and Tertilt2018] Doepke, Matthias, and Michèle Tertilt. 2018. Women's Empowerment, the Gender Gap in Desired Fertility, and Fertility Outcomes in Developing Countries. AEA Papers and Proceedings 108:358–62.

[Doepke, Tertilt, and Voena2012] Doepke, Matthias, Michèle Tertilt, and Alessandra Voena. 2012. The Economics and Politics of Women's Rights. Annual Review of Economics 4 (1): 339–372.

[dos Martires Lopes1994] dos Martires Lopes, Maria de Jesus. 1994. Teaching Methods in Goa (1750-1800): Jesuits and Oratorians. Chapter The Genesis of Portuguese Discoveries and their Influence on Indian Culture of , edited by Teotonio R. de Souza, 169–174. Xavier Centre of Historical Research.

[D'Souza2012] D'Souza, Carmo. 2012, January. Legal System in Goa - Volume 2 : Laws and Legal Trends. Margao: CinnamonTeal.

[Duflo2012] Duflo, Esther. 2012. Women Empowerment and Economic Development. Journal of Economic Literature 50 (4): 1051–1079 (December).

[Easterly and Levine2016] Easterly, William, and Ross Levine. 2016. The European Origins of Economic Development. Journal of Economic Growth 21 (3): 225–257 (September).

[Elvidge et al.1997] Elvidge, Christopher D, Kimberly E Baugh, Eric A Kihn, Herbert W Kroehl, and Ethan R Davis. 1997. Mapping City Lights with Nighttime Data from the DMSP Operational Linescan System. Photogrammetric Engineering and Remote Sensing 63 (6): 727–734.

[Elvidge et al.2001] Elvidge, Christopher D, Marc L Imhoff, Kimberly E Baugh, Vinita Ruth Hobson, Ingrid Nelson, Jeff Safran, John B Dietz, and Benjamin T Tuttle. 2001. Night-Time Lights of the World: 1994–1995. ISPRS Journal of Photogrammetry and Remote Sensing 56 (2): 81–99.

[Emma Maria2002] Emma Maria, Sr. A.C. 2002. Women in Portuguese Goa, 1510-1835. IRISH, Tellicherry.

[Fernandes2008] Fernandes, Aureliano. 2008. Local Power in Colonial and Contemporary Goa. Lusotopie. Recherches politiques internationales sur les espaces issus de l'histoire et de la colonisation portugaises XV (2): 151–173 (November).

[Fernández2014] Fernández, Raquel. 2014. Women's Rights and Development. Journal of Economic Growth 19 (1): 37–80 (March).

[Fernández and Fogli2009] Fernández, Raquel, and Alessandra Fogli. 2009. Culture: An Empirical Investigation of Beliefs, Work, and Fertility. American Economic Journal: Macroeconomics 1 (1): 146–177 (January).

[Ferreira2016] Ferreira, Roquinaldo. 2016. Taking Stock: Portuguese Imperial Historiography Twelve Years after the e-JPH Debate. e-journal of Portuguese History 14 (1): 54–70.

[Feyrer and Sacerdote2009] Feyrer, James, and Bruce Sacerdote. 2009. Colonialism and Modern Income: Islands as Natural Experiments. The Review of Economics and Statistics 91 (2): 245–262.

[Frigo and Roca Fernández2021] Frigo, Annalisa, and È̀ric Roca Fernández. 2021. Roots of Gender Equality: The Persistent Effect of Beguinages on Attitudes toward Women. Journal of Economic Growth, October.

[Gallego and Woodberry2010] Gallego, Francisco A., and Robert Woodberry. 2010. Christian Missionaries and Education in Former African Colonies: How Competition Mattered. Journal of African Economies 19 (3): 294–329 (June).

[Galor and Weil1996] Galor, Oded, and David Weil. 1996. The Gender Gap, Fertility, and Growth. American Economic Review 86 (3): 374–87.

[Gandhe1971] Gandhe, S. K. 1971. A Portrait of Population, Series-28. Census Library, India. Accepted: 2017-04-10T10:28:08Z

[Gerson Da Cunha1881] Gerson Da Cunha, José. 1881. The Koṅkaṇi Language and Literature. Bombay: publisher not identified.

[Giuliano2017] Giuliano, Paola. 2017, July. Gender: An Historical Perspective. Working Paper 23635, National Bureau of Economic Research.

[Giuliano and Nunn2021] Giuliano, Paola, and Nathan Nunn. 2021. Understanding Cultural Persistence and Change. The Review of Economic Studies 88 (4): 1541–1581 (July).

[Glaeser et al.2004] Glaeser, Edward, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer. 2004. Do Institutions Cause Growth? Journal of Economic Growth 9 (3): 271–303.

[Gomes2003] Gomes, Olivinho J.F. 2003. The Religious Orders in Goa (16th - 17th Centuries). Konkani Sorospot Prakashan.

[Gomes2005] Gomes, Olivinho J.F.. 2005. The Goan Village Communes. Vasantrao Dempo Education & Research Foundation,.

[Guiso, Sapienza, and Zingales2006] Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2006. Does Culture Affect Economic Outcomes? Journal of Economic Perspectives 20 (2): 23–48 (June).

[Guiso, Sapienza, and Zingales2016] Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2016. Long-Term Persistence. Journal of the European Economic Association 14 (6): 1401–1436.

[Gupta2014] Gupta, Bishnupriya. 2014. Where Have All the Brides Gone? Son Preference and Marriage in India over the Twentieth Century. The Economic History Review 67 (1): 1–24.

[Gupta, Roy, and Swamy2015] Gupta, Bishnupriya, Tirthankar Roy, and Anand V. Swamy. 2015, August. A New Economic History of Colonial India. 1st edition. Edited by Latika Chaudhary. London New York NY: Routledge.

[Heath and Jayachandran2018] Heath, Rachel, and Seema Jayachandran. 2018. The Causes and Consequences of Increased Female Education and Labor Force Participation in Developing Countries. In The Oxford Handbook of Women and the Economy. Cambridge, MA: National Bureau of Economic Research.

[Henderson, Storeygard, and Weil2012] Henderson, J. Vernon, Adam Storeygard, and David Weil. 2012. Measuring Economic Growth from Outer Space. American Economic Review 102 (2): 994–1028.

[Hickman2007] Hickman, Lisa Ann. 2007. Exploring the Impact of the Media on the Arranged Marriage and Dowry System in Goa, India. Ph.D. diss., Wilfrid Laurier University.

[Huillery2009] Huillery, Elise. 2009. History Matters: The Long-Term Impact of Colonial Public Investments in French West Africa. American Economic Journal: Applied Economics 1 (2): 176–215.

[Iannaccone1998] Iannaccone, Laurence R. 1998. Introduction to the Economics of Religion. Journal of Economic Literature 36 (3): 1465–1495.

[Ifeka1989] Ifeka, Caroline. 1989. Hierarchical Woman: The 'Dowry' System and Its Implications among Christians in Goa, India. Contributions to Indian Sociology 23 (2): 261–284.

[Imbens and Kalyanaraman2012] Imbens, Guido W., and Karthik Kalyanaraman. 2012. Optimal Bandwith Choice for the Regression Discontinuity Estimator. Review of Economic Studies 79 (3): 127–155.

[Iyer2010] Iyer, Lakshmi. 2010. Direct versus Indirect Colonial Rule in India: Long-term Consequences. The Review of Economics and Statistics 92 (4): 693–713.

[Iyer2016] Iyer, Sriya. 2016. The New Economics of Religion. Journal of Economic Literature 54 (2): 395–441 (June).

[Jayachandran2015] Jayachandran, Seema. 2015. The Roots of Gender Inequality in Developing Countries. Annual Review of Economics 7 (1): 63–88 (August).

[Jayachandran2017] Jayachandran, Seema. 2017. Fertility Decline and Missing Women. American Economic Journal: Applied Economics 9 (1): 118–139 (January).

[Kamat1999] Kamat, Pratima. 1999. Farar Far: Local Resistance to Colonial Hegemony in Goa, 1510-1912. Institute Menezes Braganza.

[Keele and Titiunik2015] Keele, Luke J., and Rocío Titiunik. 2015. Geographic Boundaries as Regression Discontinuities. Political Analysis 23 (1): 127–155.

[Khamat2002] Khamat, Varsha V. 2002. Marathi Education - Cause for Hindu Resurgence Under the Republic in Portuguese India. In Goa: Educational Institutions Through the Ages, edited by S. K. Mhamai, 88–107. Directorate of Archives and Archaeology, Government of Goa.

[Kugler and Kumar2017] Kugler, Adriana D., and Santosh Kumar. 2017. Preference for Boys, Family Size, and Educational Attainment in India. Demography 54 (3): 835–859 (June).

[Kumar, Kiran, and Gone2013] Kumar, A. Vimal, Bala Kiran, and Joseph Thambi Gone. 2013. The Impact of the Dowry System In Christian Communities. Technical Report, Dharmaram Vidya Kshetram, http://www.catholicethics.com/forum-submissions/the-impact-of-the-dowry-system-in-christian-communities.

[Kumar et al.2013] Kumar, A Vimal, Bala Kiran Vannekuty, Joseph Thambi Gone, MR Sharma, and Shaji George Kochuthara. 2013. THE IMPACT OF DOWRY SYSTEM IN THE CHRISTIAN COMMUNITIES: Report of the Field Study Conducted in the States of Andhra Pradesh, Kerala And Tamil Nadu. Asian Horizons 7 (02): 357–375.

[Kumar and Nahlen2023] Kumar, Santosh, and Bernard Nahlen. 2023. Intergenerational Persistence of Health: Evidence from India. Economics Letters 224 (March): 111023.

[Lehner2023] Lehner, Alexander. 2023, August. SpatialRDD: Conduct Multiple Types of Geographic Regression Discontinuity Designs.

[Lehner2024] Lehner, Alexander. 2024. A Note on Spatial Regression Discontinuity Designs. mimeograph, p. 56.

[Lopes Mendes1886] Lopes Mendes, António. 1886. A India portugueza; breve descripção das possessões portuguezas na Asia, dividida em dois volumes. Publicada por ordem do Ministerio da Marinha. Volume 26. Lisboa Imprensa Nacional.

[Lowes and Montero2021] Lowes, Sara, and Eduardo Montero. 2021. Concessions, Violence, and Indirect Rule: Evidence from the Congo Free State. The Quarterly Journal of Economics 136 (4): 2047–2091 (October).

[Lucassen and de Matos2020] Lucassen, Jan, and Paulo Teodoro de Matos. 2020. Goa at Work around 1850, A Source-Based Report on Labour Relations in Western India under the Portuguese. IISH Research Papers, vol. 54.

[Mallapaty2024] Mallapaty, Smriti. 2024. Three-Year Delay for Indian Census Frustrates Researchers. Nature 631 (8022): 718–719 (July).

[Malvankar2002] Malvankar, Alka. 2002. School Education in Goa during Post-Liberation Years. In Goa: Educational Institutions Through the Ages, edited by S. K. Mhamai, 88–107. Directorate of Archives and Archaeology, Government of Goa.

[Malvankar2015] Malvankar, Alka. 2015. Education and Society in Goa under Portuguese Rule. Journal of Social and Economic Development 17 (2): 298–311 (October).

[Marcocci2012] Marcocci, Giuseppe. 2012. A Consciência de Um Império: Portugal e Seu Mundo (Sécs. XV-XVII). Imprensa da Universidade de Coimbra, Coimbra.

[McCleary and Barro2006] McCleary, Rachel M., and Robert J. Barro. 2006. Religion and Economy. Journal of Economic Perspectives 20 (2): 49–72 (June).

[Meiyappan et al.2018] Meiyappan, P., P.S. Roy, A. Soliman, T. Li, P. Mondal, S. Wang, and A.K. Jain. 2018. India Village-Level Geospatial Socio-Economic Data Set: 1991, 2001.

[Michalopoulos and Papaioannou2014] Michalopoulos, Stelios, and Elias Papaioannou. 2014. National Institutions and Subnational Development in Africa *. The Quarterly Journal of Economics 129 (1): 151–213 (February).

[Mizushima Laboratory2013] Mizushima Laboratory. 2013. India Place Finder. Technical Report, Department of Oriental History, Graduate School of Humanities and Sociology, The University of Tokyo, http://india.csis.u-tokyo.ac.jp/.

[Moraes1964] Moraes, George Mark. 1964. A History of Christianity in India, from Early Times to St. Francis Xavier: A.D. 52-1542. Manaktalas.

[Neill1985] Neill, Stephen. 1985. A History of Christianity in India 1701-1858. Volume 2. Cambridge University Press.

[Newitt2005] Newitt, Malyn D. D. 2005. A History of Portuguese Overseas Expansion: 1400 - 1668. Routledge.

[Newman1984] Newman, Robert S. 1984. Goa: The Transformation of an Indian Region. Pacific Affairs 57 (3): 429.

[Nunn2010] Nunn, Nathan. 2010. Religious Conversion in Colonial Africa. American Economic Review 100 (2): 147–152 (May).

[Nunn2014] Nunn, Nathan. 2014. Historical Development. In Handbook of Economic Growth, edited by Philippe Aghion and Steven Durlauf, Volume 2, 347–402. North-Holland.

[Nunn2020] Nunn, Nathan. 2020. The Historical Roots of Economic Development. Science 367, no. 6485 (March).

[Oto-Peralías and Romero-Ávila2017] Oto-Peralías, Daniel, and Diego Romero-Ávila. 2017. Historical Frontiers and the Rise of Inequality: The Case of the Frontier of Granada. Journal of the European Economic Association 15 (1): 54–98 (February).

[Palma and Reis2019] Palma, Nuno, and Jaime Reis. 2019. From Convergence to Divergence: Portuguese Economic Growth, 1527–1850. The Journal of Economic History 79 (2): 477–506 (June).

[Pearson1981] Pearson, M. N. 1981. Coastal Western India: Studies from Portuguese Records. New Delhi: Concept Publishing Co.

[Pearson1988] Pearson, Michael N. 1988. The Portuguese in India. Volume 1 of The New Cambridge History of India. Cambridge University Press.

[Qian2008] Qian, Nancy. 2008. Missing Women and the Price of Tea in China: The Effect of Sex-Specific Earnings on Sex Imbalance. Quarterly Journal of Economics 123 (3): 1251–1285 (August).

[Ramankutty et al.2002] Ramankutty, Navin, Jonathan A. Foley, John Norman, and Kevin McSweeney. 2002. The Global Distribution of Cultivable Lands: Current Patterns and Sensitivity to Possible Climate Change. Global Ecology and Biogeography 11 (5): 377–392 (September).

[Rao2022] Rao, Nagendra. 2022. The State, Village Communities and the Brahmanas in Goa (1000–1600 Ce). Indian Historical Review 49 (1): 51–68 (June).

[Robinson2004] Robinson, Rowena, ed. 2004, February. Sociology of Religion in India. First edition. New Delhi ; Thousand Oaks: SAGE Publications Pvt. Ltd.

[Rocha, Ferraz, and Soares2017] Rocha, Rudi, Claudio Ferraz, and Rodrigo R. Soares. 2017. Human Capital Persistence and Development. American Economic Journal: Applied Economics 9 (4): 105–136 (October).

[Russell-Wood1992] Russell-Wood, A. J. R. 1992. A World on the Move: The Portuguese in Africa, Asia, and America, 1415-1808. Manchester: Carcanet Press Limited.

[Sen1990] Sen, Amartya. 1990. More than 100 Million Women Are Missing. The New York Review of Books.

[Shastri1978] Shastri, B. S. 1978. SOME ASPECTS OF THE FIRST CONQUEST OF GOA BY THE PORTUGUESE. Proceedings of the Indian History Congress 39:385–392.

[Spolaore and Wacziarg2013] Spolaore, Enrico, and Romain Wacziarg. 2013. How Deep Are the Roots of Economic Development? Journal of Economic Literature 51 (2): 325–369 (June).

[Srivastava1990] Srivastava, Harish C. 1990. Demographic History and Human Resources. In Goa through the Ages - Volume II: An Economic History, edited by Teotonio R. de Souza, Goa University Publications Series no. 6, 55–77. Concept Publishing Company, New Delhi.

[Subrahmanyam1993] Subrahmanyam, Sanjay. 1993. The Portuguese Empire in Asia, 1500-1700: A Political and Economic History. Longman.

[Subrahmanyam and Thomaz1991] Subrahmanyam, Sanjay, and Luís Filipe Ferreira Reis Thomaz. 1991. Structural Changes in European Long-Distance Trade, and Particularly in the Re-Export Trade from South to North, 1350–1750. In The Political Economy of Merchant Empires: State Power and World Trade, 1350–1750, edited by James D. Tracy, Studies in Comparative Early Modern History, 298–331. Cambridge University Press.

[Susewind2015] Susewind, Raphael. 2015. What's in a Name? Probabilistic Inference of Religious Community from South Asian Names. Field Methods 27 (4): 319–332 (November).

[Tertilt2005] Tertilt, Michèle. 2005. Polygyny, Fertility, and Savings. Journal of Political Economy 113 (6): 1341–1371 (December).

[Teso2019] Teso, Edoardo. 2019. The Long-Term Effect of Demographic Shocks on the Evolution of Gender Roles: Evidence from the Transatlantic Slave Trade. Journal of the European Economic Association 17 (2): 497–534 (April).

[Valencia Caicedo2019a] Valencia Caicedo, Felipe. 2019a. Missionaries in Latin America and Asia: A First Global Mass Education Wave. In Globalization and the Rise of Mass Education, edited by David Mitch and Gabriele Cappelli, Palgrave Studies in Economic History, 61–97. Cham: Springer International Publishing.

[Valencia Caicedo2019b] Valencia Caicedo, Felipe. 2019b. The Mission: Human Capital Transmission, Economic Persistence, and Culture in South America. The Quarterly Journal of Economics 134 (1): 507–556 (February).

[Vanjari1969] Vanjari, Shrikrishna. 1969. Goa's Village Community Lands. Economic and Political Weekly 4 (14): 612–614.

[Varde1977] Varde, P. 1977. History of Education in Goa : From 1510 to the Present Day. Panaji: Goa Vidya Pratishthan.

[Velinkar1984] Velinkar, Joseph. 1984. Jesuit Educational Style in Sixteenth Century Goa. Indica 21 (1): 17–27.

[Voth2021] Voth, Hans-Joachim. 2021. Persistence: Myth and Mystery. In Handbook of Historical Economics. Elsevier.

[Waldinger2017] Waldinger, Maria. 2017. The Long-Run Effects of Missionary Orders in Mexico. Journal of Development Economics 127 (July): 355–378.

[White1980] White, Halbert. 1980. A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. Econometrica 48 (4): 817–38.

[Xavier1993] Xavier, P. D. 1993. Goa: A Social History. Rajhauns Vitaran.

[Xue2020] Xue, Melanie Meng. 2020. High-Value Work and the Rise of Women:The Cotton Revolution and Gender Equality in China. mimeo.

# 8 Appendix: Further Results & Descriptives

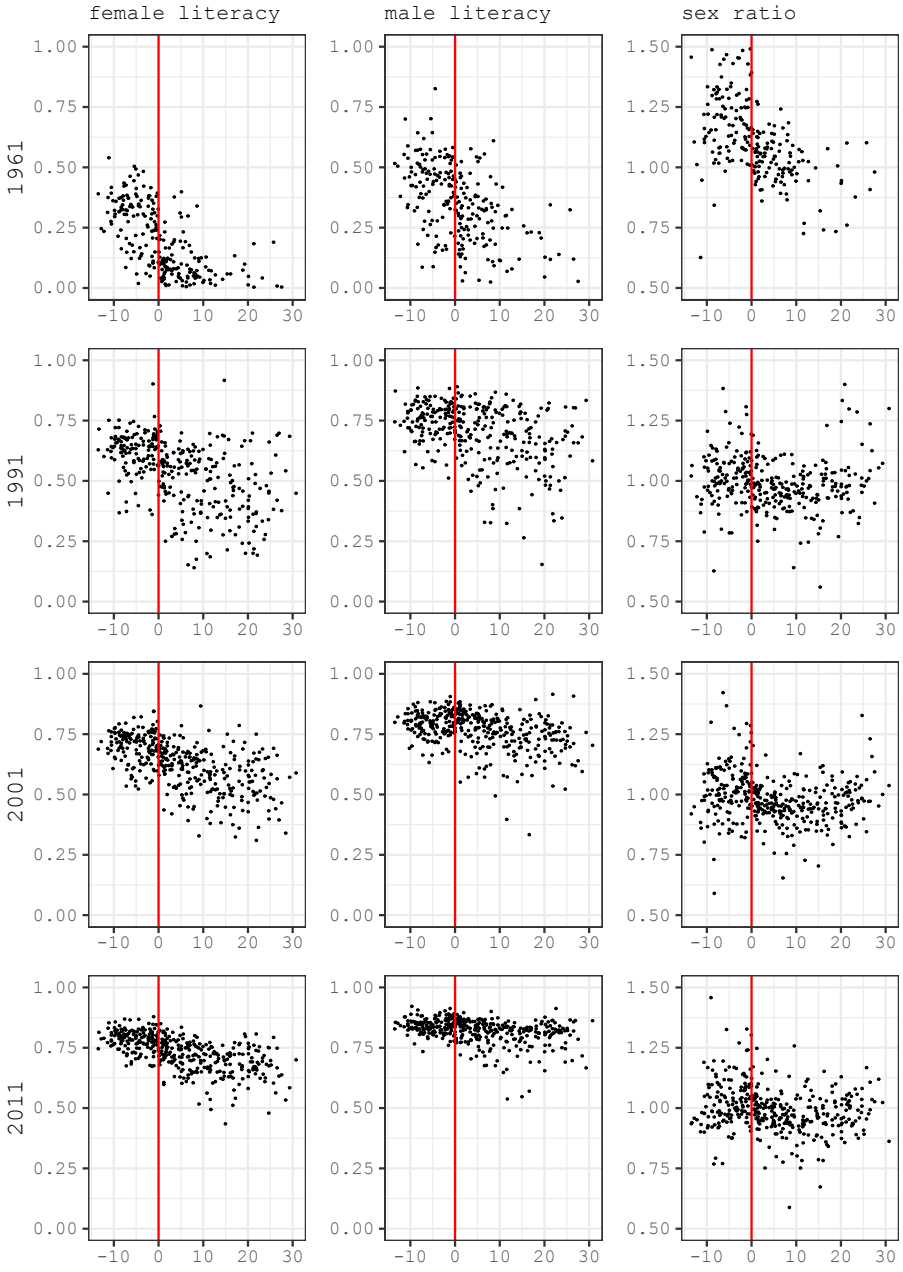


Figure 12: The full RD clouds of all villages (no binning as in the RD plots) for the main specification across all variables and time periods. One nice feature of these plots is that they clearly illustrate the gradient as one moves away from the coast. The villages in the deep hinterland with distances of 20 to 30 kilometers from the RD cutoff are on average the least literate throughout all years.

## 8.1 Further Placebo Outcomes

Table 7: Further placebo tests: No difference in infrastructure across censuses.

| | share post office | | | primary health center | | | family welfare center | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1991 | 2001 | 2011 | 1991 | 2001 | 2011 | 1991 | 2001 | 2011 |
| **I(Old Conquests)** | **0.071** | **0.192** | **0.199** | **0.135** | **0.063** | **-0.092** | **0.263** | **-0.029** | **-0.027** |
| | (0.217) | (0.239) | (0.299) | (0.269) | (0.256) | (0.247) | (0.228) | (0.232) | (0.237) |
| | [0.145] | [0.083] | [0.254] | [0.128] | [0.141] | [0.302] | [0.110] | [0.140] | [0.268] |
| | ([0.177]) | ([0.205]) | ([0.259]) | ([0.242]) | ([0.206]) | ([0.247]) | ([0.210]) | ([0.198]) | ([0.230]) |
| Observations | 97 | 89 | 69 | 90 | 86 | 82 | 106 | 92 | 85 |
| Obs [trt] | 46 | 42 | 32 | 41 | 41 | 40 | 53 | 44 | 43 |
| Obs [ctrl] | 51 | 47 | 37 | 49 | 45 | 42 | 53 | 48 | 42 |
| Moran's I [y] | 0.942 | -0.085 | 0.512 | -0.465 | -0.106 | -0.791 | -0.051 | -1.011 | -1.397 |
| Moran's I [resid] | 1.031 | -0.715 | -0.837 | -0.569 | 0.122 | -0.971 | -0.216 | -1.177 | -1.120 |
| Mean [ctrl] | 0.569 | 0.617 | 0.595 | 0.490 | 0.511 | 0.524 | 0.566 | 0.521 | 0.524 |
| Std.Dev. [y] | 0.501 | 0.491 | 0.492 | 0.545 | 0.525 | 0.527 | 0.568 | 0.524 | 0.503 |

*Note:* The shown point estimates refer to coefficient $\beta_1$ in Equation 1, depicting the local treatment effect at the cutoff. The specifications allow for different slopes of the conditional expectation functions on both sides of the cutoff. Chosen RD bandwidths minimize the MSE of the RD point estimator while allowing for different lengths on either side (`"msetwo"`, `rdrobust` [Calonico, Cattaneo, and Titiunik2015]). The three standard errors reported are (heteroskedasticity robust), [clustered at subdistrict level], ([SAC consistent ([Conley1999]), 5km bandwidth]).
The Moran's I test statistic for spatial autocorrelation was obtained using a 20-nearest-neighbor matrix. With a z-score roughly above 2 one can reject the null hypothesis of no spatial autocorrelation.

Table 8: Further placebo tests: No difference in employment structure across all recorded economic censuses.

| | share female employees | | | | share employees in services | | | | share firms owned by SC/ST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 1998 | 2005 | 2013 | 1990 | 1998 | 2005 | 2013 | 1990 | 1998 | 2005 | 2013 |
| **I(Old Conquests)** | **-0.041** | **-0.009** | **0.030** | **-0.002** | **0.033** | **0.017** | **0.029** | **-0.073** | **-0.005** | **-0.010** | **-0.034** | **-0.026** |
| | (0.049) | (0.048) | (0.050) | (0.050) | (0.097) | (0.081) | (0.084) | (0.077) | (0.060) | (0.018) | (0.040) | (0.058) |
| | [0.032] | [0.046] | [0.050] | [0.035] | [0.083] | [0.052] | [0.080] | [0.060] | [0.062] | [0.016] | [0.034] | [0.031] |
| | ([0.043]) | ([0.050]) | ([0.051]) | ([0.055]) | ([0.076]) | ([0.072]) | ([0.072]) | ([0.070]) | ([0.048]) | ([0.018]) | ([0.031]) | ([0.057]) |
| Observations | 113 | 108 | 105 | 142 | 95 | 93 | 98 | 93 | 87 | 104 | 91 | 101 |
| Obs [trt] | 55 | 55 | 54 | 70 | 44 | 43 | 49 | 45 | 40 | 53 | 43 | 49 |
| Obs [ctrl] | 58 | 53 | 51 | 72 | 51 | 50 | 49 | 48 | 47 | 51 | 48 | 52 |
| Moran's I [y] | -0.254 | 0.124 | 0.836 | 2.547 | 1.009 | 1.434 | 0.106 | -0.480 | 4.091 | 3.121 | 2.854 | 6.169 |
| Moran's I [resid] | 0.322 | 1.113 | 0.998 | 1.761 | 1.592 | -0.601 | 0.345 | 0.003 | 2.874 | 0.232 | -1.483 | 1.054 |
| Mean [ctrl] | 0.281 | 0.266 | 0.238 | 0.367 | 0.575 | 0.659 | 0.648 | 0.736 | 0.059 | 0.038 | 0.096 | 0.142 |
| Std.Dev. [y] | 0.122 | 0.113 | 0.124 | 0.153 | 0.203 | 0.193 | 0.212 | 0.182 | 0.091 | 0.047 | 0.107 | 0.135 |

*Note:* The shown point estimates refer to coefficient $\beta_1$ in Equation 1, depicting the local treatment effect at the cutoff. The specifications allow for different slopes of the conditional expectation functions on both sides of the cutoff. Chosen RD bandwidths minimize the MSE of the RD point estimator while allowing for different lengths on either side (`"msetwo"`, `rdrobust` [Calonico, Cattaneo, and Titiunik2015]). The three standard errors reported are (heteroskedasticity robust), [clustered at subdistrict level], ([SAC consistent ([Conley1999]), 5km bandwidth]).
The Moran's I test statistic for spatial autocorrelation was obtained using a 20-nearest-neighbor matrix. With a z-score roughly above 2 one can reject the null hypothesis of no spatial autocorrelation.

## 8.2 Regressions using distances to Jesuit sites

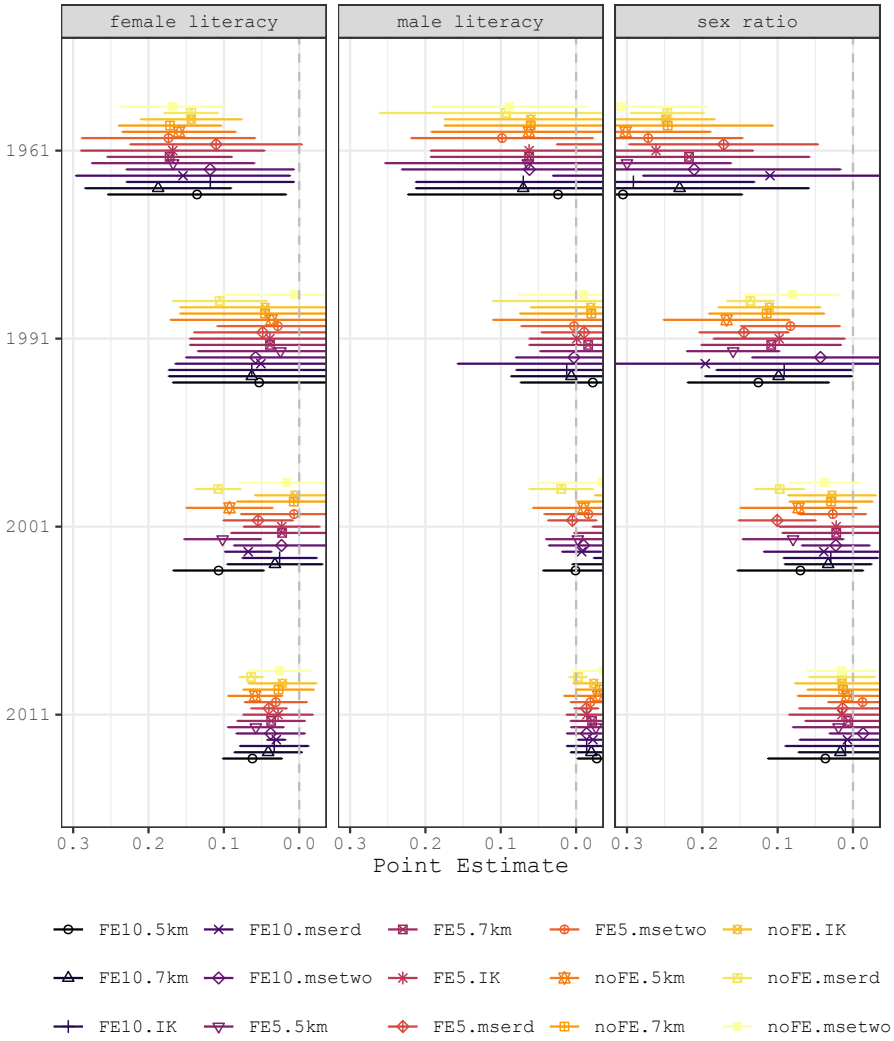


Figure 13: Placebo point estimates of various specifications combined (95% confidence intervals) when estimation is carried out on the placebo boundary shifted to the left.

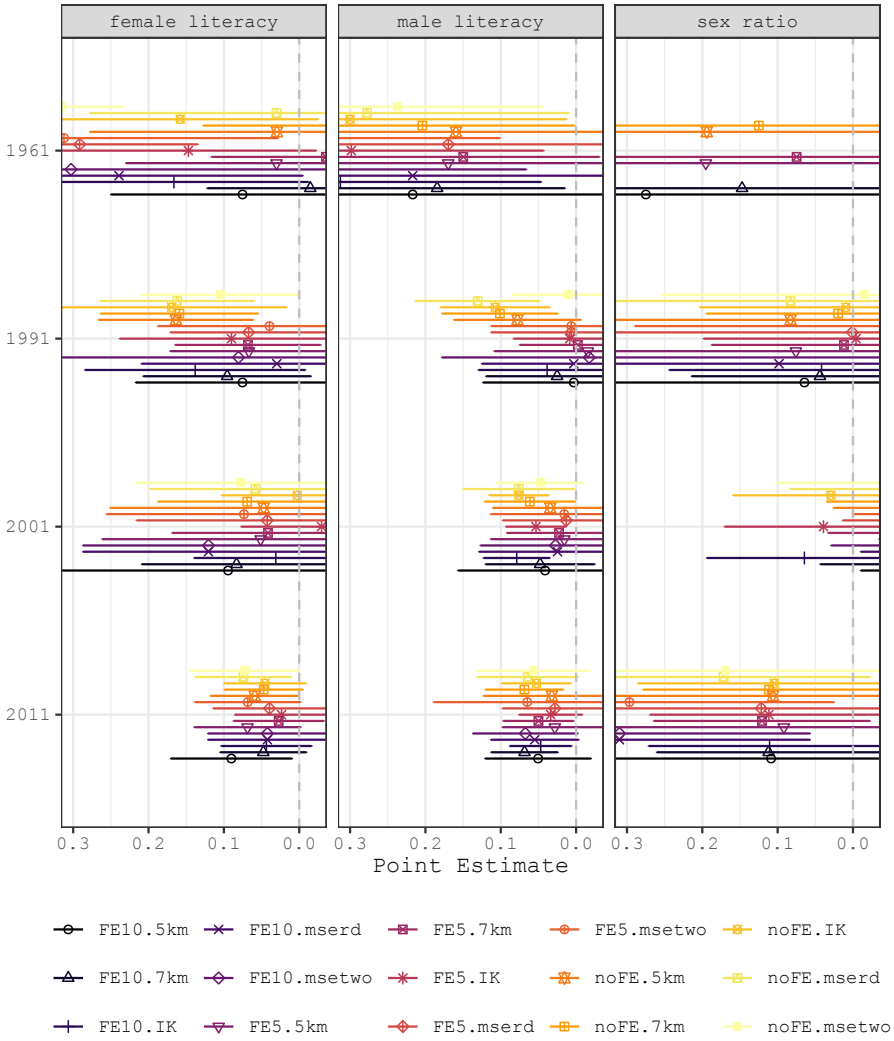


Figure 14: Placebo point estimates of various specifications combined (95% confidence intervals) when estimation is carried out on the placebo boundary shifted to the right.

Table 9: Further placebo tests: No difference in terms of outcomes pertaining to household welfare.

| | | ownership (SECC 2012) | | | | income (SECC 2012) | | |
|---|---|---|---|---|---|---|---|---|
| | RWI | land | enterprise | 4wheeler | solid roof | ag share | ag income | begging |
| **I(Old Conquests)** | **0.110** | **-0.054** | **-0.021** | **-0.008** | **-0.063** | **0.003** | **0.064** | **0.002** |
| | (0.114) | (0.067) | (0.023) | (0.006) | (0.089) | (0.034) | (0.098) | (0.002) |
| | [0.119] | [0.028] | [0.018] | [0.004] | [0.061] | [0.036] | [0.079] | [0.002] |
| | ([0.102]) | ([0.065]) | ([0.021]) | ([0.004]) | ([0.079]) | ([0.032]) | ([0.093]) | ([0.002]) |
| Observations | 110 | 108 | 105 | 89 | 103 | 88 | 87 | 94 |
| Obs [trt] | 46 | 35 | 38 | 40 | 32 | 41 | 29 | 45 |
| Obs [ctrl] | 64 | 73 | 67 | 49 | 71 | 47 | 58 | 49 |
| Moran's I [y] | 8.269 | 0.431 | -0.398 | 2.011 | 2.302 | 0.651 | -0.518 | 3.725 |
| Moran's I [resid] | 1.216 | 1.482 | -1.156 | 0.057 | -0.203 | -1.897 | -1.022 | 0.514 |
| Mean [ctrl] | 0.514 | 0.171 | 0.069 | 0.035 | 0.352 | 0.088 | 0.133 | 0.002 |
| Std.Dev. [y] | 0.347 | 0.173 | 0.070 | 0.019 | 0.231 | 0.079 | 0.207 | 0.006 |

*Note:* RWI refers to the wealth index of [Chi et al.2022]. Ownership refers to the share of people who own any given asset measured at the village level. The shown point estimates refer to coefficient $\beta_1$ in Equation 1, depicting the local treatment effect at the cutoff. The specifications allow for different slopes of the conditional expectation functions on both sides of the cutoff. Chosen RD bandwidths minimize the MSE of the RD point estimator while allowing for different lengths on either side (`"msetwo"`, `rdrobust` [Calonico, Cattaneo, and Titiunik2015]). The three standard errors reported are (heteroskedasticity robust), [clustered at subdistrict level], ([SAC consistent ([Conley1999]), 5km bandwidth]).
The Moran's I test statistic for spatial autocorrelation was obtained using a 20-nearest-neighbor matrix. With a z-score roughly above 2 one can reject the null hypothesis of no spatial autocorrelation.

Table 10: Distance regressions with control variables but no fixed effects

| | female literacy | | | | male literacy | | | | sex ratio (f/m) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1961 | 1991 | 2001 | 2011 | 1961 | 1991 | 2001 | 2011 | 1961 | 1991 | 2001 | 2011 |
| **DistJesuit** | **-0.066** | **-0.024** | **-0.027** | **-0.018** | **-0.018** | **-0.015** | **-0.014** | **-0.006** | **-0.023** | **-0.005** | **-0.031** | **-0.036** |
| | (0.008) | (0.012) | (0.007) | (0.005) | (0.011) | (0.011) | (0.006) | (0.004) | (0.017) | (0.009) | (0.008) | (0.009) |
| | [0.015] | [0.023] | [0.010] | [0.008] | [0.014] | [0.026] | [0.012] | [0.006] | [0.031] | [0.021] | [0.015] | [0.016] |
| | ([0.011]) | ([0.019]) | ([0.012]) | ([0.008]) | ([0.013]) | ([0.019]) | ([0.011]) | ([0.006]) | ([0.017]) | ([0.013]) | ([0.012]) | ([0.011]) |
| Observations | 229 | 323 | 381 | 383 | 230 | 323 | 381 | 383 | 230 | 323 | 381 | 383 |
| Moran's I [y] | 22.323 | 24.995 | 28.441 | 30.371 | 13.389 | 24.434 | 21.929 | 18.801 | 11.304 | 9.866 | 12.614 | 12.735 |
| Moran's I [resid] | 13.448 | 20.953 | 20.567 | 22.397 | 10.453 | 23.168 | 20.060 | 17.708 | 6.294 | 10.539 | 9.816 | 9.123 |
| Mean [y] | 0.195 | 0.534 | 0.629 | 0.732 | 0.355 | 0.700 | 0.768 | 0.821 | 1.119 | 0.989 | 0.983 | 0.995 |

*Note:* The shown point estimates refer to coefficient $\beta_1$ in Equation 2, reflecting the extent to which villages benefit from being closer to a historic Jesuit site. The three standard errors reported are (heteroskedasticity robust), [clustered at subdistrict level], ([SAC consistent ([Conley1999]), 10km bandwidth]).
It can be seen that spatial autocorrelation is present, which is reflected by the fact that confidence bands often more than double when appropriate standard errors are used. The Moran's I test statistic for spatial autocorrelation was obtained using a 20-nearest-neighbor matrix. With a z-score roughly above 2 one can reject the null hypothesis of no spatial autocorrelation. The mean depicts the average of the outcome variable across all villages for every census year. The standard deviation of the outcome illustrates that the effects are sizeable.

# 9 Historical Appendix

This appendix provides some more details and evidence on the channels through which the Portuguese impacted Goa.

**Christianity.** From the 16th century on, Goa, which before had experienced the presence of Hindu and Muslim rulers alike, was now subjected to probably the most dominant themes of Por-

Table 11: Distance regressions with control variables and fixed effects

| | female literacy | | | | male literacy | | | | sex ratio (f/m) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1961 | 1991 | 2001 | 2011 | 1961 | 1991 | 2001 | 2011 | 1961 | 1991 | 2001 | 2011 |
| **DistJesuit** | **-0.049** | **-0.051** | **-0.032** | **-0.028** | **-0.016** | **-0.059** | **-0.032** | **-0.017** | **-0.003** | **0.007** | **-0.022** | **-0.031** |
| | (0.016) | (0.018) | (0.012) | (0.009) | (0.021) | (0.017) | (0.010) | (0.008) | (0.029) | (0.017) | (0.014) | (0.015) |
| | [0.024] | [0.037] | [0.022] | [0.019] | [0.019] | [0.033] | [0.018] | [0.015] | [0.032] | [0.028] | [0.024] | [0.023] |
| | ([0.018]) | ([0.026]) | ([0.015]) | ([0.011]) | ([0.018]) | ([0.024]) | ([0.013]) | ([0.009]) | ([0.023]) | ([0.019]) | ([0.018]) | ([0.018]) |
| Observations | 229 | 323 | 381 | 383 | 230 | 323 | 381 | 383 | 230 | 323 | 381 | 383 |
| Moran's I [y] | 22.323 | 24.995 | 28.441 | 30.371 | 13.389 | 24.434 | 21.929 | 18.801 | 11.304 | 9.866 | 12.614 | 12.735 |
| Moran's I [resid] | 2.379 | 8.446 | 5.428 | 3.563 | -1.511 | 7.990 | 2.319 | 1.532 | -0.357 | 5.276 | 5.139 | 5.103 |
| Mean [y] | 0.195 | 0.534 | 0.629 | 0.732 | 0.355 | 0.700 | 0.768 | 0.821 | 1.119 | 0.989 | 0.983 | 0.995 |

*Note:* The shown point estimates refer to coefficient $\beta_1$ in Equation 2, reflecting the extent to which villages benefit from being closer to a historic Jesuit site. The three standard errors reported are (heteroskedasticity robust), [clustered at subdistrict level], ([SAC consistent ([Conley1999]), 10km bandwidth]).
It can be seen that spatial autocorrelation is present, which is reflected by the fact that confidence bands often more than double when appropriate standard errors are used. The Moran's I test statistic for spatial autocorrelation was obtained using a 20-nearest-neighbor matrix. With a z-score roughly above 2 one can reject the null hypothesis of no spatial autocorrelation. The mean depicts the average of the outcome variable across all villages for every census year. The standard deviation of the outcome illustrates that the effects are sizeable.

tuguese imperialism: christianization and acculturation. Temples were destroyed and churches built on top of them [see, e.g., Boxer1969]. Especially the Muslims were exposed to brutality. Even though locals were provided with incentives to convert, there were also many coercive elements [Kamat1999]. Hostilities increased especially in the first decades after 1560, when the holy inquisition was put in place also in Goa.

Quantitative evidence is virtually non-existent, but from colonial records, we know that, e.g., in 1623, in the city of Goa, there were around 60.000 Christians (roughly 40%). In the countryside, this share was much higher [Xavier1993, p. 146]. Thus the Portuguese were successful in their proselytizing endeavor.[36]

Historians often stress the integrating role the church played because it ensured continuity to some extent. The Viceroys and captains of Goa only served for several years, while an archbishop could stay decades, and clerics usually made a lifetime commitment to India. What is more, church members were pioneers in learning local languages to better convert people. This facilitated communications and interactions with locals but also meant that local languages began to be standardized [Pearson1988].

**Missionaries.** A unique feature of Portuguese colonization was that Catholic missionaries were a central element and backed by the authorities. In Goa, the most important orders were the Jesuits (Salcete, Mormugao) and the Franciscans (Bardez) [Gomes2003]. Their approach was to learn the local language (Konkani) and go to even the most remote villages to convince locals of the superiority of their faith [e.g. Alden1992]. They built residences, parishes, and schools. Especially the Jesuits were famous for their educational style [Velinkar1984]. They became influential also economically and politically [Borges1994; Alden1996], at some point even tasked to lead diplomatic missions to the Mughal court. The Jesuits played an important role not just in Goa, but in the whole Portuguese overseas empire [Subrahmanyam1993]. From [Bocarro1992], an official who wrote in the 1630s, we know that in 1625 there were around 600 missionaries based in Goa, 150 of which were Jesuits.

[36]For a later period, 1719-21, the records from HAG (Historical Archive of Goa) show more precise numbers in terms of the religious composition [Christian/Hindu/Muslim]. Tiswadi: 70,186 (62,328 C, 7,719 H, 39 M), Salcete: 66,965 (64,916 C, 2,289 H, 153 M), Bardez: 119,490 (105,206 C, 13,339 H, 900 M).

Generally speaking, the constant presence of missionaries in villages was also paramount for the transmission of lusitanian culture.[37] [Pearson1988], for example, states that the main European representative in the villages was the parish priest.[38] Their expulsion – the Jesuits by a papal bull from Rome, all others by an order of the crown several decades later – had not much to do with local events and left a temporary void in Goa [dos Martires Lopes1994].[39] For the econometric identification of the present study, this proves to be useful because the expansion of the territories was unrelated to these expulsions. Furthermore, it is thus also ensured that missionaries never entered the New Conquests. Even upon their return to Goa in the early 20th century, the orders only remained in the Old Conquests.

**Education.** While it is true that missionary education was, to a large extent, geared towards (male) elites, their sheer presence had an impact on their surroundings. It has been suggested that education was one crucial channel through which cultural conversion happened [see, e.g., Barreto Xavier2022]. For instance, the legacy of the parish schools can be seen up until today. Virtually every church has an accompanying school right next to it, establishing a clear link between religiosity and education. Even the most critical accounts of the Portuguese legacy in Goa admit that the educational model of the religious orders (especially of the Jesuits) had an impact also on the broader population [e.g. Kamat1999].

Exemplary for their determination to spread knowledge was the fact that a printing press was brought in at a remarkably early point in time in 1556 [Borges1994], and that the College of St. Paul was one of the most famous schools across the globe in its golden ages. It attracted students from Asia, Africa, and Europe. Initially it was begun "to promote the training of priests", but its scope was extended soon; as in most Jesuit institutions of the time [see, e.g., Velinkar1984].

**The Role of Women.** From the early days of conquest onwards, the Portuguese sought to restrict several elements of local culture that they did not approve of: early childhood marriages, polygamy, the interdiction of remarriage, the prohibition of property rights (girls could not inherit from their families or passed away husbands), and infanticide [Da Silva Gracias1996].[40] As noted above, sati and the tonsuring of widows were banned already in 1510. Of course, the colonizers did not seek these changes out of philanthropic motives. It was simply what they believed to be a superior way of organizing society.

Later on, the Portuguese Civil Code of 1867, which was extended to the colonies in 1869, regulated all the above-mentioned things more clearly and formally and further improved the position of women. The code was uniform for all citizens, irrespective of caste or gender. It guaranteed equality of the sexes with respect to property, protected the interests of widows and it contained

[37] [Malvankar2015] for instance writes *"Thus, education during the early half of the Portuguese regime became the instrument for the internalization of Portuguese religion and culture. The seminaries trained local priests who were despatched to different areas of Old Conquests and also to other Portuguese colonies. In the efficient dissemination of religious education during this time, the Portuguese rulers closely collaborated with the missionaries, especially the Jesuits."* and later *"The Jesuits had played a leading role in spreading Christianity and in setting up educational institutions to propagate their religious faith and acceptance of Portuguese rule, language and culture."*

[38] *"Sometimes these priests had been granted, in return for a quit-rent (aforamento), rights over a particular village. The main benefit was the right to collect tribute from the village or villages concerned. This, of course, is not a matter of a transfer of land ownership; village rights and customs were not affected."* [Pearson1988, p.111]

[39] Their facilities were handed over to the other orders and later to the government. Even upon their return in the 20th century, their activities did not extend into the New Conquests.

[40] Albeit there are no records on female infanticides in Goa, it is reported that daughters on average were treated worse than sons. They were breastfed for shorter periods and were also later on poorer fed. Male children were also provided with better medical care as well since they were regarded as an asset according to social customs. Thus the disease survival rate of boys was reported to be higher [Da Silva Gracias1994].

laws concerning the family. When Portugal became a republic in 1910, the civil code was further expanded, e.g. by the possibility to annul or divorce a marriage.

Like the caste system, the age-old (informal) institution of dowry payments, i.e. the transfer of money from the bride's family to the groom, was kept intact by the Portuguese. In fact, these payments played a role also throughout the whole 20th century and seemingly do so even today [see, e.g., Ifeka1989; Hickman2007; Kumar, Kiran, and Gone2013; Kumar et al.2013].

**Education of Women.** Early on, education of women was not very common, while in the New Conquests, it was virtually non-existent up until the late 19th century as a famous Portuguese agronomist reports [Lopes Mendes1886].

It has to be mentioned that in early times the education of women was generally neglected. Only some girls of upper strata were exposed to homeschooling. If girls benefited at all at early stages from Portuguese and missionary interventions from an educational point of view, then the historical narrative again strongly suggests that this exclusively was the case for the Old Conquests. In this process the Catholic church played a significant role, although the precise motives and channels being somewhat opaque, scholars agree on the importance of the church in this respect [Neill1985; Xavier1993; Da Silva Gracias1996; Emma Maria2002].

**Women and the Church.** As already mentioned, Catholic missionaries played a significant role in the process of raising the status of women in Goan society. Numerous letters and decrees display the concern of church officials towards the plight of women. Through their ability to influence the government substantially, several achievements have to be ascribed to their efforts – especially when it comes to the ban of polygamy and the encouragement of widow remarriages. Around the turn of the 17th century, the church started to set up several homes that served as shelters for women. At around the same time, the first nunnery was started in the city of Goa.

While women in the Old Conquests, of course, suffered from the many disadvantages that traditional societies bear on them, from the historical narratives, it is evident that their position has been elevated substantially. To corroborate this I present a few quotes from studies across different fields. The first one is from a famous Portuguese traveler and agronomist who painted a very detailed societal picture of all parts of Goa – just to show the stark cultural differences that were clearly visible to a foreign observer in the late 19th century.

> "*The woman there [the New Conquests], due to the state of social degradation to which she is condemned, will never be able to understand the great role that nature has assigned her on earth.*" [Lopes Mendes1886]

> "*It must be admitted that unlike other religions, Christianity gave their women due respect and position which was an impetus for others to reform their society. The Christian were neither treated as chattels nor were they treated as properties. Whey were not treated as as door-mats but as human beings with rights and privileges. They enjoyed the proprietary rights, they were consulted in all matters of importance, they attended all functions and so on. The position which the Christian women enjoyed was in fact a matter for envy for non Christian women. Even the Hindu reformists in the later years, became fervent adcovates to critisice the disparaged position of the Hindu women. The Portuguese themselves were instrumental to improve the position of non-Christian women through several state laws in the 17th and 18th centuries.*" [Xavier1993]

> "*Christian missionaries were the first to put women on the agenda of Indian social reform and drew attention to the low social status of women. They felt that education alone wouldc help*

*them to oppose things like sati, female infanticide, child marriage, and enforced widowhood.*" [Basu1993]

"*Historically, the Portuguese have displayed a deep concern for women's rights and their egalitarian sense has reflected itself in the people of Goa. One can see this in the equalaccess to education and the resultant freedom to choose a full time profession, the increase in the age of marriage and the Portuguese Uniform Civil Code, later called the Uniform Civil Code which gives the daughter an equal right to her father's inheritance and property.*" [D'Costa2007]

"*The State and the Curch played a significant role in upgrading their [the women's] position. The Portuguese rule seemed to have made a difference to the status of women. As a result the conditions of women in Goa were far better than their counterparts elsewhere in India.*" [Da Silva Gracias1996]

**Historical Narrative – A Quick Overview**

<table>
<tr><th>Old Conquests</th><th>New Conquests</th></tr>
<tr><td colspan="2">• Uniform institutional set-up: village level organization remains unchanged, caste hierarchies in place everywhere (also for Christians), dowry payments, ...</td></tr>
<tr><td>• Conquered in 1510 (Tiswadi) & 1543 (Bardez, Salcete/Mormugao)<br>• Experienced the heydays of the Portuguese Estado da Índia where the so-called "golden Goa" had supposedly up to 100.000 inhabitants<br>• Network of parishes/schools from early days<br>• Mass conversions (yet, two main institutions remained: caste system & dowry payments)<br>• College, printing press<br>• Sati, polygamy, early childhood marriage curbed from early 16th century on<br>• Women can inherit and remarry already in the 16th century</td><td>• Acquired/gifted in peculiar ways in different stages in 2nd half of 18th century<br>• No "early" economic impetus since the Portuguese thalassocracy was already at the bottom when these parts were acquired<br>• Catholic orders never enter<br>• Religious freedom, no conversions, Hindu identity retained<br>• Education at village level mostly through temples<br>• Polygamy and early childhood marriage up until the 20th century.<br>• Laws improving the position of women being implemented from late 19th century on</td></tr>
<tr><td colspan="2">• Uniform civil code of 1867 (still in place, makes Goa the only state so far in India which has a uniform civil code, applying to all people across religions, female and male)<br>• From 1961: uniform public goods provision by the Indian government (schools, electricity,...)</td></tr>
</table>

Table 12: An overly simplified sketch of the two historically distinguishable parts of Goa.