Culture, Institutions, and the Roots of Gender Inequality: 450 Years of Portuguese Colonialism in India

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Abstract

When are economic phenomena persistent over time, and when are they not? If they are, do inequalities persist forever, or do they converge, and if so, at what speed? By analyzing the Indian state of Goa, this research makes use of a historical quasi-natural experiment to study the effect of Portuguese (catholic) colonialism. To achieve econometric identification, I apply a spatial regression discontinuity design alongside a border that was abandoned in the 18th century. This provides a rare opportunity to isolate and identify the effect of culture, holding constant geography, income, and institutions. I establish that historical disparities in female education can be overcome, albeit much slower than for males. In contrast, male-biased sex ratios stay virtually unchanged - highlighting the differential degree persistence of deeply rooted preferences.

Keywords:	Path Dependence, Gender Inequality, Male Favoritism, Culture vs. Institutions, Colonialism, India, Portuguese Empire, Spatial RDD.
JEL Codes:	F54, I24, I25, J16, N35, O15, O43, Z12.

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. Yet, very little is known under which circumstances these effects are persistent throughout time, how long they matter, and when, if at all, inequalities induced by certain events or policies vanish.

One crucial channel for economic development through which path dependence can operate is the status and position of women in society, broadly speaking. Even though gender aspects are essential when it comes to long-run economic development [Duflo, 2012; Giuliano, 2017], we still understand surprisingly little about the origins and roots of certain gender inequalities and, even more importantly, how they evolved over time. Especially in poor countries gender gaps favoring males - be it in terms of education, autonomy, or health - are more pervasive [Jayachandran, 2015]. Economic development and large-scale economic growth throughout the last decades have helped a great deal. Nevertheless, many disparities still exist, even within single countries that operate under the same constitution and experience the same economic shocks. Arguably the most important one appears to even worsen with economic development: male son preference and the implied male-skewed sex ratios[1] [Jayachandran, 2017].

By analyzing the Indian state of Goa, this paper makes use of a historical quasi-natural experiment to demonstrate the persistent effect of Portuguese (catholic) colonialism in a South-Asian context. To obtain causal estimates using the most recent village level census data, I redraw a border that was abandoned 250 years ago and apply a spatial regression discontinuity design (RDD). I then use this identification device to go further. After digitizing and cross-linking censuses from 1961 (the time of independence) to 2011, I am able to use a differences in spatial discontinuities strategy to study the differential persistence of three key socio-economic variables: female literacy, male literacy, and sex ratios. I establish that discontinuities in male literacy converge within roughly one generation once primary education is provided at a large scale. Gaps in female literacy do converge as well, but at a much slower speed. Male son preference, on the other hand, seems to be extremely rigid: discontinuities in sex ratios appear not to have moved at all throughout the last decades.

After being the first European power to round the southern tip of Africa in 1497, the Portuguese established the capital of their subsequent seaborne empire in the Indian Ocean, the so-called *Estado da Índia*, in Goa in 1510. From then on, it was uninterruptedly ruled for 450 years and thus makes it the longest constantly colonized piece of land in younger human history. After initially holding only the port town and its surroundings, around 1540 they decided to occupy larger parts of land in a north-south direction in order to have a buffer zone. These areas constitute the *Old Conquests*, and this was where the unique Portuguese colonization strategy unfolded. Unlike other usurpers in the Indian Ocean, like the Dutch or the British with their trading companies, the Portuguese interacted with the autochthonous people. Intermarriage of their soldiers with local women was encouraged in order to create a

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[1]Armatya Sen famously highlighted this problem and spoke of 100 million missing women [Sen, 1990]. Recent demographic estimates suggest that currently around 60 million women are missing in India. The problem is very similar in China, but also in many other areas around the globe [Das Gupta, 2017]. Bongaarts and Guilmoto [2015] estimate that the *annual* number of newly missing females will remain above 3 million every year until 2050.

loyal local population and extend the cultural influence. Furthermore, efforts were made to convert the populace to Catholicism. They were always accompanied by monks and priests, for that matter, which belonged to specific religious orders: Franciscans, Dominicans, and, most importantly, the Jesuits. They built churches, a college, set up a network of parish schools, introduced structured education, and even brought the printing press.

More importantly, the Lusitanians significantly - and more or less unintentionally it has to be noted - altered the position of women in society right from 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 from then on. This was conditional upon marrying a Christian and thus served as an additional incentive to convert. A further break with local cultural norms was marked by widows being allowed to remarry.

The so-called *New Conquests*, on the other hand, were taken at a much later stage and also did not experience any of the aforementioned cultural interventions. Around 1780 the Portuguese, albeit being economically and militarily already very weak, managed to extend the territory of Goa by seven sub-districts. These extensions were due to gifts from neighboring rulers and the 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. A bit later, in 1839, all remaining religious orders were forbidden. Moreover, the people of the *New Conquests* were guaranteed religious freedom because the colonial government could not afford to pick up a fight with the landowning upper caste Hindus in those newly gained territories. It is thus ensured that the early missionaries did not carry out activities of any sort in those new dominions and none of the aforementioned cultural changes regarding females were propagated.

Even though the same institutional set-up was in place in all of Goa[2] - this also includes informal institutions such as the cast system and dowry payments, which stayed in place also for Christians after conversion - the hinterlands were neglected when it comes to government expenditure. This naturally affected the *New Conquests* more, as most of them are farther inland. As time passed by, the result was a noticeable inequality between the two areas also when it comes to infrastructure. At the time India drove out the Portuguese colonizers in 1961, only a few percent of villages had electricity and many had no public schools. The Indian government stepped in with large scale infrastructural investments, however, and managed to equalize public goods provision throughout all of Goa at a remarkable speed.

Instead of being a threat to my identification strategy, I view this variation as a feature of the "kitchen sink" treatment that allows me to asses the speed of convergence once infrastructure (which includes the number of schools) gets equalized across space.

Average literacy rates at a village level grew from roughly 35% to over 80% in the *Old Conquests* from 1961 to 2011. In the *New Conquests* they grew even faster from 20% to over 75%. I document that the remaining difference between these two areas is entirely explained by a gap in female literacy rates. Moving to the described RD border in order to document causal effects, I show that the discontinuity in male literacy rates stood at roughly 11 percentage points and vanished completely in the 1990's until it is not observable anymore in the census of 2001. Female literacy rates show a similar pattern, albeit at a slower pace.

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[2]It shall be noted that this uniform Portuguese institutional setting, centered around the civil code of 1871 - based on the Code Napoleon, was quite unique and is still in place up until today. It makes Goa the only state so far in India which has a uniform civil code that applies invariably to *all* people, independent of religion or gender.

After an initial gap at independence of 14 percentage points, my RD estimates still show a measurable gap of four percentage points in 2011.

Sex ratios have worsened on average in the entire state of Goa throughout the last decades because of economic opportunities that attracted more male than female migrants. As discussed below, this does not affect the credibility of my research design that focuses only on a small part of the state in its hinterland. My identification device still allows me to obtain credible estimates. I demonstrate that there is also a significant discontinuity in sex ratios that shows a male-bias in the *New Conquests*, while the ratio on the other side of the borer is roughly normal. Unlike with literacy rates, though, I document that there is no convergence and the gap remains at roughly 80 more women per 1000 men.

I trace this back to deeply rooted cultural preferences that were altered by the Portuguese throughout 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 ensured the dissemination of educational and gender norms throughout space. Once education became uniformly available in all of Goa, boys and girls were almost equally sent to schools, even though for the latter the process was more rigid and there are still observable gaps. I thus conclude that educational gaps can be overcome relatively fast, despite large scale and long-lasting historical differences between areas. Economic development and infrastructural investments alone, though, seem to be rather ineffective when it comes to cultural norms that are more deeply rooted in the context of patriarchal societies. The village level analysis of this paper shows that male-biased sex ratios do not fade in the process of modernization.

I further try to convince the reader that these results are not driven by "being Christian" alone. We should rather view the documented phenomena as something that is present at the level of the village communities. This is elicited by the fact that the distribution across space of the educational gender gap between men and women for Hindus and Muslims, the former constituting the main religious group in contemporary Goa, is systematically different in the *Old Conquests* as shown by non-parametric statistical tests in the final part of the paper.

From an econometric standpoint, this set-up and the outlined historical peculiarities have many nice features that ensure credible identification. Most persistence studies are constrained to exploit variation across geographic dimensions[3], sometimes even at large scales. For the present study, though, the border that is used as the RD cutoff has a length of only roughly 50 kilometers in a north-south direction. Therefore, the analysis is constrained only to a very homogeneous and spatially confined environment.
Furthermore, 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 that happened in Goa, but was exogenously imposed. Even more importantly, it also predates the onset of large scale economic growth and was thus not a function of any societal process that was already ongoing.

The key regression discontinuity identifying assumption is that all relevant factors besides treatment vary smoothly at the boundary between the *Old & New Conquests*. I show that this is the case: the compared villages have roughly the same number of households and

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[3]Where econometric concerns would most importantly pertain to endogeneity, but these studies are often also affected by correlated error structures, thus violating basic orthogonality assumptions [see e.g. Kelly, 2019; Voth, 2021, for discussions].

inhabitants, the same size, and a similar occupational structure. Moreover, environmental and climatic variables such as agricultural suitability, the ruggedness of the terrain, temperature, or rainfall exhibit no discontinuity at the cutoff. Yet, there could be four major concerns that something other then the Portuguese cultural influence drove the observed discontinuities in literacy rates and sex ratios.

First, the difference between the two sides of the border could have been there before the colonizers arrived. Of course there exists no data prior to their arrival other than exogenous environmental variables since there were no structured records. And even if there were, they would most probably have not survived the conquest by the Portuguese. I thus provide historical narratives that show that the actual cultural boundary at the time reached way farther up and down the coast, and until the mountain range in the hinterland. Therefore, the border that is used for the RD had no prior meaning.

Second, something else during the Portuguese reign could have caused the observed discontinuities. To address this, I use the earliest colonial census available on a village level and show that sex ratios were already biased in favor of males in the *New Conquests* while they show no anomaly on the other side (literacy rates were unfortunately not recorded back then).

The third concern regards the movement of people. As I compare mostly small villages in the hinterland, this is generally less of an issue. Of course people were free to move, but these out-migrations took place because of employment opportunities to the urban centers on the coast, or later to Mumbai, the Gulf, and the colonies in Africa. There is a period where temporary outmigration was selective (the 1961 census, which is explained in section 3), but generally there is no reason to believe that in- or out-migration patterns were different for villages on one side of the border. The same holds true for selective migration just on the other side of the border: there were no economic incentives to do this as the institutional and legal setting was the same. Disaggregate religious estimates constructed from electoral roll data confirm this interpretation. More generally, one could argue that if there was strong migration, then discontinuities would have smoothed out over time and we would not observe a discontinuity but a smooth gradient that decays for instance with distance to coast (which is the case for many other variables that are presented in the balancing checks).

Fourth, it could be that discontinuities developed because of differences in income. To disprove this, as a placebo check in subsection 5.4, I use satellite night data, which is arguably the most reliable measure for income at a very disaggregated level in India. I show that there is a smooth gradient of income that declines as one approaches the mountain ridges in the hinterland of Goa. Comparing 1992 - the first year for which this data is available - with 2011, one can see there was a slight premium in terms of growth rates for being closer to the coastline. Thus places in the *Old Conquests* seem to have grown slightly more. Yet, the growth rate of female literacy in the *New Conquests* was larger and sex-ratios did not move. Therefore, income seems to be largely unrelated to these processes in Goa. So is the tourism industry that developed in the last decades and evolved to a major economic factor. It pertains mostly to coastal areas and the beaches, not penetrating the hinterland.

Finally, the public goods provision and infrastructural investments by the Indian government after independence have to be examined. As already mentioned, and discussed in more detail in section 2, the Portuguese started to build schools in the 19th centuries. In 1961 there were significantly more schools in the *Old Conquests*, while education on the other side was carried out the same way as it was the centuries before, namely within village communities through the temples.

Instead of being a problem to worry about, this is rather a feature of the study. It allows me to measure the differential degrees of persistence of female vs. male educational gaps, once educational opportunities are equalized due to large scale government investments.

While important literature on gender equality has so far focused on the effect of institutions on gender equality [Doepke and Tertilt, 2009; Doepke, Tertilt, and Voena, 2012; Fernández, 2014], cultural channels received less attention. This is partly due to the fact that variation in culture is much more difficult to credibly exploit as it typically also varies across geographic dimensions and is therefore influenced for instance by economic factors, climate, and other environmental characteristics. Thus, econometric problems such as endogeneity become much more of a concern. This paper uses a set of historical peculiarities in order to overcome these issues by isolating the role of culture while holding constant geography, income, and institutions.

By examining the long-run effect of Catholic colonization in a South-Asian context, this research establishes that deep-rooted cultural norms regarding education and gender might interact differentially with modern-day laws and policies and therefore have a diverse effect on observable outcomes today. I am thus contributing to a novel strand that tries to investigate the interaction of culture and institutions, something that is still not well understood by economists [as has been recently argued by Alesina and Giuliano, 2015]. Along the same lines, this paper also naturally relates to a very recent first effort to try to understand when cultural factors are persistent and when they are more likely to change [Giuliano and Nunn, 2021]. More generally, it attaches to the literature that studies the role of culture in connection with gender norms [e.g. Alesina, Giuliano, and Nunn, 2013; Fernández and Fogli, 2009].

Furthermore, this article also relates to the literature on the evolvement and importance of female agency [4]. More generally it attaches to recent studies that investigate the historical roots of gender inequality [e.g. Xue, 2020; Frigo and Roca Fernández, 2021]. Especially in the context of developing countries, it is paramount to understand the roots of gender inequality [see e.g. Jayachandran, 2015, for a recent survey]. In numerous studies that examine the strong correlation between women empowerment and economic development, it is typically not clear in what direction the causation goes and whether the interrelationship is self-sustaining [Duflo, 2012; Doepke et al., 2012]. A common identification problem is that efforts toward the improvements of 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" regarding the improvement of the female position in society. These pre-date 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" towards modern day gender discrimination, holding institutions and environment constant. I can also out-rule that there are any channels regarding higher female wages (or comparative labor market advantages) and their positive implications at play [see e.g. Galor and Weil, 1996; Xue, 2020; Qian, 2008].

More specifically, the study relates to the pressing problem of male son preferences which

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[4]Starting off more than two decades ago with the theoretical contribution by Galor and Weil [1996]. Important contributions being Doepke and Tertilt [2009], Fernández [2014], Doepke and Tertilt [2018], among others. Tertilt [2005] documents the effect of banning polygamy (polygyny). Heath and Jayachandran [2018] document the effect of increased female education. Dhar, Jain, and Jayachandran [2018] documents the intergenerational persistence of gender attitudes that was also present in the Goan context.

result in male skewed sex ratios [as pointed out by Sen, 1990][5]. Several studies pointed out the important role for culture on the deep roots of male son preferences [Abrevaya, 2009; Almond, Edlund, and Milligan, 2013]. 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 developing countries[6] [Anderson and Ray, 2010; Das Gupta, 2017]. Son preference stems from economic and cultural factors that have long influenced the perceived relative value of women in these regions and resulted in millions of "missing girls". The observed patterns of gender discrimination have been long practiced by families as a way to control the number and sex composition of their offspring [Bhaskar and Gupta, 2007; Gupta, 2014]. Recent research indicates that these biased sex-ratios don't improve as countries develop and being poor is insufficient to explain them [see e.g. Jayachandran, 2017].

Contrary to my study, very recent sociological research argues that religion played an ambiguous role in the early-modern onset of Portuguese colonialism, as compared to other cases where religion is highlighted as a strong marker and maker of cultural difference [Henn, 2014]. This stems mostly from the fact that in Goa things seem to be somewhat molten together: Christian converts kept a lot of Hindu practices up until today (e.g. the dowry system, clothing, ...). I am trying to convince the reader that, even though Hindu and Christian culture seems to be somewhat molten together, what mattered most for contemporary economic outcomes was the common historical experience of those families and villages in the *Old Conquests*. My study argues that, albeit having no clear measurable impact during early stages apart from the differential sex-ratios, the historical experience turned out to be important once education became widely available after the liberation in 1961. A certain set of beliefs toward education and the status of women was conducive for the appreciation of education and made people more likely to send their kids to school. This effect through missionaries on education was already shown to be important in the Latin American context by Valencia Caicedo [2019] and Waldinger [2017].

Broadly speaking, I am contributing to the persistence literature that tries to link historical events to contemporary economic outcomes, emphasizing the importance of history for economic development, as e.g. summarised by Nunn [2009, 2014], Spolaore and Wacziarg [2013]. A plethora of studies documents inequalities in many dimension that were induced by historical shocks, yet, it is generally not clear how long these effects last, or if they vanish at all. I demonstrate that discontinuities that are plainly induced by a centuries long neglect from officials can be overcome within roughly a generation, given that institutions and government spending are equal (the literacy rates). Culturally induced differences which have deeper roots, on the other hand, are seemingly impossible to overcome without any additional efforts (the biased sex-ratios).

Within this sub-field, the present study tries to assess the long-term impacts of colonialism in the specific context of the Portuguese seaborne empire [the historical seminal study still being Boxer, 1969] and the Indian Ocean trade[7]. Contributions focusing on Asia in this respect almost exclusively study the impact of Britain's influence in India [Banerjee and Iyer, 2005; Iyer, 2010; Gaikwad, 2014]. Recently, there is some work that tries to asses the long-

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[5]Sen spoke of 100 million missing women. Recent demographic estimates suggest that currently around 60 million women are missing in India. The problem is very similar in China.

[6]Recent work also tries to understand this problem in the history of Europe [e.g. Beltrán Tapia, 2019; Beltrán Tapia and Gallego-Martínez, 2017].

[7]And thus also generally relates to previous work investigating the impact of colonialism and colonial investments as in Feyrer and Sacerdote [2009], Huillery [2009], Bruhn and Gallego [2012].

term impacts of Protestant missionaries in the territories of the British East India Company [Mantovanelli, 2013], and of colonial educational investments therein [Chaudhary and Garg, 2015; Castelló-Climent, Chaudhary, and Mukhopadhyay, 2017]. Supposedly one reason why not much attention was paid so far to Lusitanian legacies, was that the Portuguese empire was a "forgotten empire" amongst historians and even more so amongst economic historians up until recently [Marcocci, 2012, p. 33]. Arguments, explanations and a description of the development in the field of Portuguese "overseas history", including a summary of the 2003 e-JPH debate are described in detail by Ferreira [2016].

The remainder of the study is organized as follows. After giving a brief introduction into Goan and Portuguese overseas history, section 3 describes the data. Section 4 describes the econometric framework and verifies all the necessary assumptions. Sections 5 and 6 discuss results. Section 7 concludes.

2 A Short History of Portuguese Colonization in Goa

The contemporary state of Goa, the 25th of the Indian Union, admeasures an area of only around 3700 square kilometres and 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 kilometres in an east-west direction and extends to a length of about 105 kilometres from north to south. To the east, Goa (and the whole Konkan) are 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 shaped their unique history. For the present study this feature is useful, as it ensures that there was historically very 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. Since more than 100 years the share of Christians is 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 neighbours' 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.

2.1 Portuguese Conquest

The Portuguese were the first European power to arrive and the last one to depart from the sub-continent of India. Their 450 year long stay thus marks one of the longest uninterrupted periods of colonisation in recent history. The lusitanian adventure 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. 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 [Shastri, 1978; Pearson, 1988]. 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*.
It soon became the capital of the Portuguese *Estado da Índia* and rose to one of the world's most magnificent cities of the 16th century. It became an important trading post that con-
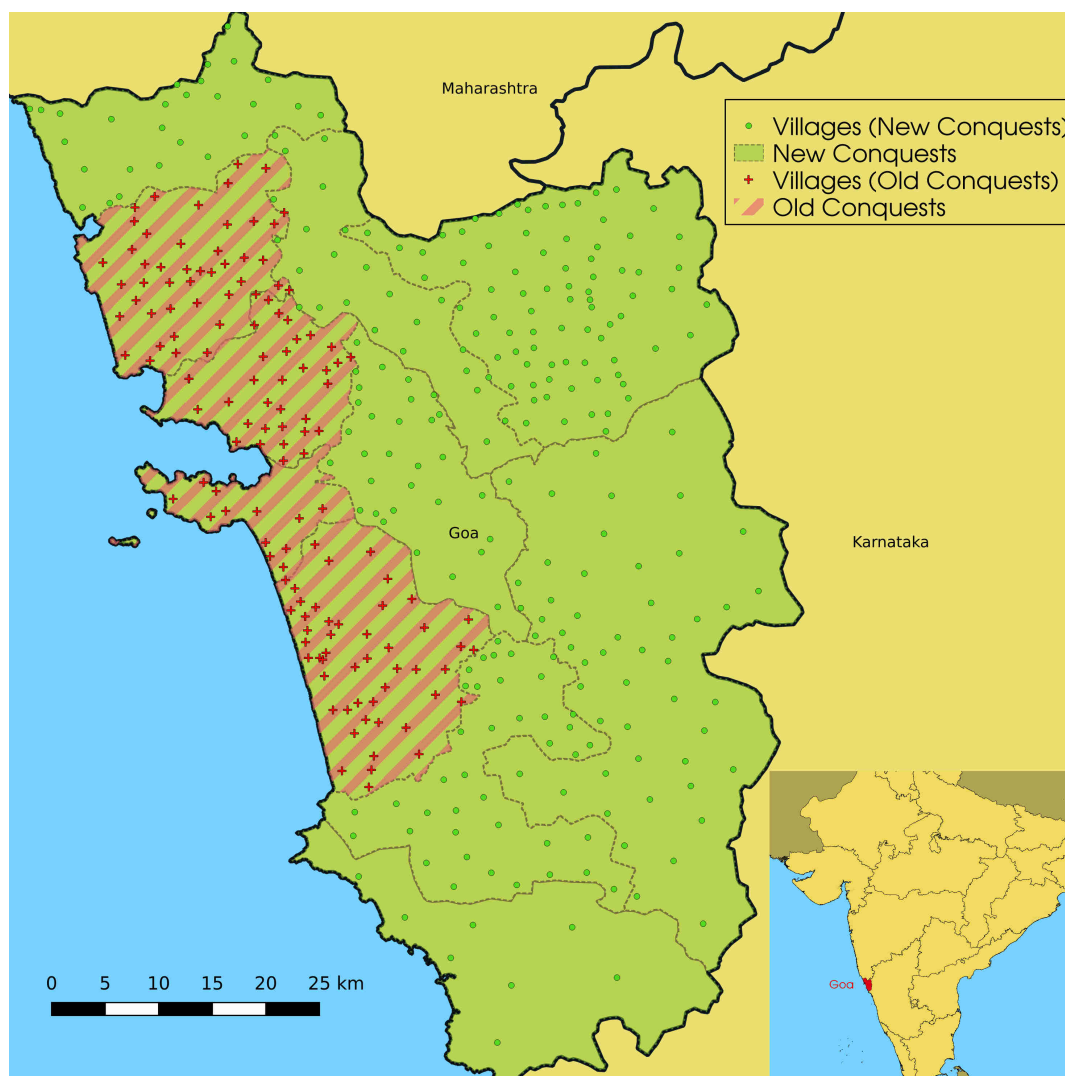
Figure 1: The location of Goa on the Indian west coast. The dots refer to the effective sample in 2011.

nected China, Japan, the Moluccas (the famous "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 [Srivastava, 1990]. 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. 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-Wood, 1992], 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.

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 [8] [see e.g. Gerson Da Cunha, 1881]. 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 village institutions, the so-called *Gaunkaris* (or *Communidades*), around which economic and social life was organized, were left in tact because the European colonizers realized their importance to control affairs in the rural economy [see e.g. Vanjari, 1968, for details]. 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'Souza, 2012]. Its origins are known to exist since before any modern state every came into existence in this area [Gomes, 2005; Robinson, 2004]

The key feature of the Portuguese colonizing "strategy" - as opposed to all other European 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 which is loyal to the colonial government and thus reduce the potential for uprisings and revolts. 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. Prior to that, women were burned on the pyre of their dead husband. 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 Gracias, 1996].

2.1.1   The New Conquests of Goa

Even though the seaborne empire was in decline since around 1600 [Newitt, 2005], the Portuguese managed to extend their territory in the late 18th century. These expansions were not due to military power, but rather because of several fortuitous incidents: the Marathas to the north receiving pressure by the expanding Mughal Empire and skirmishes of the territories in the neighbouring south and east with the Kingdom of Mysore.

By 1788 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 kilometres, the *New Conquests* a little under 3000. The attitude towards the autochthonous people was quite different than during

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[8]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 [Moraes, 1964, p. 278]

the 16th century. Hindus were guaranteed religious freedom, but they were subject to the Portuguese legal code - even though a few exceptions for residents in the newly acquired territories were made. One reason for this change of sentiment was the fact that Goa was dependent on agricultural produce from these areas and thus did not want to upset the local land owners. 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 Souza, 1990; Gomes, 2003, p 107].

Goa remained lusitanian until the 19th December of 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.
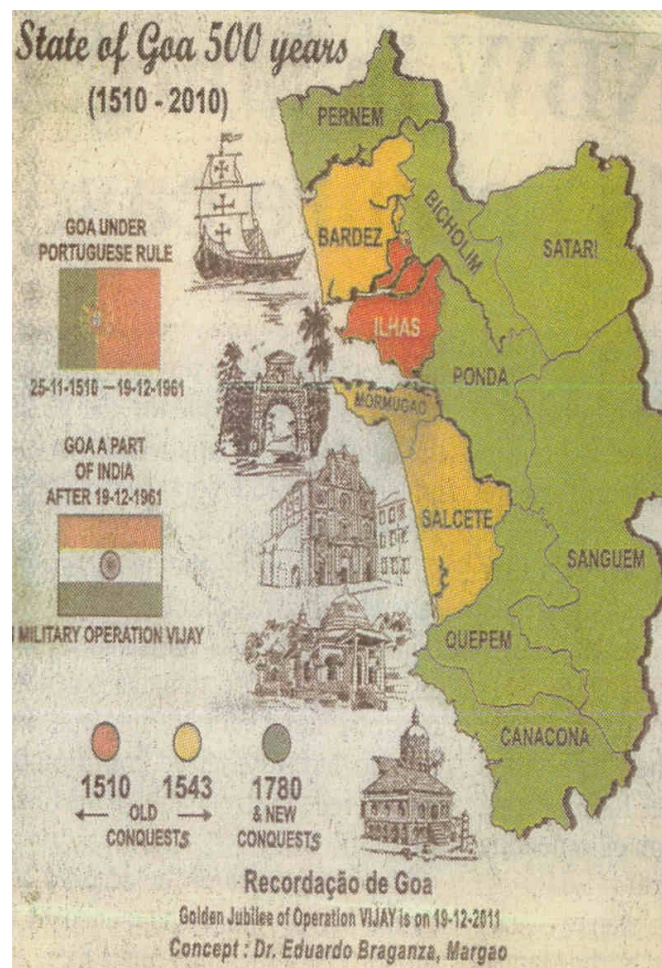

Figure 2: The expansion of Goa

2.2 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. The latter were subject to the same civil code, though. Furthermore, like in the case of the early conquests in the 16th centuries, the village system, lying at the core of how economic and social life is carried out, remained untouched. The institutional set-up in this sense was thus virtually similar throughout all of 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 Portuguese imperialism: christianization and acculturation. Temples were destroyed and churches built on top of them [see e.g. Boxer, 1969]. Especially the Muslims were exposed to brutality. Even though locals were provided with incentives to convert, there were also many coercive elements [Kamat, 1999]. 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 [Xavier, 1993, p. 146]. Thus the Portuguese were successful in their proselytizing endeavor[9].

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) [Gomes, 2003]. Their approach was to learn the local language (Konkani) and go to even the remotest villages to convince locals of the superiority of their faith [e.g. Alden, 1992]. They built residences, parishes, and schools. Especially the Jesuits were famous for their educational style [Velinkar, 1984]. They became influential also economically and politically [Borges, 1994; Alden, 1996], at some point even tasked to lead diplomatic missions to the Mughal court.

Generally speaking, the constant presence of missionaries in villages was also paramount for the transmission of lusitanian culture[10]. Their expulsion - the Jesuits by a papal bull from Rome, all others by an order of the crown several decades later - had nothing to do with local events and left a temporary void in Goa [dos Martires Lopes, 1994]. 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*.

Education. While it is true that the missionary education was to a large extent geared towards (male) elites, their sheer presence had an impact on their surroundings. 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

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[9]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).

[10]Malvankar [2015] 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."*

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. Kamat, 1999].

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 [Borges, 1994], and that the College of St. Paul was one 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. Velinkar, 1984].

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[11] [Da Silva Gracias, 1996]. As already 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 (Christian) women. The code was uniform for all citizens, irrespective of caste or sex. It guaranteed equality of the sexes with respect to property, protected the interests of widows and it contained laws concerning the family. Hindus generally were subject to the so called *Codigo dos Usos e Costumes* (in the *New Conquests* it was promulgated in 1853). 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 supposedly do so even today [see e.g. Ifeka, 1989; Hickman, 2007; ?].

2.2.1 Education of Women

Early on, education of women was not very common, while in the New Conquests it was literally non-existent up until the late 19th century as a famous portuguese agronomist reports [Lopes Mendes, 1886] [12].

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 home schooling. If females benefited at all at early stages from Portuguese and missionary's 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

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[11]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 Gracias, 1994].

[12]An exception were the so-called Bailadeiras.

of the church in this respect [Neill, 1985; Xavier, 1993; Da Silva Gracias, 1996; Emma Maria, 2002]

2.2.2 Women and the Church

As already mentioned, Catholic missionaries played a significant role in the process of raising the status of women in the Goan society. Numerous letters and decrees display the concern of curch 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 towards 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 Mendes, 1886]

> "*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.*" [Xavier, 1993]

> "*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.*" [Basu, 1993]

> "*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'Costa, 2007]

> "*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 Gracias, 1996]

Historical Narrative - A Quick Overview

Old Conquests	*New Conquests*
• Uniform institutional set-up: village level organization remains unchanged, caste hierarchies in place everywhere (also for Christians), dowry payments, ...	
• Conquered in 1510 (Tiswadi) & 1543 (Bardez, Salcete/Mormugao) • Experienced the heydays of the Portuguese *Estado da Índia* where the so-called "golden Goa" had supposedly up to 100.000 inhabitants • Network of parishes/schools from early days • Mass conversions (yet, two main institutions remained: caste system & dowry payments) • College(s) [printing press] • Sati, polygamy, early childhood marriage curbed from early 16th century on • Women can inherit and remarry already in the 16th century	• Acquired/gifted in peculiar ways in different stages in 2nd half of 18th century • No "early" economic impetus since the Portuguese thalassocracy was already at the bottom when these parts were acquired • Catholic orders never enter • Religious freedom, no conversions, Hindu identity retained • Structured education barely exists • Polygamy and early childhood marriage up until the 20th century. • Laws improving the position of women being implemented from late 19th century on
• 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) • From 1961: uniform investments from Indian government (schools, electricity,...)	

Table 1: An overly simplified sketch of the two historically distinguishable parts of Goa.

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 create a void in Goa, especially when it comes to education [see e.g. Boxer, 1961]. Parish schools were closed and primary education was carried out only through government schools. 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 even closed because they were deemed to expensive Varde [1977]. Private entrepreneurship in setting up schools was encouraged [see e.g. Coutinho, 1975]. The distribution of schools was always

uneven: concentrated closer to the coast in the *Old Conquests* while the hinterlands of the *New Conquests* were neglected.

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 casualities was very low and the later transition towards "normality" took place comparatively smooth. Especially when one takes 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 representatitves to Parliament, and a local assembly of 30 elected members.

Fact is, that Goa back then can be described as one of the poorest regions in India: the number of schools was very low, and education was tailored towards an elite that was close to the colonial government, only less than 5% of the villages had electricity, and so forth.
Once the Indians took over, transfers in form of infrastructural investments were flowing from the government in Delhi. This was especially true for the construction of primary and secondary schools [Varde, 1977; Malvankar, 2015]. As the later census data suggests, these investments were highly successful and were one of the reasons for Goa's immense catchup. One thing that has to be thought of here is, that this is not the usual way how things unfold when we look back at the history of development aid and infrastructural investments in structurally weak areas. The effect of decades of foreign aid in numerous countries across all continents has to be described as mild at best. This holds also true for different parts of India, mostly in its North. So why could Goa be so different?
This study shows that the aggregates in terms of educational improvement (as measured by literacy rates, both for males and females) were in the beginning driven by the *Old Conquests* of Goa, and that the other parts only started to catch-up in the 1980's and 1990's. I try to convince the reader that one of the main reasons for this phenomenon lies in Goa's differential history. Due to the penetration of those four districts that are "Missionary Goa" by monks and priests for centuries, even in remote villages, people became familiar with the concept of structured education and potentially also saw the returns to it, even without being able to participate by themselves. This is what I would describe as a "taste for education", that becomes important once schools become widely available and accessible for children of all backgrounds. Out of a similar reasoning this also differentially contributed to female education. Since the position of females were alleviated by a bundle of "rules" early on (regarding sati, polygamy, childhood marriage) and these diffused intergenerationally throughout time, families were much more likely to also send their daughters to schools, once the Indian government made them available.
It should be mentioned here already that the government did not preferentially treat the *Old Conquests*. This is crucial to point out, otherwise one might conclude that the effect that I am describing stems from differential infrastructural investments that eventually made those parts more prosperous. Rather the opposite was true: it was obviously known that the *New Conquests* did worse on average, especially the parts in the hinterland, thus it was aimed to harmonise the regions and the *New Conquests* received more rather than less investments from the time on 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 almost exclusively concentrated into 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 reason the believe why they would have taken place systematically on only one side.
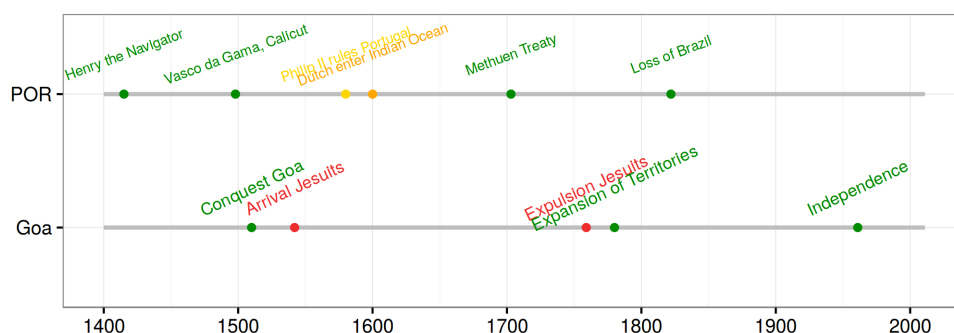

Figure 3: Cornerstones in the history of the Portuguese thalassocracy.

3   Data

The main arguments of the present study are based on census data on a 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 UT before together with Daman & Diu), 2001, and the most recent one in 2011. As a sanity check I also manage to draw 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 on a gridcell level. Most importantly variables that relate to climate and geography, but also satellite nightlight data to demonstrate that the Portuguese "cultural treatment" did not induce a jump in incomes at the boundary that I use as RD cutoff. The geolocalization was carried out with India Place Finder [Mizushima Laboratory, 2013].

My sample then consists of 70 towns and 335 villages in 2011. This is then matched to the censuses of 2001 [with assistance of NASA-SEDAC data Meiyappan, Roy, Soliman, Li, Mondal, Wang, and Jain, 2018] and 1991. The latter was the first census where Goa was included as a full state after its transition from a Union Territory, and thus marks the earliest possible starting point for a disaggregate analysis. 1991 includes a few observations less because some villages were split up later. Even less observations are contained in the 1961 census. For both cases, though, these villages splits happen almost exclusively in the hinterlands close to the mountain ridge and thus do not apply significantly to observations close to the RD boundary.

The respective Primary Census Abstracts contain the number of males/females for each village or town, whether they are literate, and several other aggregates that are not of use for this study. This allows me also to compute a sex-ratio for each unit of observation, not by age-cohorts though. The religious composition, unfortunately, cannot be observed for villages, and is only available at the (statutory) town, taluka (sub-district), and state level.

From the so called District Census Handbook (DHCB) I obtain village/town-level data on infrastructure and the like. This I use as control variables in some specifications (e.g. the number of doctors and nurses, number of primary schools).

Details on the specific sources, and the data gathering and assembly in general can be found in the appendix.

For robustness checks I employ nightlight data from the DMSP-OLS program which have been shown to correlate highly with regional economic activity [Croft, 1978; Elvidge, Baugh, Kihn, Kroehl, and Davis, 1997; Chen and Nordhaus, 2011; Henderson, Storeygard, and Weil, 2012]. Geographic information (i.e. the respective geopackages/GeoJSON's/shapefiles) on the location of borders and (sub-)districts has been obtained from the Data{Meet} [2016] which was cross-checked with exactly georeferenced maps and numerous historical sources, all of which are cited throughout the paper. An important note of caution for the implementation of Spatial RDD's in general is, that the widely used data on sub-national units and their border from the GADM project [?] or from the widely known (and very good) website naturalearth.com are not precise enough for a full fledged GRD design.

Historical information on the location of churches and parishes in the 18th century (before the expulsion of the missionaries) come partly from Borges [1994] and Gomes [2003]. A map of the location of Jesuit "sites" in Salcete and contemporary Mormugao & Tiswadi from Borges

[1994].

For descriptive statistics (e.g. shares of religious groups), I use data from the so called A-Series from the 2011 census. I unfortunately cannot observe the literacy broken down for each religious group for villages, only for towns. The latter information is then used for the non-parametric statistical tests in table 4.

3.1 Descriptives & Average Effects

	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: OLS regression on the respective full samples.
Robust standard errors (HC3, [White, 1980]) in parentheses.
Moran's I test for residual autocorrelation reports test statistic (knn 20 matrix used).

?? provides the 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 border between the *New Conquests* and the *Old Conquests* that was abandoned 250 years ago. The constant therefore shows the average in the "non-treated" areas. The units of observations here are already the towns and villages that are then also used for the RDD.

The sex-ratio in the *New Conquests* shows around 970 women for every 1000 men, while it is around 1020 in the *Old Conquests*[13]. The latter can be regarded as more or less normal[14], while the former exhibits a bias in favor of men. This variable shows an anomaly in 1961 which will also show up later in the RD results: Before and right after independence, Goa was characterized by heavy outmigration due to a lack of economic opportunities. This temporary emigration was selective in the sense that mostly Christian men left their villages - thus biasing sex-ratios - for better employment opportunities in the Portuguese colonies in East-Africa, the Gulf, and, most importantly, Mumbai [see e.g. Gandhe, 1971]. It shall also be noted here that once Goa started to grow economically, this pattern reversed and many migrants came to Goa due to work opportunities starting in the 1980ies and 1990ies.

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[13]I report sex-ratios throughout this study as number of females divided by males, following the convention of the Indian census bureau.

[14]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.

Literacy rates, on the other hand, moved quite substantially over time and serve as a proxy for the impressive economic catch-up of Goa. They were fairly constant until independence, growing only slowly in the last decades of Portuguese rule. In 1961 village level literacy in the *New Conquests* stood at around 20%, while on the other side of the old border it was almost double on average. Until 2011 it grew to around 75% while the gap diminished to a mere six percentage points.

3.2 Descriptive Statistics on Disaggregate Religious Estimates

As the religious composition is not reported by Census India at disaggregate levels[15], and religion clearly plays a role in this study, I am reporting religious classifications inferred from surnames based on an algorithm by Susewind [2015].

These are intended to serve two purposes. First, to 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", delineated in detail in section 2, actually persists. Given that this is a source independent of the data that are used in this study, 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.

According to the 2011 Indian Census, the population comprises about 1.2 million people of whom 65 percent are Hindus, 27 percent Christians, and 6 percent Muslims. The share of Christians has been constantly declining throughout the last century while the share of Hindus and Muslims was increasing[16].

From the polling station data in Figure 4 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 these shares are very similar, while at the same time there are almost no 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. This interpretation is corroborated by two quantitative facts that I will establish later: First, there is suggestive evidence that Hindus in the *Old Conquests* are substantially different in terms of my main variables of interest as compared to the ones in the *New Conquests*. Secondly, we observe convergence (literacy gaps) or stagnation (sex ratios) for outcome variables while the religious composition keeps changing drastically over time. My quantitative results can thus not entirely be driven by "being Christian" alone.

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[15]Only for statutory towns. This data will be used in Section 6 to look at the differences in literacy gaps and sex-ratios across the three major religious groups.

[16]According to Census India, in 1900 there were 52% Christians and 47% Hindus while in 1971 the shares are 32% and 64% respectively [Gandhe, 1971, p. 118, p. 120].
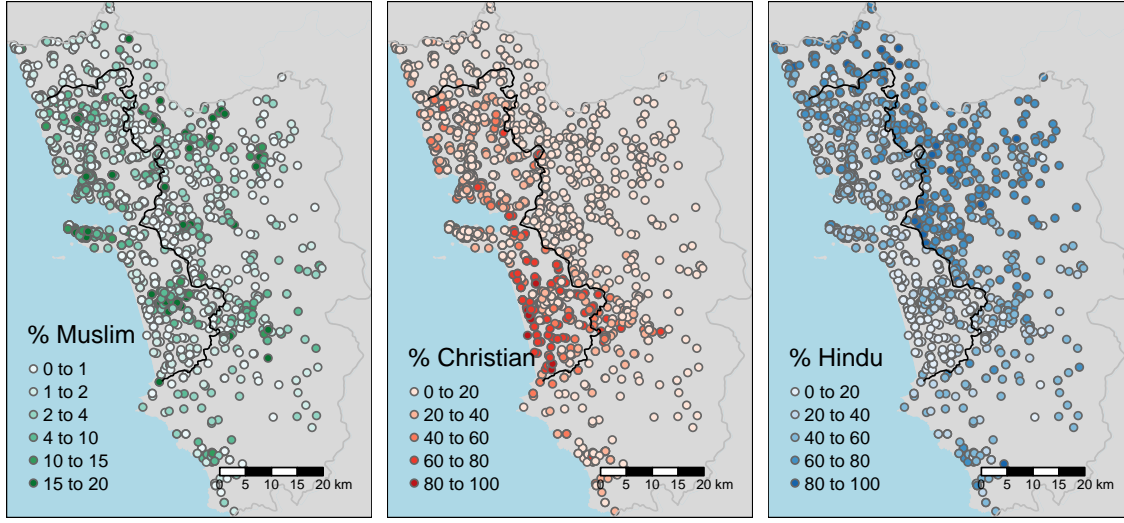
Figure 4: Estimates from surnames for all 1613 polling stations in Goa that confirm the historical narrative of a sharp cultural discontinuity at my identified RD cutoff. The "historical" Christian and Hindu groups align alongside this border. Muslims that have been migrating in only since a few decades are mostly in the urban centres.

4 Econometric Specifications

I will draw on two core specifications throughout this study: OLS with spatial fixed effects (as popularized by Dell [2010]) and a classic nonparametric regression discontinuity that uses the distance to the border as the score variable. The main reason for this choice is that one has to be cautious of results from parametric specifications. When there is a discontinuity, they are perfectly able to report the correct conditional average treatment effect. Yet, when it comes variables that exhibit a strong distance decay or strong spatial heterogeneity alongside the RD border, they would typically report a statistically significant effect even though there is no discontinuous jump at the cutoff. The classic non-parametric estimation is a quick way to verify this. Another drawback of parametric, that is, OLS specifications is that there are no clear formalized suggestions for the bandwidth selection in such an estimation procedure. For nonparametric procedures, on the other hand, a lot of guidance has been put forward [Imbens and Kalyanaraman, 2012; Calonico, Cattaneo, and Titiunik, 2014]. In addition to data-driven bandwidth selection procedures (when available), I will show results for both a three and a five kilometers wide buffer along the RD border in order to demonstrate robustness.

Parametric Specification.

$$y_i = \alpha + \beta_1 \, OldConquests_i + \beta_2 \, distborder_i + \beta_3 \, OldConquests_i \times distborder_i +$$
$$\sum_{j=1}^{J} \gamma_j \, SEGMENT_{ji} + \delta \mathbf{X}_i + f(\mathsf{geolocation_i}) + \varepsilon_i, \tag{1}$$

where y_{ib} is the outcome variable of interest for village i. $OldConquests_i$ denotes a dummy variable that represents the "treatment status", equalling 1 if the village is inside the old, non-existing border and was exposed to early Portuguese colonial rule and missionary influence.

$f(\text{geolocation}_i)$ represents the RD polynomial in X- and Y-coordinates, which is supposed to control for smooth functions of geographic location and is going to take on varying forms across different specifications. Finally, matrix $\mathbf{X}$ contains a set of geographic control variables and $SEGMENT_{ji}$ represents a dummy, equalling 1 if village i has segment j as its closest segment. Regression just produces the weighted average over all segments. These are the equivalent to a set of boundary segment fixed effects and are meant to capture geographic heterogeneity and alleviate omitted variable problems by only exploiting within segment variation, thus ensuring that we only compare villages next to each other. This might be desirable in some settings, but the obvious drawback is that this approach masks the heterogeneity that potentially is capable of delivering deeper insights into the problem at hand.

Since the next section shows the balancedness and homogeneity of all relevant variables that potentially could confound the RD estimates, my preferred specification excludes all control variables. Of course I show later that all specifications are robust to the inclusion of any set of additional regressors.

When it comes to the length of segment fixed effects, I tie my hands and include two different sets to demonstrate robustness. They have been created with the SpatialRDD package [Lehner, 2020], and for full transparency they are plotted in Figure 5.
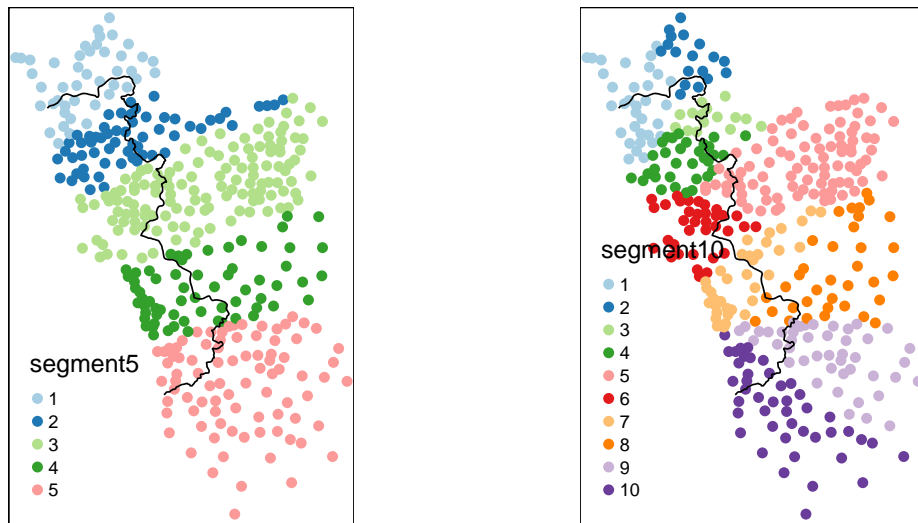
Figure 5: Illustration of the two sets of segment fixed effects that are used in the OLS specifications. The baseline uses five segments (each roughly 26km long), while the ten segments (roughly 13km each) are presented in robustness checks. The points shown refer to the number of villages in the 2011 census.

Nonparametric Specification. This simpler version of a spatial RD uses the euclidean distance of each observation to the boundary as its score for the estimation. This geographically "naive" measure of distance ignores how the units are spatially distributed since the shortest distance towards the border does not determine the exact location in the two-dimensional space [as e.g. pointed out in Keele and Titiunik, 2015, p. 137].

This type of analysis is capable of delivering a good intuition of what the magnitude of a potential discontinuity is. Especially when it comes to the visualization of this set-up with a

standard RD-plot. In this setting units around a narrow band around a border are assumed to be valid counterfactuals. This specification is measured nonparametrically via a local linear regression as is state-of-the art in "classical", ideally with data driven robust confidence intervals as suggested by Calonico et al. [2014]. To show robustness, I always include the "classic" bandwidth selection method, the one suggested by Imbens and Kalyanaraman [2012], and an arbitrarily chosen 6km bandwidth as a fourth and final one. This appears to be somewhat close to the minimum that is possible because nonparametric estimation is quite data hungry. Otherwise there would not be enough observations on each side of the border to obtain a meaningful estimate.

4.1   Balancing Tests

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. This will be demonstrated in the following section. Another important thing that has to be verified is that "pre-treatment", i.e. before the Portuguese arrived in Goa, there has been nothing of significance that would have affected either side of the border differentially.

"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 that they decided to create a buffer zone around the port city. This border between *Old & 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 [Pearson, 1981]. This meant not just the port town but the whole hinterland up until the mountains and beyond [17]. I feel thus very confident in arguing that this very border had no meaning before colonization, and therefore I do not have to fear any sort of interference for my identification strategy due to an unbalancedness of important economic variables alongside of it in the 15th or 14th century. The balancing tables corroborate this interpretation, as there is no jump in any first nature geography variable that we would typically expect to influence variables relevant to the present study.

Balancing Checks.   The regression table shows that the villages I am juxtaposing on both sides of the border are highly comparable in size, population, the number of households, and the economic structure (the share of people that work in agriculture and the share of people that work in the household industry). It is thus out-ruled that any observed effects are spuriously driven by comparing big with small or urban with rural villages. From the comparable household size it can also be inferred that the observations are approximately comparable when it comes to socio economic factors.

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[17]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 Belgaum district of Karnataka."*

	Dependent variable:				
	Area	Population	Households	Share Agriculture	Share HH. Industry
	(1)	(2)	(3)	(4)	(5)
𝕀(Old Conquests)	−87.256	278.809	114.660	−0.011	0.004
	(140.976)	(687.312)	(161.027)	(0.013)	(0.003)
Constant	613.499	3,359.936	768.979	0.093	0.018
	(119.381)	(442.260)	(98.182)	(0.011)	(0.002)
Observations	94	94	94	94	94

Note: OLS regression on a 3km bandwidth around RD cutoff on 2011 sample. Robust standard errors (HC3, [White, 1980]) in parentheses.

	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	14.169	24.763	46.718	3.691	1.425	5.040	⊢•⊣
Ruggedness	37.463	88.173	9.104	43.140	61.962	3.250	-4.866	6.243	⊢•⊣
Potential Forest (Index 0-100)	6.243	8.343	0.375	6.789	7.222	0.147	0.426	0.245	⊢•⊣
Ramankutty (Index 0-1)	0.588	0.538	0.011	0.594	0.562	0.017	-0.003	0.030	⊢•⊣
Cashew potential	3573.706	3692.466	29.048	3583.172	3619.947	14.517	4.196	17.626	⊢•⊣
Wetrice potential	3114.849	3155.689	13.380	3122.040	3134.725	6.742	-3.074	8.028	⊢•⊣
Climate									
Annual Mean Temp.	27.190	26.602	0.120	27.187	27.028	0.043	-0.037	0.040	⊢•⊣
Mean Diurnal Range	8.558	8.787	0.085	8.671	8.809	0.077	0.036	0.084	⊢•⊣
Isothermality	60.231	58.736	0.291	60.117	59.713	0.139	-0.090	0.149	⊢•⊣
Temp. Seasonality	126.493	135.575	2.448	128.831	131.677	1.379	0.573	1.602	⊢•⊣
Temp. Annual Range	14.211	14.965	0.172	14.424	14.757	0.136	0.082	0.154	⊢•⊣
Annual Precipitation	3.036	3.189	0.059	3.089	3.186	0.026	-0.021	0.046	⊢•⊣
Precipitation Seasonality	144.684	145.211	0.654	144.745	144.857	0.304	-0.669	0.639	⊢•⊣
Village/Town Level Characteristics									
Distance Velha Goa	16.589	28.976	4.736	16.056	21.453	1.979	2.067	3.734	⊢•⊣
Distance Coastline	5.684	20.096	2.881	8.211	12.742	0.818	1.129	1.547	⊢•⊣
Distance Nearest Stat. Town	6.559	10.515	1.283	8.225	7.712	1.525	0.675	2.218	⊢•⊣
Village Area	368.539	960.056	123.709	550.639	600.304	110.809	12.195	156.138	⊢•⊣
Village Population	6027.308	2483.371	1075.474	3806.479	3618.818	639.740	1576.681	1083.510	⊢•⊣
Village No. Households	1443.343	571.050	255.373	920.225	829.818	149.930	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 full balancing table shows averages and (non-existing) discontinuities in more depth. Elevation and ruggedness are of course higher when the full extent of the *New Conquests* is considered because the mountain ridge of the Western Ghats is in the hinterland. Around the RD border there is no difference, though. The elevation is around 30 meters above sea level. Also the suitability for the relevant crops is similar, as well as the general Ramankutty suitability index [Ramankutty, Foley, Norman, and McSweeney, 2002]. What is more, so-called features of first nature geography such as climate and rainfall are similarly comparable. When it comes to the balancedness of "fundamentals", other than outcome variables, the placebo checks from Table 2 give further evidence that there is no underlying discontinuity. The number of doctors, nurses, and primary schools per capita is virtually the same across the cutoff. This also demonstrates that there is no preferential treatment by the government for either side anymore.

	female literacy, 5km				male literacy, 5km			
	1961	1991	2001	2011	1961	1991	2001	2011
I(Old Conquests)	**0.141**	**0.099**	**0.046**	**0.041**	**0.112**	**0.043**	**-0.003**	**0.007**
	(0.020)	(0.021)	(0.013)	(0.009)	(0.027)	(0.014)	(0.010)	(0.006)
	[0.019]	[0.026]	[0.015]	[0.009]	[0.023]	[0.015]	[0.016]	[0.008]
	([0.022])	([0.024])	([0.013])	([0.008])	([0.029])	([0.016])	([0.011])	([0.007])
Observations	114	112	137	137	115	112	137	137
Moran's I [y]	3.855	4.862	10.016	6.073	4.754	9.343	13.110	11.527
Moran's I [resid]	-0.671	0.401	1.531	-0.558	-2.357	-1.033	0.616	0.551
Mean [y]	0.184	0.578	0.669	0.761	0.355	0.736	0.797	0.836
Std.Dev. [y]	0.122	0.110	0.077	0.053	0.143	0.089	0.062	0.038

Notes: Polynomials in lon/lat as controls and five border segment fixed effects (c. 25km each).

SEs: [1] (robust, HC3), [clustered at subdistrict level], ([Conley with a 5km cut-off and triangular kernel]) Moran's I tests for spatial autocorrelation are carried out with a 20 nearest neighbour weighting matrix. Their Z-scores are reported for the dependent variable and the residual of the respective OLS regression.

5 Empirical Results

I present the results for literacy rates and sex ratios separately. I focus on one parametric specification only for each subsection in order to keep the text tighter. Figure 6 then reports dozens of different specifications for all variables together. The appendix then includes all tables explicitly for both the parametric and the nonparametric specifications. There I also show further coefficientplots that report even more specifications including different sets of controls, all bandwidth, and fixed effects.

The tables report tests for spatial autocorrelation for both the dependent variable and also for the residual for the reported regression. This is important because spatial autocorrelation in the residual could increase the false positive rate as it biases downward the standard errors, leading to spurious results. In this respect is consistent and very clear across all specifications: the regressand always exhibits spatial autocorrelation, but once the indicator variable for the *Old Conquests* is included, this pattern is gone, i.e. there is no spatial autocorrelation anymore in the residual. The former arises naturally and is expected: we are well aware that geographically near observations are more equal than far away ones. Also it has to be noted that for a true spatial discontinuity to be present, a test for autocorrelation has to be significant (because if there is a random distribution across space, a discontinuity is impossible). This is reassuring and we can thus be certain that the significance of the reported point estimates is not spuriously driven.

To be also transparent when it comes to the choice of standard errors, I decided to report three for each specification: robust (HC3) [White, 1980], clustered at the sub-district level, and [Conley, 1999] standard errors that allow for arbitrary correlation within a certain predefined range.

5.1 Literacy Rates

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 76% and 84% respectively within the 5km bandwidth. The discontinuity in female literacy rates diminished to a mere four percentage points from being 14 percentage points in the first study period. In all periods this jump at

	sex ratio (f/m), 5km				sex ratio (m/f), 5km			
	1961	1991	2001	2011	1961	1991	2001	2011
I(Old Conquests)	**0.222**	**0.071**	**0.068**	**0.070**	**-0.206**	**-0.071**	**-0.062**	**-0.065**
	(0.036)	(0.023)	(0.018)	(0.017)	(0.050)	(0.023)	(0.018)	(0.016)
	[0.049]	[0.011]	[0.013]	[0.011]	[0.068]	[0.010]	[0.015]	[0.011]
	([0.045])	([0.019])	([0.018])	([0.016])	([0.057])	([0.018])	([0.018])	([0.015])
Observations	82	77	94	94	82	77	94	94
Moran's I [y]	0.334	1.111	3.352	5.191	-0.184	0.819	3.356	4.869
Moran's I [resid]	-0.609	0.469	1.295	1.101	0.026	0.610	1.442	1.041
Mean [y]	1.119	1.013	1.010	1.034	0.931	0.997	0.999	0.975
Std.Dev. [y]	0.194	0.103	0.098	0.094	0.246	0.102	0.094	0.087

Notes: Polynomials in lon/lat as controls and five border segment fixed effects (c. 25km each).

SEs: [1] (robust, HC3), [clustered at subdistrict level], ([Conley with a 5km cut-off and triangular kernel]) Moran's I tests for spatial autocorrelation are carried out with a 20 nearest neighbour weighting matrix. Their Z-scores are reported for the dependent variable and the residual of the respective OLS regression.

the RD cutoff explains around one standard deviation and is thus substantial.

The male literacy, on the other hand, converged much faster and is not observable anymore in 2001. For some of the nonparametric specifications it appears to have vanished already in 1991 as the full plot of all specifications shows (Figure 6). Because the majority of models point towards a discontinuity, I decided to interpret the gap as having vanished at some point in the 1990's.

5.2 Sex Ratios

In this section the regression table reports the sex ratio in both versions to make it easier to interpret for readers that are used to the convention that divides males by females. This paper sticks to the number of females divided by males because this is the convention that is used by Census India.

The big anomaly is the year 1961 here. As has been explained already in section 3 and section 2, this was induced by out-migration induced by better economic opportunities in Mumbai but also in Portuguese colonies in Africa and the Gulf states. This mobility was concentrated amongst Christian men who happened to live mostly inside the *Old Conquests*. This is reported in certain census publications [e.g. Gandhe, 1971; Desai, 1991] and can also be inferred from the sex ratios reported by religions at an aggregate level (Christian sex ratios were always above 1200 until way after independence).

It can thus be assumed that, net of migration, the discontinuity in sex ratios is not 230 but rather in the ballpark of the estimates of the subsequent periods. Looking at the mean of the dependent variable in column one, this would imply an unnaturally high sex ratio of almost 1400 right across the cutoff in the *Old Conquests*.

The regression table seems to suggest there was a slight movement. Yet, when we look at all potential specifications together, also the nonparametric ones, in Figure 6 and think of this as a naive model averaging approach, it becomes clear there was no real convergence of sex ratios. There tiny observed variation in point estimates suggests this is due to imprecise estimation rather than an actual differential effect.

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 females per 1000 males explains a substantial part
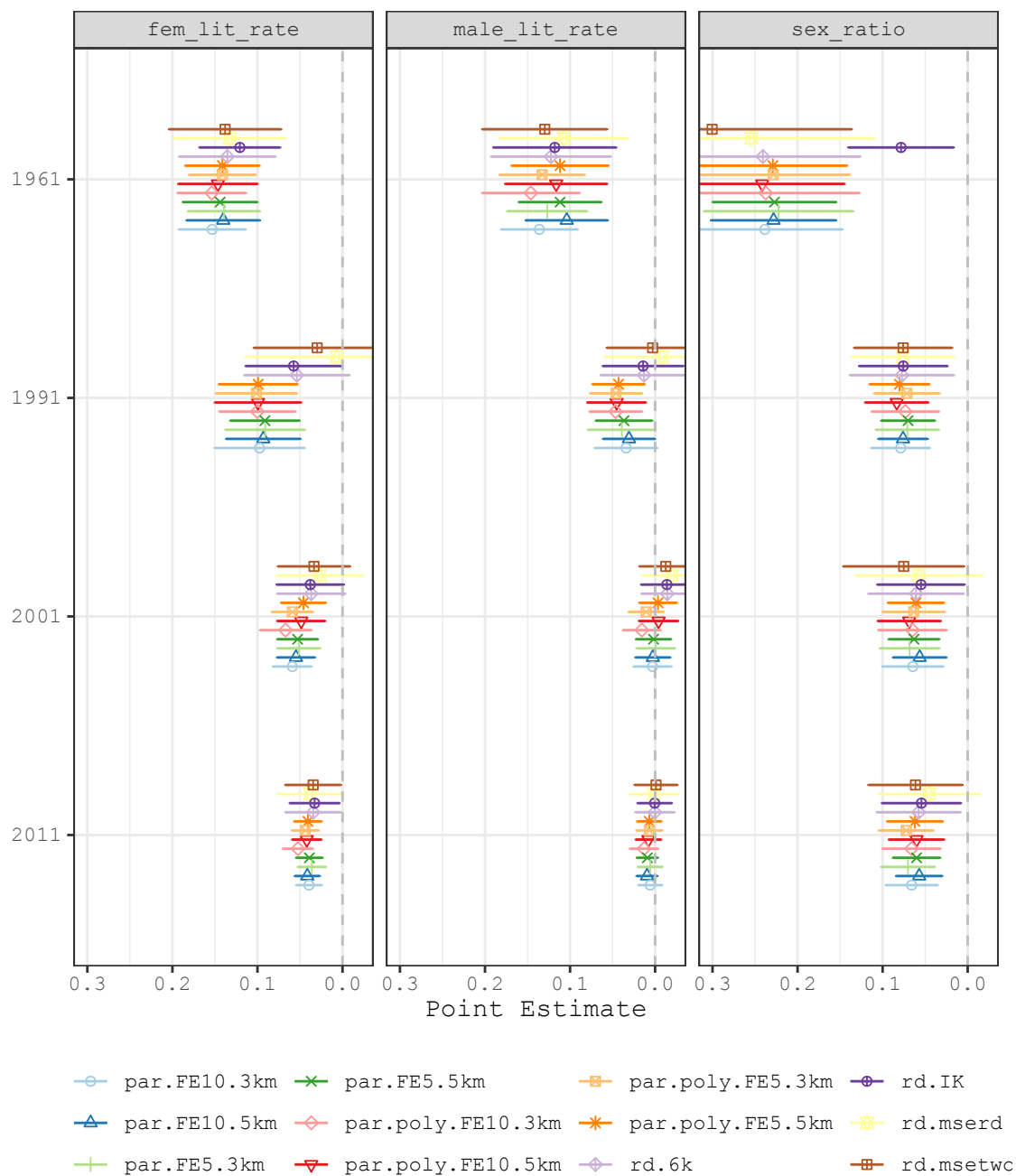
of the observed variation.

Figure 6: Point estimates of various specifications combined (95% confidence intervals)
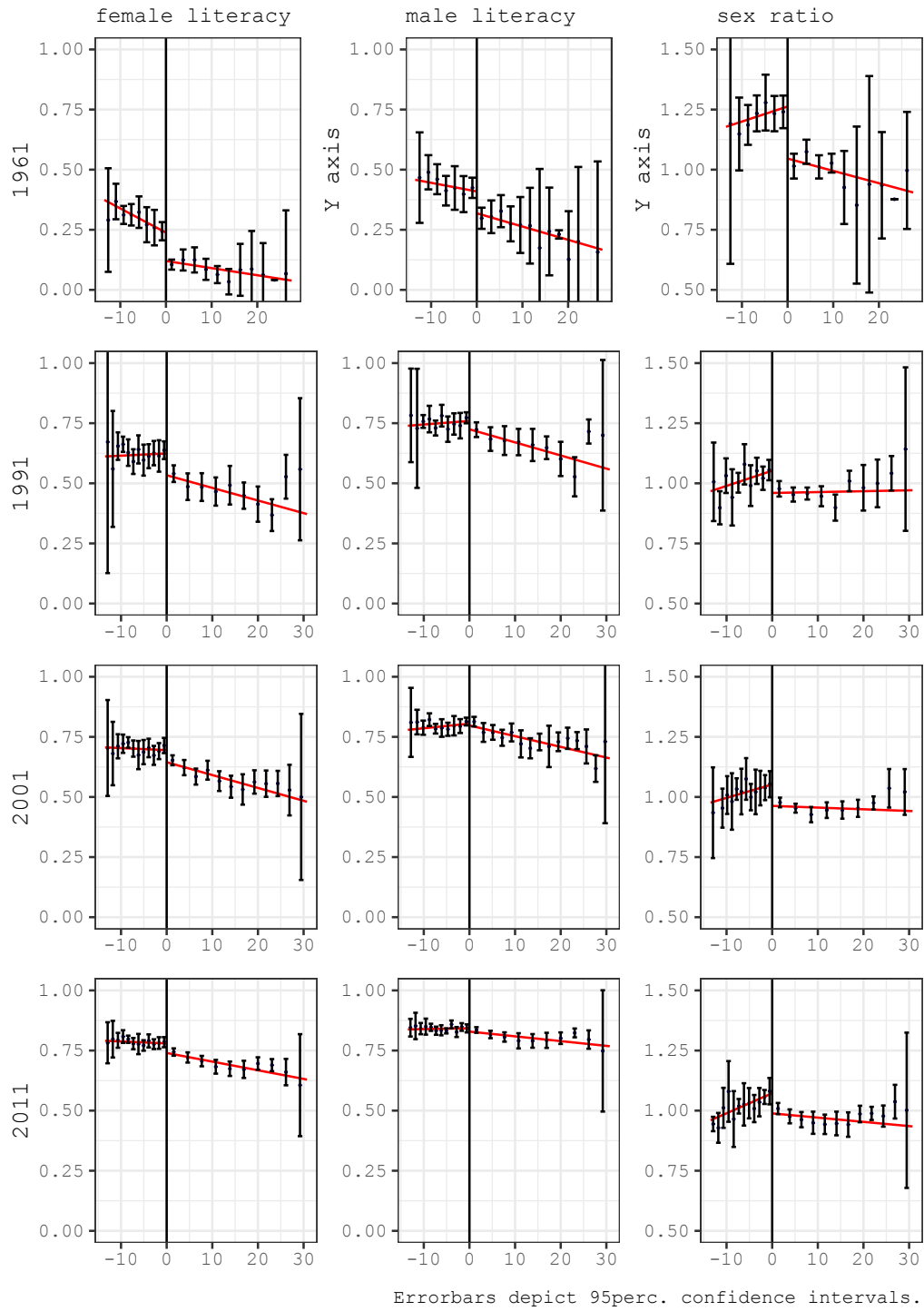
Figure 7: The RD plots for the nonparametric specification across all variables and time periods.

5.3 RDD identification

It has already been illustrated that both the process of putting in place the boundary that I use as an RD cutoff, and the one that removed, can be regarded as quasi-random and had no deeper reason that would in any way render my estimates meaningless. Albeit having been already been discussed, one open issues is still flying around: the observed discontinuities could have been caused by the fact that one side of the border is more wealthy. Implicitly this has been already outruled by the balancing tables that showed that geography, climate, and suitability for the main crops is very similar. Also the occupational structure suggested this: roughly ten 10% of the workforce on both sides of the border work in agriculture. Also the share in the household sector, which is the second sector that can be clearly distinguished in the census data, is roughly the same.

To be on the safe side of things, I finally analyze the best proxy for GDP/income at a disaggregated level that is available right now for India: satellite night data. This comes from the DMSP satellite [Elvidge, Imhoff, Baugh, Hobson, Nelson, Safran, Dietz, and Tuttle, 2001; Henderson et al., 2012; Chen and Nordhaus, 2011] and is available from 1992 to 2013.

From the summary in Figure 8 it can be clearly seen that they are declining smoothly with distance to coast as we would have expected. In the farther hinterland, as we approach the mountain ridge, they become zero.
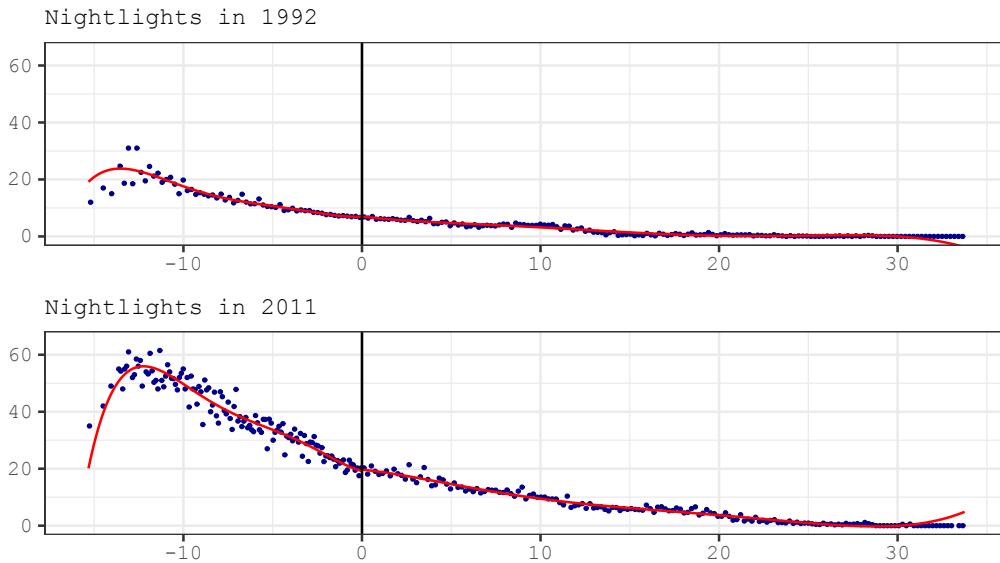

Figure 8: The effects do not seem to be driven by economic activity

5.3.1 Pseudo Borders

The robustness to many different bandwidth sizes for both the parametric and nonparametric specifications has already been demonstrated. As a last important check I now move the border by just a few kilometers in either direction. The operations have been carried out again with the SpatialRDD package [Lehner, 2020]. This way just a few villages change treatment status. Figure 9 illustrates this tiny shift. The right map illustrates the new

treatment polygon that is used to assign the new treatment status for each shift.
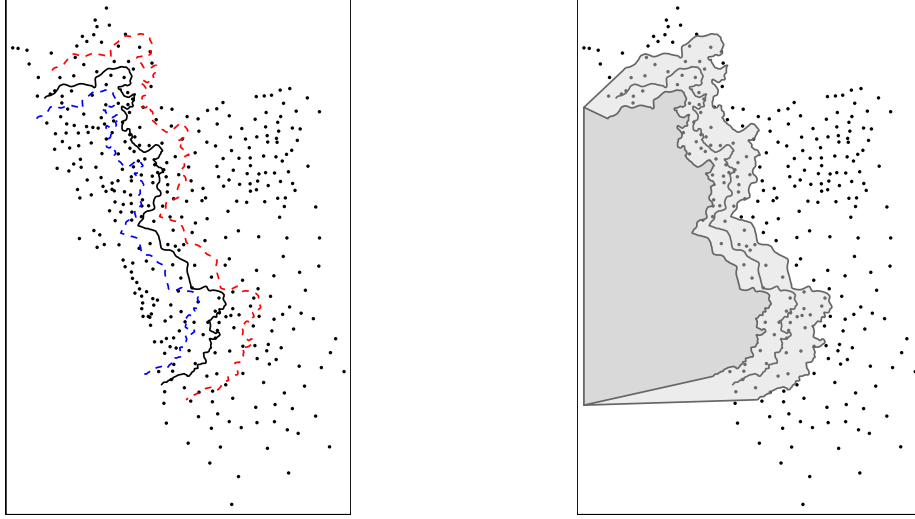

Figure 9: Illustration of the two placebo borders. The border to the left was shifted down by 4km and left by 2km, while the same shifts were applied to the outer placebo in opposite directions. Both were then rescaled accordingly. As essentially only the closest villages to the border on each side switch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

When the border is moved in either direction and the estimations carried out on those fictional lines, practically all of the relevant specifications loose significance. The full coefficientplots demonstrate this nicely. They are both reported in the appendix. Obviously this is the minimum placebo boundary movement. More severe movements would of course make the respective estimates look even more insignificant.

5.3.2 Compound Treatment Effects

A typical problem with RDs is that sometimes several differential treatments happen within the exact same geographic area. In may case this is not much of a concern, as the border is meaningless since two and a half centuries and virtually no other border that is meaningful in terms of public administration, schooling, etc. coincides with the presented RD cutoff.

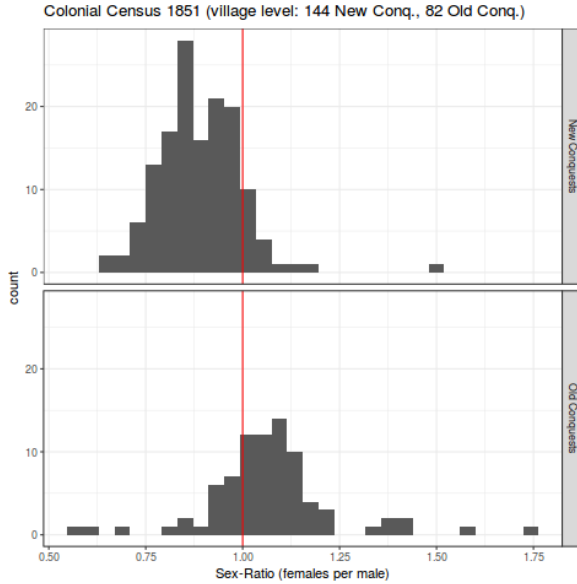### 5.3.3   Intermediate Step: Colonial Census of 1851

Figure 10: Sex-ratios at the village level in 1851.

One might argue that the observed effects are an artefact of something that happened after the Portuguese had left, or was due to something that was not caused by their presence. I thus analyse the recently digitised Portuguese colonial censuses starting from 1776 which were recently digitised by a group of economic historians [de Matos, 2013, 2016]. The first one which is reported on a village level and is thus compatible with how I carry out the analysis is from 1851. For all of those data-points I know in which district they are, and thus whether they are within the *Old-* or *New Conquests*. The exact location of the villages is almost impossible to obtain since the names changed multiple times over the years and some villages were merged with each other. An RDD on this dataset is thus not feasible.

But as figure 10 demonstrates, in order to make the point it suffices to report a simple descriptive statistic. It plots the histogram of the sex-ratio for each village and demonstrates firmly that the ones in the "treated" districts are far off from the ratios in the other villages. It is thus safe to argue that the effect I was talking about was already in place before the Indian government took over and even before Portugal moved away from being a monarchy. Furthermore it has to be noted that this should be seen as something like a lower bound since the older parts of Goa back then were already attracting labour migrants which are typically male. It is true that the numerous servants were mostly women, but to the best of my knowledge only a minority of them was recorded in the cencuses. On top of that, the Portuguese a substantial amount of soldiers for Goa's defense. Those were almost exclusively stationed close to the capital in the *Old Conquests* and obviously all of the were men, thus dragging down the sex-ratios.

5.4   Placebo Outcomes

Typically one part of any study employing Regression Discontinuity Designs has to show that there is no jump in other variables across the cutoff that might potentially be the drivers behind the observed discontinuities in outcomes. As the information provided by the Indian census reported at the level of my units of observation, the village and town level, is very sparse - especially for the former - I can only rely on the three variables that are shown in Table 2. It is shown that there are no jumps when it comes to the availability of education (as measured by primary school since I proxy for education by literacy rates) and the provision of medical coverage, both governmental and non-governmental.

Table 2: Placebo outcomes with the polynomial in longitude/latitude specification

	Dependent variable:		
	PrimSchools	nonGovmedicoverage	medicoverage
	(1)	(2)	(3)
Village in Old Goa	−0.179	−0.744	−0.107
	(0.273)	(0.862)	(0.503)
Segment FE	YES	YES	YES
Poly. lat/long	YES	YES	YES
Observations	77	77	77
R^2	0.114	0.122	0.071
Adjusted R^2	−0.021	−0.010	−0.070
Residual Std. Error (df = 66)	0.990	3.123	1.823
F Statistic (df = 10; 66)	0.845	0.921	0.506

Note: *p<0.1; **p<0.05; ***p<0.01

These results are based on a 3km bandwidth.

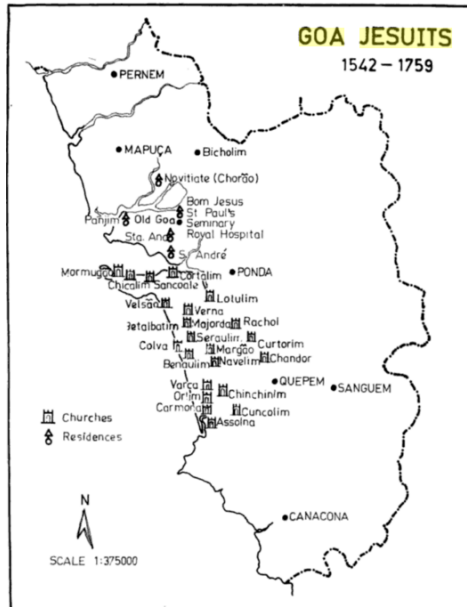## 6 The Persistent Effects: Mechanisms

Figure 11: Geo-localised map of historical Jesuit sites.

To further show the importance of the educational channel I show that there is an effect on the intensive margin. Figure 11 shows a geo-localised historical map of the accurate locations of historical Jesuit parishes [taken from Borges, 1994]. In Table 3 it is then shown that for every kilometre away from these sites, the literacy rate in villages decays by around 0.1 percentage points. As the typical distance of villages in the 2011 census to those sites is in the range of 5-10 kilometres, this is a sizeable effect which further hints at the historical imprint the structured education that was brought by the religious orders still has.

This is in line with studies on religious orders by Valencia Caicedo

Table 3: Distance to Jesuit historical sites predicts literacy rates in 2011.

	Literacy rate 2011	
	Salcete	Salcete
	(1)	(2)
Distance to Jesuit Site	−0.010**	−0.008*
	(0.004)	(0.005)
Distance to Coast		−0.002
		(0.001)
Observations	62	62
R^2	0.081	0.113
Adjusted R^2	0.066	0.083
Residual Std. Error	0.035 (df = 60)	0.034 (df = 59)
Note:		*$p<0.1$; **$p<0.05$; ***$p<0.01$

[2019] and Waldinger [2017], but also with stories on human capital persistence in general [e.g. Rocha, Ferraz, and Soares, 2017].

Table 4 shows the indicative evidence that, in addition to the documented effect across time, there seems to be also horizontal diffusion through space at play. Hindus and Muslims residing in the *Old Conquests* show significantly different literacy gaps than their respective counterparts in the *New Conquests* which did no receive the early "treatment" regarding the role of women in society. This potentially hints at an explanation that the effect that I am describing is not entirely driven by religion, but by something cultural which has been "imprinted" in those communities in the *Old Conquests*. Consistent with the deep-rooted cultural explanation for the male son preferences, I cannot find this pattern when it comes to the sex-ratio.

Unfortunately I cannot show this result on the full set of all villages that was used throughout the paper because Census India is reporting the religious composition only for statutory towns (supposedly due to privacy reasons as some of the smaller villages in the countryside e.g. only have one or two Muslim families).

Var	Group	mean(New)	mean(Old)	t-test	Wilcox rank-sum	Kruskal-Wallis
lit_gap	Muslim	0.0890	0.0494	**0.1026**	0.1911	0.1891
	Hindu	0.0775	0.0646	**0.0501**	0.0296	0.0292
	Christ	0.0444	0.0378	0.5477	0.2075	0.2054

Table 4: The gap between male and female literacy for the 44/26 statutory towns broken down by religion.

7 Conclusion

The interaction between institutions and culture, and their joint effect on economic development has been remarkably complex in the past and still is today. While many studies find that institutional and legal settings greatly affect gender inequality, a large part of the observed variation, however, remains unexplained. Much of this variation is driven by income and economic development, but researchers typically struggle to tell apart and disentangle channels because of confounding variables and endogeneity problems.

This paper has put forward a deep-rooted explanation for the emergence of gender differences by examining the effects of the long-term presence of Portuguese colonizers in the Indian state of Goa. They interfered culturally 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": their accompanying missionaries set up a network of churches, parishes with schools and even set up a college and brought the printing press. To identify causal effects, I rely on a territorial expansion that happened more or less for exogenous reasons. Combined with the exogenous expulsion of Catholic orders, which were the catalyst for the diffusion of Lusitanian culture, and the fact that the *New Conquests* were granted religious freedom and the same institutional rights - regardless of religion or gender.

Quantitatively analyzing these historical peculiarities, I show that culture contributes a great deal to observed gender disparities, being able to hold institutions, income, and geography constant. I find that male son preferences - as measured by male-skewed sex ratios - seem to be extremely persistent and hard to overcome. Gaps in female education - measured in terms of female literacy - however, seem to be less rigid and do start to equalize once education is equally made available. The discontinuity in male literacy rates, on the other hand, vanished within roughly one generation and is not observable anymore today.

By exploiting a time dimension, I go one step further and thus naturally add to the literature that investigates the historical roots of economic development [Nunn, 2020; Voth, 2021]. Many scholars have illustrated the persistence and long-run effects that events in the past have on economy and society today. Yet, it is still unclear under which conditions inequalities persist, and if they vanish, at what speed they do so.

My results highlight that uniform formal institutions, equalizing women and men, can go a long way when it comes to educational gender equality. Since practices and traditions in Goa are very similar to large parts of India, they plausibly inform a variety of contexts, even in other patriarchally oriented societies outside of South Asia. One general hope for the future is that culturally induced preferences favoring males might naturally fade themselves within the process of economic modernization, enabling gender gaps to close [Jayachandran, 2015]. The gloomy implication of this paper would be that sex-ratio biases induced by culturally deep-rooted preferences virtually do not move, despite economic growth and modernization. Thus, it seems reasonable to suggest that policy makers should exploit any scope they have to expedite the process.

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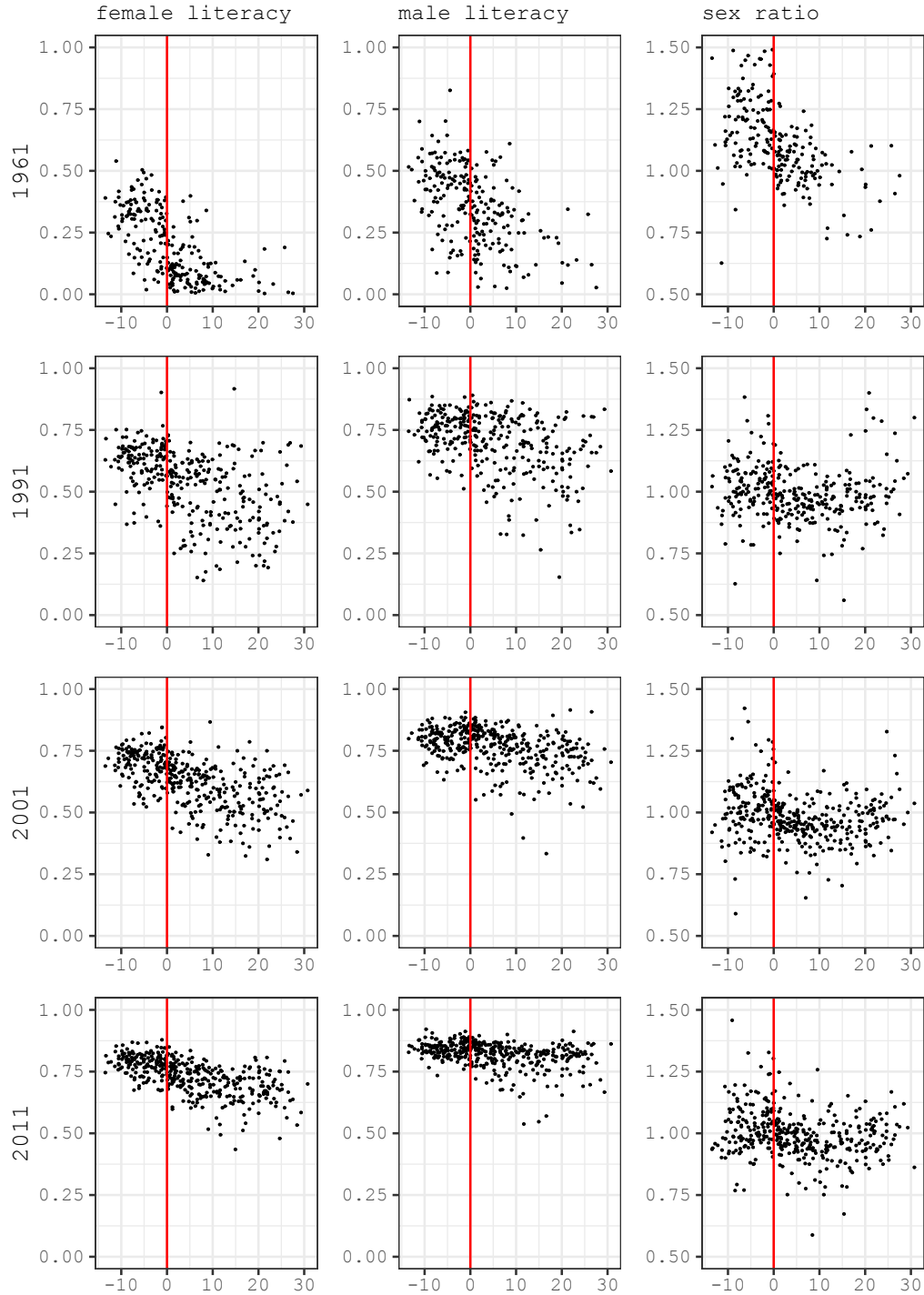# 8 Appendix: Further Results & Descriptives

Figure 12: The full clouds of all villages (no binning as in the RD plots) for the nonparametric specification across all variables and time periods.

8.1 Placebo Border Regressions

8.2 Religion by district

	Name	lit	m_lit	f_lit	lit_gap
1	Pernem	0.797	0.838	0.755	0.083
2	Bardez	0.869	0.884	0.856	0.028
3	Tiswadi	0.856	0.871	0.842	0.029
4	Bicholim	0.864	0.889	0.838	0.051
5	Satari	0.848	0.873	0.823	0.049
6	Ponda	0.825	0.855	0.797	0.058
7	Mormugao	0.817	0.85	0.785	0.065
8	Salcete	0.807	0.834	0.785	0.049
9	Quepem	0.73	0.77	0.694	0.076
10	Sanguem	0.763	0.804	0.726	0.078
11	Canacona	0.815	0.84	0.794	0.046

Table 5: Shares only for Christians

	Name	lit	m_lit	f_lit	lit_gap
1	Pernem	0.707	0.732	0.678	0.054
2	Bardez	0.714	0.744	0.678	0.066
3	Tiswadi	0.704	0.724	0.683	0.041
4	Bicholim	0.758	0.781	0.732	0.05
5	Satari	0.825	0.843	0.807	0.035
6	Ponda	0.721	0.755	0.682	0.073
7	Mormugao	0.749	0.784	0.712	0.072
8	Salcete	0.728	0.752	0.702	0.05
9	Quepem	0.708	0.739	0.676	0.063
10	Sanguem	0.714	0.756	0.669	0.087
11	Canacona	0.726	0.765	0.681	0.084

Table 6: Shares only for Muslims

|	Name	lit	m_lit	f_lit	lit_gap
1	Pernem	0.802	0.844	0.758	0.086
2	Bardez	0.821	0.849	0.791	0.058
3	Tiswadi	0.819	0.853	0.781	0.071
4	Bicholim	0.805	0.846	0.762	0.084
5	Satari	0.761	0.819	0.699	0.12
6	Ponda	0.813	0.855	0.769	0.086
7	Mormugao	0.799	0.837	0.754	0.083
8	Salcete	0.817	0.844	0.787	0.057
9	Quepem	0.753	0.793	0.711	0.082
10	Sanguem	0.744	0.802	0.685	0.117
11	Canacona	0.748	0.799	0.696	0.103

Table 7: Shares only for Hindus
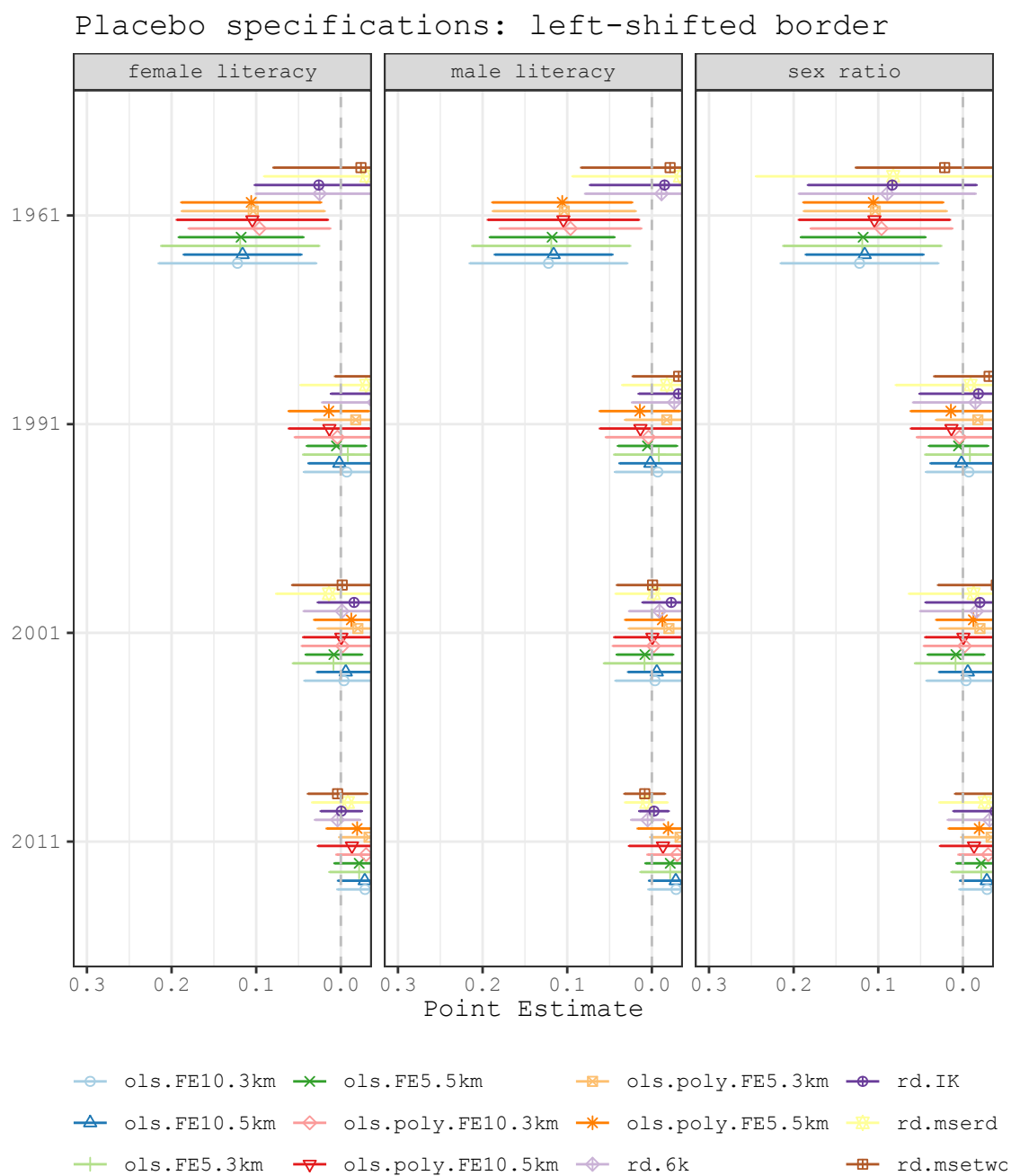
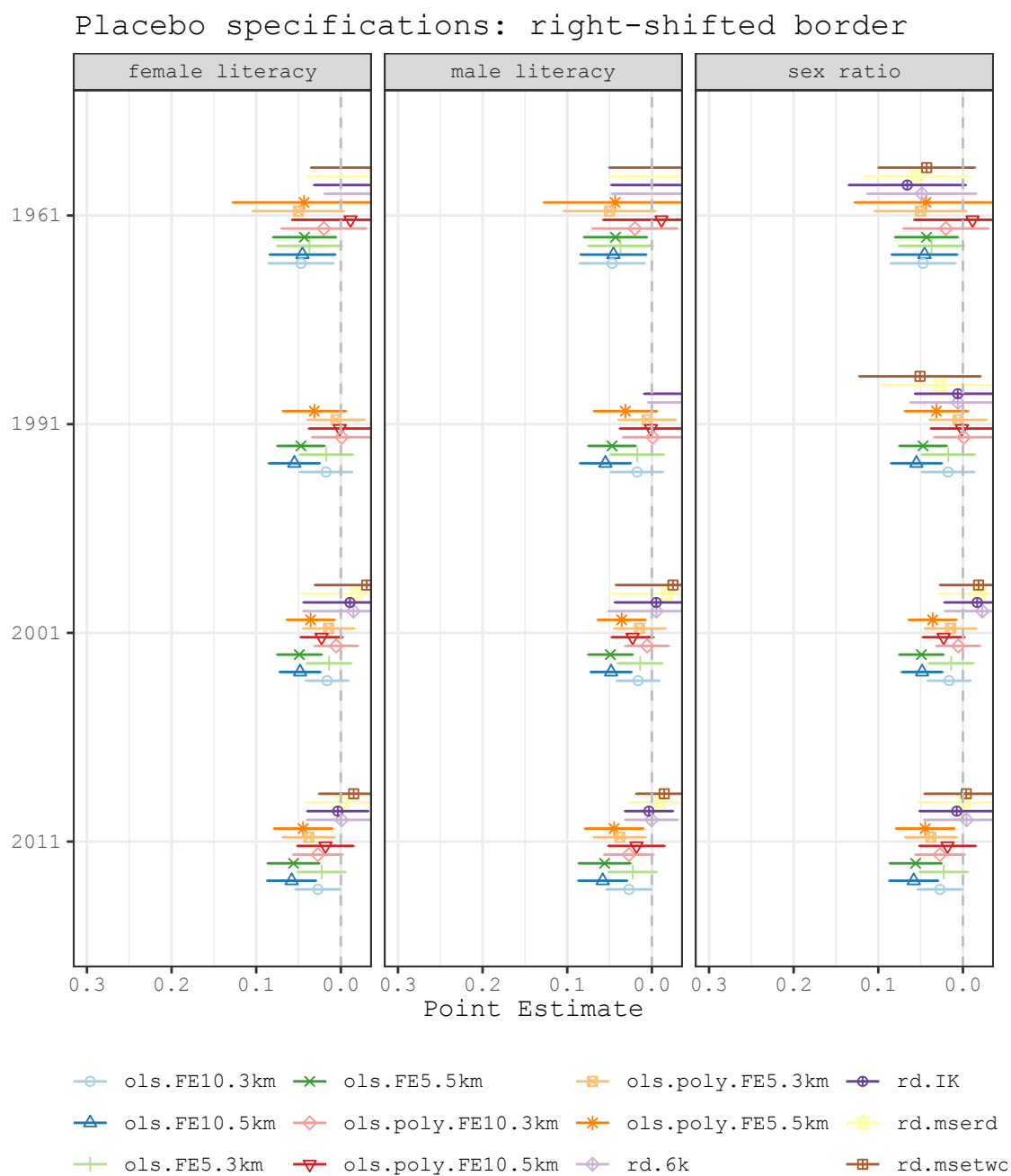Figure 13: Point estimates of various specifications combined (95% confidence intervals)

Figure 14: Point estimates of various specifications combined (95% confidence intervals)