British law and caste identity manipulation in colonial India: the Punjab Alienation of Land Act.

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Very preliminary, please do not quote.

I analyze the impact of the creation of an "agricultural tribe" category by the Punjab Alienation of Land Act of 1901, the membership of which was almost compulsory in order to buy or sell land. Using original panel data built from the decennial census of Punjab from 1881 to 1921, I show, using various triple difference strategies, that in the districts where the law was enacted, caste groups showed a tendency to manipulate their caste identity in order to claim an affiliation to castes and tribes registered as agricultural by the British administration, pointing to both the role of the British administration in the making of caste as a salient identity in colonial Punjab, as well as the ability of caste groups to manipulate their identity in response to economic and institutional incentives.

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Introduction

This paper analyzes the impact on the caste system of a land policy reform, the Punjab Alienation of Land Act, passed in 1901 by the British administration in Punjab. By creating an "agricultural tribes" category the membership of which was almost compulsory to buy or sell land, it created a very strong incentive for caste groups to manipulate their caste identity in order to claim membership to a caste group actually considered as an agricultural tribe[1] so as to be able to enter the land market. By using caste census data from 1881 to 1921, I am able to follow the population of the different caste groups of the Province of Punjab, and thus to evaluate the impact of the enacting of this law on the tendency of caste groups to respond to the incentives given to them by the British administration.

This paper is related to several strands of the economic literature. First of all, it is very close in spirit to the growing literature studying the role of the British institutions in India in several colonial and contemporary outcomes (Iyer [forthcoming], Banerjee and Iyer [2005], Banerjee and Somanathan [2007], Chaudhary [2009]), and thus, more generally, to the literature focusing on the understanding of the role of institutions in development (Acemoglu et al. [2001], Engerman and Sokoloff [1997]). Then, it is also linked to the study of ethnicity which has now become a very large strand of the mainstream development economic literature. Indeed, ethnic fractionalization has been associated with lower provision of public goods (Alesina et al. [1999], Miguel and Gugerty [2005]) , lower growth (Acemoglu et al. [2001], Alesina and La Ferrara [2005]) or lower quality of government (La Porta et al. [1999], Easterly and Levine [1997]). For India, more than ethnic identity, it is caste that has been at the center of attention with studies such as Banerjee and Somanathan [2007], Banerjee et al. [2005] or Chaudhary [2006]. Those studies, in line with the research on ethnic fractionalization, typically find that caste fractionalization leads to lower public good access, both in colonial times and in more recent periods.

However, what is missing in this type of studies is to allow for the possibility of ethnic or caste identification to be endogenous: all those study rely on cross section data and thus have to make the hypothesis that the caste/ethnic groups are exogenous to the outcome measured [2], while it has been widely acknowledged in social sciences that ethnic identity might not be as fixed as it is often assumed[3] and might thus respond endogenously to institutional or economic incentives, and thus leading to spurious results. However, documenting this aspect has proven tricky, as it requires to follow ethnic groups through time in order to ascertain their evolution. For ethnic groups, the study of Michalopoulos [2008] demonstrates the link between ethnic group formation and very long term geo-

[1]The tendency of caste associations to manipulate their caste names in colonial times has been widely studied by social scientists, and is presented in more details in the body of this paper.

[2]Most of those study use data collected often decades before their measured outcome, and thus argue that their exogeneity hypothesis is not too strong.

[3]The so called "constructivist" approach underlines that ethnic composition of a region as well as individuals or groups ethnic identities might evolve in response to the context (see Posner [forthcoming] for a review)

graphic and meteorological determinants. In the Indian context, the only attempt to understand the evolution of the number of caste groups I am aware of is the one by Ban and Rao [2007], which points to a causal impact of the post independence land policy on the number of caste groups.
To my knowledge, this paper is the first one to empirically raise the question of and demonstrate the link between colonial institutions and more traditional institutions, such as ethnicity or the caste system[4]. It thus poses a bridge between the two different strands of literature discussed above, and points to the need of addressing the issue of the role of the interaction of the two in the development of a country. Moreover, this paper is also the first one to try to address the question of group identity manipulation using panel data, hence allowing more convincing econometric techniques to be used. Indeed, being able to follow caste groups populations at the district level both before and after 1901, I can evaluate precisely the impact of the Punjab Alienation of Land Act on the trend of the population of the caste groups affected by the law.
The first part of the paper presents the law and gives some historical perspective, the second part describes the data being used, the third part is dedicated to the different empirical strategies and robustness checks while the last part rules out other potential interpretations of the results found.

1 Historical background

1.1 The Punjab Alienation of Land Act

By the end of the 19th century, the debt of the peasantry had become a concern for the British authorities : *"One of the most significant domestic problem confronting the Indian government [...] was the growing indebtness of the cultivating classes and a concomitant transfer of landed property [...] to urban moneylenders."* Barrier [1966]. This concern was of particular importance in the Province of Punjab, since the Indian army was largely recruiting in the Province. Hence, avoiding rural agitation there was a prime concern and *"...the driving force behind government attempts to find solution to debt and land transfer was fear for its own position [...]."* [Barrier, 1966]. The act, which was put in application in June 1901 creates an "agricultural tribe"[5] category for which the selling or buying or land was restricted : a member of an agricultural tribe could sell his land only to an other member of an agricultural tribe (see Annex 1 for the text of the Act). Since most of the land was held by members of the "agricultural tribes", this resulted in an almost complete exclusion of non agricultural tribe members from the land market, as underlined by Barrier [1966] : *"Sales to non agriculturists ceased after*

[4]Of course, this question has already been studied in other social sciences, see for example Posner [2005] for Africa or Bayly [1999] and Dirks [2001] for India.

[5]In colonial writings, the distinction between a "tribe" and a "caste" if very unclear, as underlined in Kaul [1912]*"...in vulgar parlance, the terms Caste and Tribe are used as synonyms"*. Throughout this paper, I will thus write caste or tribe indifferently.

1901." [6]. Thus, the Act was really enforced, and was a real constraint for Punjabese. This act was then reinforced by the Punjab Pre Emption acts of 1905 and 1913 who grave pre emption rights on land sales to members of agricultural tribes. In a Province in which the population lived in rural areas in its vast majority, being considered as a member of agricultural tribes became critical after the enacting of the act.

1.2 Its impact on the caste system

Indeed from 1901 on, the various Census reports underline a tendency from caste associations to make claims towards the British administration in order to be considered as agricultural : as can be read in the Report on the Census of Punjab, 1911 : *"The introduction of the Punjab Alienation of Land Act [...]has naturally stimulated [...] a tendency to claim an affinity with one or the other of the castes declared by Government as agricultural"* Kaul [1912] [7]. Indeed, it has been widely documented (from Ghurye [1932] and Srinivas [1966] to Dirks [2001] and Bayly [1999]) that far from being fixed, the caste system, especially under the British rule, was evolving under the action of the caste associations (or caste "sabhas") which were formed in order to press for *"support social advancement"* Assayag [1995] and to gain access to the economic opportunities created by the British presence [8] (see Annex 2 for more details on the tendency by the British rulers to create a caste directed legislation and hence, caste specific economic opportunities). Hence, the Punjab Alienation of Land Act created a tendency for caste groups to try to be recorded by the British administration as members of agricultural tribes, in order to be able to enter the land market.

2 Data

2.1 Caste Census Data

To estimate the impact of the Punjab Alienation of Land Act on the evolution of the caste system, I have collected caste census data from 1881 to 1921. Indeed, from 1871 to 1931, every decennial Census collected caste data, which was then tabulated at the district level. It has been widely documented that the Census was part of the mobilization strategies from caste associations, who were very often claiming for new caste names, making the following of each single caste very difficult across time, as both classifications and names might change across time. However, the Punjab Census data is of very good quality from 1881 to 1921: using the different Census reports and the Glossary of the Tribes and Castes of the Punjab and North-West Frontier Province (Rose [1911]), I have

[6] Other references emphasize the impact of the law on the non agricultural castes, such as :*"by means of this act moneylenders were practically wiped out of the land market"* Hirashima [1978]

[7] This claims persisted through time and can also be found in the Report on the Census of Punjab, 1931: *"...on the present occasion more than ever before a tendency was noticeable in various localities,[...] to return a higher caste. One of the main reasons was a desire to be included in one of the agricultural tribes [...] to secure exemption from the provisions of the Punjab Alienation of Land Act."* Khan [1933]

[8] *"the associations began to press for places in the new administrative and educational institutions and for political representation"* Rudolph and Rudolph [1960]

Table 1: Descriptive Statistics : districts and states of Punjab, 1901.

	British Districts	Princely States
Mean Population (std deviation)	1397666 (1133804)	207298 (357096)
Mean Population/km2 (std deviation)	303.7 (177)	194.5 (126.6)
Mean Urban Population (std deviation)	10.9% (0.04)	9.9%(0.07)
Number of Districts/States	11	21

been able to track all caste groups, taking into account the hundreds of changes in classification and names[9] and thus building what I believe is the first dataset following caste groups demography over time at such a fine level[10]. However, the various modifications of district borders and the partition of the North West Frontier Province from Punjab in 1901 as well as the creation of the Delhi Province in 1911 have led me to leave aside some districts while merging some others, in order to assure their comparability over time (see Figure 1).

Overall, I am able to follow 76 caste groups, 15 of which are agricultural[11], which represent from 97% to 99% of the population of the 34 districts and states I am tracking over time, which themselves contain 80% of the population of the Province of Punjab. I have thus built a district level panel of caste composition allowing to study through time at a very fine geographical level the response of caste groups to the Punjab Alienation of Land Act.

2.2 Descriptive Statistics

The whole Province of Punjab had a 24.4 million population in 1901, for an area of 354 634 square kilometers. It corresponds to the contemporary States of Punjab (Pakistan), Punjab (India), Himachal Pradesh (India) and Hariana (India). As for the rest of India, it was not entirely administered by the British, since some area, the Princely States, were under the rule of local Princes, and as such, were not subject to British law (see Iyer [forthcoming] for more details, and Figure 2 for their localization), the population of the Princely states was 4.4 millions, thus leaving 19.9 million under direct British rule.

The Province of Punjab was essentially rural, with 89% of the population living in a rural area[12], hence most of its population is directly concerned by the act, while the

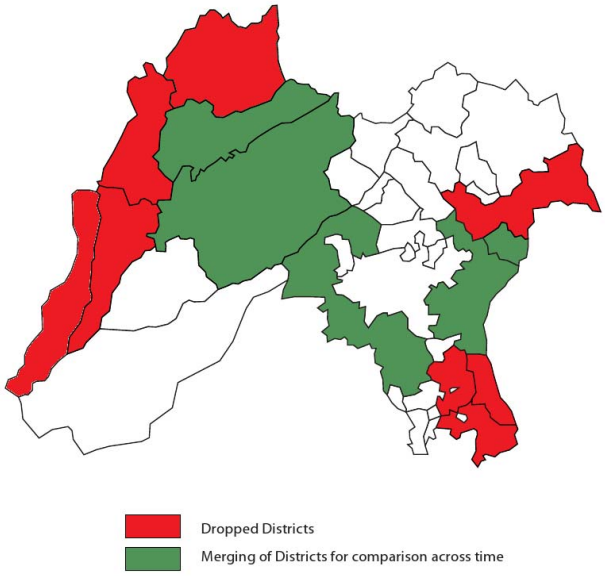
[9]The reason why I do not use the 1871 and 1931 Census is that they do not report Castes group at such a fine level as the other years, thus not allowing me to track all Castes for those years. Also, it has often been reported that Caste Census data is flawed due to people reporting their occupation or their region instead of their castes, but the Glossary and the Census reports do list those occupational and regional names, that I was thus able to identify and remove, and which account for a negligible part of the total population.

[10]Both geographically fine, at the district level, and fine at the caste level, since I follow caste groups, and not only "scheduled castes" and "scheduled tribes" as is usually the case in most datasets.

[11]More castes and tribes were actually considered as agricultural, but in order to be able to track them over time, I had to merge them either with other agricultural castes, or with non agricultural ones (which bias the results downward).

[12]The Urban population is defined as "*(1) Every municipality of whatever size.(2) All civil lines not included within municipal limits.(3) Every cantonment.(4) Every other continuous collection of houses,*

Figure 1: British Punjab : dropped and merged districts



urban population is also affected if it wanted to own land.

Among the British districts, the population was roughly cut in half between agricultural castes[13] and non agricultural castes, as can be seen in Figure 3. However, the differential evolution of the populations of the two groups is very striking : while the trends were very similar before 1901, after the enacting of the law, the population of the agricultural castes begins to increase much faster than it did before, while the population of non agricultural castes tends to have a much flatter trend than it had before.

This is in line with the effect I would expect the act to have : with its enactment, as the caste groups try to be included in the agricultural tribe category, I was expecting to

permanently inhabited by not less than 5,000 persons, which the Provincial Superintendent may decide to treat as a town for census purposes." (Report on the Census of Punjab, 1901 Risley [1903])

[13]I have considered as agricultural the castes listed as being traditionally agricultural in the 1911 Census report of Punjab, as well as from the "ethnographic glossary of castes" of the same Census report (Kaul [1912]).

Figure 2: British Punjab : Princely States and British Districts

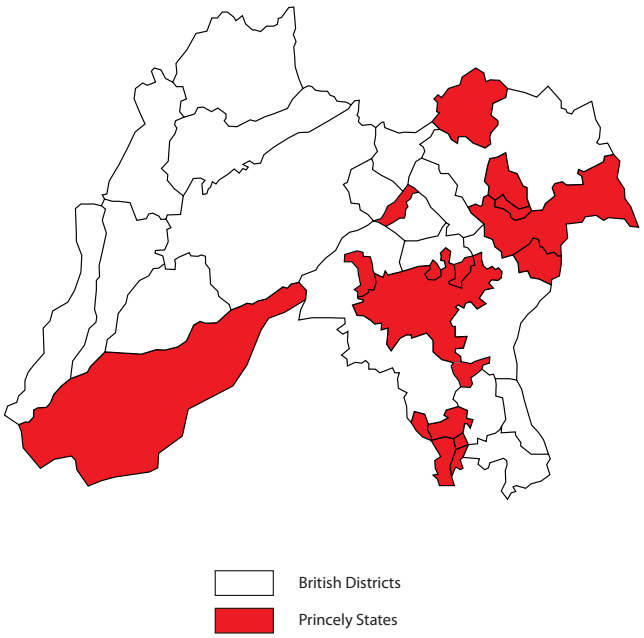
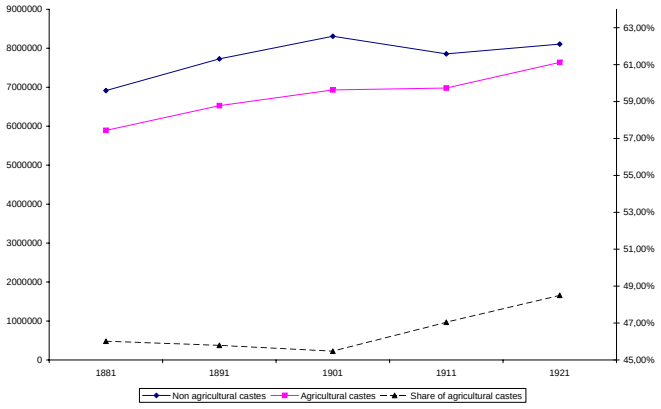


Figure 3: Evolution of the populations of agricultural versus non agricultural tribes in British districts of Punjab. 1881-1921.



see a rise in the population trend of agricultural tribes and a decline in the population trend of non agricultural tribes, as the non agricultural tribes manage to enter the agricultural castes.

3 Empirical Approach

3.1 First identification strategy : non agricultural castes as a control group

The fact that only certain castes were considered as "agricultural" by the act does not allow us to use a simple double difference strategy. Indeed, as "agricultural tribes" were not randomly selected, they are likely to exhibit systematic differences from non agricultural ones. To account for this, I will turn to a triple difference strategy, comparing the variations in the caste populations of those two groups before and after the law. In this case, the identification relies on the much weaker hypothesis that the differences in the variation of the population of agricultural castes versus non agricultural tribes before and after 1901 would have remained stable in the absence of the law, and not that their variations themselves were similar. Hence, I will run regressions of the form :

$$lvt_{itd} = constant + \beta agr_i + \gamma post_t + \delta agr_i * post_t + \eta X_{dt} + \epsilon_{it} \quad (1)$$

With lvt_{itd} the percentage variation (approximated by the difference in log) of the population of caste i in district d (if the regression is at the district level) during each of the periods t (1881-1901 and 1901-1921), agr_i a dummy indicating whether caste i is an agricultural tribe, $post_t$ a dummy taking a value of 1 when the period is in the 1901-1921 interval and 0 in the 1881-1901 interval, and X_{dt} a set of District dummies, and district dummies interacted with the $post_t$ dummy, to control for any possible district specific change in trend [14] (if the regression is at the district level).

I use two main specifications of this regression. In specification 1, I regress the variation in caste population at the British Punjab level, while in specification 2 and 3, I regress the variation in caste population at each British district level, which allows me to control in specification 3 for any district specific change in trend that might have been driving the results (for example, a district with a higher than average share of agricultural tribes that would have been less exposed to some negative demographic shock).

As can be seen in Table 2 the very precisely estimated coefficient on the interaction between agr and post (apart from the first specification in which the lack of observation leads to large standard error) is bigger than the coefficient on agr and remains of comparable range across specifications: the effect that we were anticipating is thus present, as after the law passes, the difference in the trends between agricultural tribes and non agricultural tribes decreases. Indeed, this points to a clear tendency for caste identity

[14] Adding an interaction between post and district dummies, makes the coefficients on post non comparable across specifications, as this interaction results in a decomposition of the post coefficient across districts. The coefficients on agr and post*agr remain comparable, however.

Table 2: Within British Punjab impact of the Act. Dependent variable : difference in log-populations.

	State level	District level	
	(1)	(2)	(3)
post	-0.351***	-0.466***	-0.238***
	(0.100)	(0.0643)	(0.0854)
agr	0.00759	-0.0602	-0.0610
	(0.0585)	(0.0649)	(0.0636)
post*agr	0.273***	0.306***	0.308***
	(0.0870)	(0.0827)	(0.0826)
Constant	0.193**	0.237***	0.0755
	(0.0771)	(0.0324)	(0.0482)
District Dummies	NO	NO	YES
post*District Dummies	NO	NO	YES
Observations	158	1172	1172
R^2	0.116	0.090	0.116

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

manipulation in response to the enacting of the law, with the average agricultural caste having a growth rate from 27 to 30 percentage points bigger than the one of the average non agricultural caste after 1901, while their growth rate were not statistically different before 1901. As can be seen in specification 3, this effect is not driven by an outlier district, as the results remain robust to including an interaction term of post with district dummies, controlling for any district specific change in demography. However, the negative coefficient on the post dummy underlines the fact that after 1901, the average non agricultural caste tended to see its population increase on average less, leading us to suspect the existence of some demographic shocks that would affect Punjab after 1901.

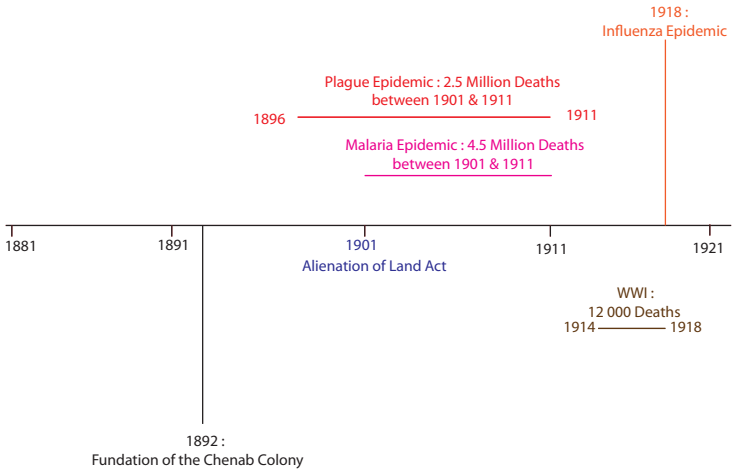
3.2 Second Identification Strategy: Princely States as a control group

3.2.1 Full Sample

Hence, one might argue that the results obtained with the first identification strategy are not the results of the Punjab Alienation of Land Act, but solely that those demographic shocks affect more non agricultural tribes than agricultural ones : for example, it could well be that the non agricultural castes members tend to live in more urban area, in which the diseases might tend to spread faster. And as a matter of fact, the 1901-1921 period faced various episodes of epidemic, with plague, malaria and influenza killing millions, as can be seen in Figure 4.

To account for this, I use an other identification strategy: in line with the work of Iyer [forthcoming], I use the fact that all of India was not under direct British rule. Indeed, the Princely States were under the rule of local Princes, and as such, were not subject to the British legislation, and in particular, to the Alienation of Land Act. Arguably, the States of Punjab faced the same epidemic as the British districts, due to their close proximity (as can be seen in Map 2), but were not concerned by the Punjab Alienation of Land Act, thus providing a counterfactual that allows me to control for the demographic shocks of the period: the castes located in the Princely States of Punjab are indeed similar to the castes of the British districts, are subject to the same epidemic,

Figure 4: Main Demographic Shocks affecting the Punjab



but are not concerned by the agricultural/non agricultural castes categories created by the law. Hence, if the variation in caste groups populations observed in British Punjab were to be attributed to the Alienation of Land Act, we would expect the Princely States caste groups not to exhibit any specific change around 1901 as was the case in British Punjab. Indeed, we can see in Figure 5 that the populations of both agricultural and non agricultural tribes exhibit relatively similar trends up to 1911. As a matter of fact, they actually exhibit very similar trends up to 1921 if the State of Bahalwalpur was not taken into account[15], as can be checked in the same Figure.

I will thus estimate regressions of the form :

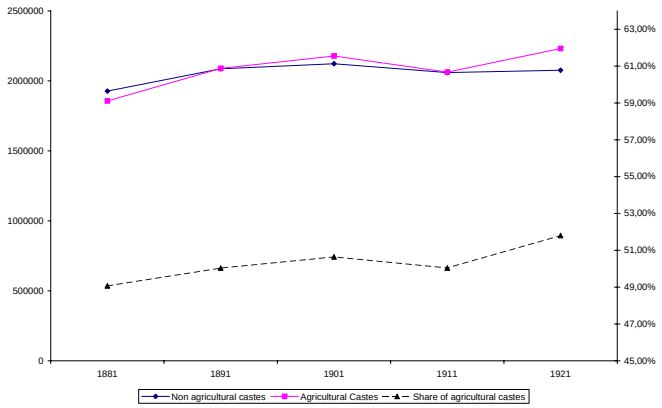
$$lvt_{itd} = constant + \beta agr_i + \gamma post_t + \delta agr_i * post_t + \rho br_d + \pi agr_i * post_t * br_d + \eta X_{dt} + \epsilon_{itd} \quad (2)$$

With the same notation as in Model 1 and br_d a dummy indicating whether district d is a British district or a Princely State, with alternatively the interaction of br_d and $post_t$ replacing the interaction of district dummies and $post_t$, to control either for a British districts specific shock (ie. the demographic shocks affected asymmetrically British districts and Princely States, which might for example be due to the fact that British district were more densely populated as seen in Table **??**) or for district specific shocks, when the regressions are at the district level. These sets of dummies allow me to control for the fact that the epidemics might not affect all districts in the same manner, as well as for any district specific change in trend that might drive the result, as in the first identification strategy.

The observed upward trend in the population of the agricultural tribes after 1911 is not a major issue to my identification strategy, as it pushes the coefficient downwards and thus drives the result in the opposite direction of the expected impact of the Act.

[15]See Annex 3 for the evolution of the agricultural and non agricultural castes of this State)

Figure 5: Evolution of the populations of agricultural versus non agricultural tribes in the Princely States of Punjab. 1881-1921.



As a matter of fact, this identification strategy tends to bias the coefficient downwards for two reasons. First, it relies on the assumption that the law was not passed in all the Princely States, which might not have been the case, as any of those States was free to pass any law of its choice, and might have chosen to implement this law. Second, it also assumes that even if not passed in the State, the law had no impact in the State, which is far from being obvious: it is quite clear that any person living in a Princely State but near a border with a British district would be affected by the law if it were to try to buy some land just on the other side of the border, and would thus face very similar incentives to a British district inhabitant.

We can see in Table 3 that the coefficients on the interaction of post, british and agr is significant in all the specifications but two and negative in all, while the interaction between post and agr is not significant in all specifications, and has a negative sign in a majority of them. Hence, it appears that the tendency for agricultural tribes to grow relatively faster than the non agricultural tribes after 1901 than before is only specific to British districts (as indicated by the coefficient on br*agr, before 1901, they even tended to grow relatively slower in the British districts before 1901), the districts were the law was passed. This confirms the fact that the results obtained in our first identification strategy were not driven by asymmetric demographic shocks but by the impact of the law itself. Even more so, the estimated impact of the Act with this identification strategy is roughly consistent with the results obtained in the first one, with the average agricultural caste exhibiting an increase in its relative trend ranging from 16 (specification 2) to around 50 percentage points (specification 4 and 5), in British districts only.

Table 3: British districts vs Princely States. Dependent variable : difference in log-populations.

	State level		District level		
	(1)	(2)	(3)	(4)	(5)
post	-0.248**	-0.136	-0.339***	-0.212***	-0.238**
	(0.106)	(0.167)	(0.0453)	(0.0425)	(0.0857)
agr	0.102	0.170*	0.0661	0.114***	0.107**
	(0.0839)	(0.0892)	(0.0401)	(0.0418)	(0.0425)
post*agr	0.104	-0.00823	0.0691	-0.0574	-0.0563
	(0.115)	(0.173)	(0.0702)	(0.0683)	(0.0702)
br*agr	-0.0312	-0.162*	-0.0783	-0.174**	-0.168**
	(0.0644)	(0.0844)	(0.0661)	(0.0761)	(0.0740)
post*br*agr	0.0661	0.281	0.110	0.363***	0.364***
	(0.0618)	(0.176)	(0.0791)	(0.102)	(0.103)
br		0.131**		0.0955**	
		(0.0651)		(0.0386)	
post*br		-0.215		-0.254***	
		(0.171)		(0.0646)	
Constant	0.131*	0.0622	0.189***	0.141***	0.0755
	(0.0691)	(0.0761)	(0.0212)	(0.0241)	(0.0484)
District Dummies	NO	NO	NO	NO	YES
post*District Dummies	NO	NO	NO	NO	YES
Observations	304	304	2382	2382	2382
R^2	0.045	0.052	0.066	0.074	0.118

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

3.2.2 Neighboring districts and states

However, the negative and significant coefficient on the interaction of British and post in Table 3 suggests that the British districts have been more affected than the Princely States by the epidemics of the period. One could thus argue that the results obtained in this specification are solely due to the fact that the non agricultural castes are more affected by the epidemics in the British districts than in the Princely States. As the epidemics are likely to affect more similarly neighboring districts than distant ones, a manner to control for this possibility, inspired by Banerjee and Iyer [2005], would be to restrict the sample to the British districts and Princely States neighbors to each other[16]. Indeed, due to geographical nature of the spread of an epidemic, neighboring districts and states are likely to be affected by the same diseases at the same time and with the same virulence, hence controlling for the possibility that the results obtained in the former specifications were driven by the comparison of heavily affected British districts with non affected Princely States (or the contrary), or for any other geographically linked shock affecting the Province of Punjab around 1901. The results obtained with this specification are to be read in Table 4. Overall, the qualitative results are not affected by restricting the sample to this neighbors, while of comparable range. However, the negative and significant coefficient on the interaction between post and british seems to show that even in this restricted sample of neighboring districts, the British districts are more heavily impacted by the epidemics, this being certainly due to the fact that they are much more dense than their Princely neighbors (as seen in Table **??**, thus

[16]As the british*post treatment is discrete, I do not have to use the matching technique used by Huillery [2009].

Table 4: British districts vs Princely States. Dependent variable: difference in log-populations.

	State level		District level		
	(1)	(2)	(3)	(4)	(5)
post	-0.243***	-0.151	-0.326***	-0.142**	-0.241***
	(0.0840)	(0.146)	(0.0533)	(0.0614)	(0.0849)
agr	0.179**	0.189*	0.120**	0.162***	0.147**
	(0.0763)	(0.0984)	(0.0558)	(0.0603)	(0.0602)
post*agr	0.0544	-0.0376	0.0516	-0.133	-0.131
	(0.106)	(0.159)	(0.0893)	(0.0942)	(0.0945)
br*agr	-0.0863	-0.105	-0.181**	-0.253***	-0.239***
	(0.0719)	(0.121)	(0.0752)	(0.0899)	(0.0887)
post*br*agr	0.0553	0.233	0.135	0.449***	0.447***
	(0.0727)	(0.173)	(0.0857)	(0.110)	(0.110)
br		0.0190		0.0725	
		(0.0792)		(0.0491)	
post*br		-0.178		-0.314***	
		(0.152)		(0.0687)	
Constant	0.0855**	0.0757	0.186***	0.143***	0.0831*
	(0.0415)	(0.0741)	(0.0232)	(0.0317)	(0.0480)
District Dummies	NO	NO	NO	NO	YES
post*District Dummies	NO	NO	NO	NO	YES
Observations	302	302	1626	1626	1626
R^2	0.061	0.069	0.060	0.074	0.110

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

facilitating contamination. Still, the sample of neighboring Princely States constitutes a counterfactual for the impact of the disease on the population of agricultural castes in the absence of the Punjab Alienation of Land Act, and we can see that both in the full sample (Table 3) and in the restricted sample (Table 4) the coefficient on agr is positive and significant in most of the specifications, while the interaction of post and agr is close in absolute term to zero, and non significantly different from it, thus pointing to the fact that the epidemics seem to have affected more the agricultural castes than the non agricultural ones, as they were growing faster before the peak of the epidemics, and at roughly the same rate during the epidemic episodes. Hence, it seems that the asymmetric impact of the epidemics on the agricultural versus non agricultural castes, if any, goes in a direction biasing my estimates downward[17].

4 Ruling out alternative interpretations

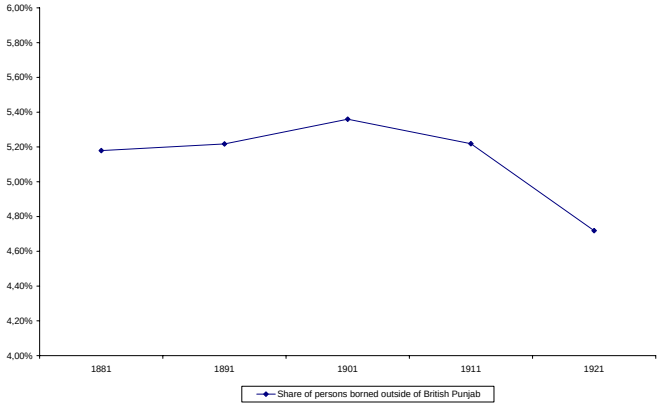
However, it is unclear how the impact of the law should be interpreted: while the anecdotical evidence taken from the Census reports points to caste identity manipulation, we can not yet rule out other interpretations.

4.1 Change in the caste composition of migration

First, it could well be that the results are entirely driven by migration: after the law passes, members of the castes that would be considered as agricultural in the British

[17]Annex 4 proposes two others robustness checks ruling out the demographic shocks' impact hypothesis.

Figure 6: Evolution of the share of persons born outside a British District of Punjab in the British Districts of Punjab. 1881-1921.



districts of Punjab face an incentive to migrate from their place of origin (outside of Punjab or a Princely State of Punjab) to a British district of Punjab in order to benefit from the status that the law gives to them. In order to rule out this interpretation, I use the birth place statistics of the Census[18] summarized in Figure 6.

We can see that with being around 5%, migration is fairly small, and seems to be decreasing after 1901. However, what can not be seen (as the birth place data is not detailed at the caste level) is whether the composition of migration has changed after 1901 towards more arrivals of members of agricultural tribes. Hence, I am going to be very conservative, and assume that all the persons born outside a British district of Punjab and enumerated after 1901 are actually members of such castes. To check if migration is indeed driving the results, I then recompute the variations of population of each caste group, but this time subtracting the population of migrants (ie. numbers of migrants recorded in 1921) from the population of agricultural tribes, assuming that the migrants are distributed across the different agricultural castes proportionally to their respective sizes[19]. This very conservative method artificially creates measurement error, as it considers all migrants as being agricultural caste members, which is of course a very unrealistic assumption, and also because, due to data limitation, I don't have access to proper migration data, but only to the birthplace of the inhabitants, meaning that I will consider as having migrated after 1901 any person recorded in 1921 as being born outside a British District of Punjab, and thus will treat any person having migrated

[18] I thank Dave Donaldson for having given me access to this data.

[19] ie. I substract x% of the population of a district's migrants from the population of an agricultural caste representing x% of the district's agricultural tribes population.

Table 5: Migration robustness check : within British Punjab. Dependent variable : difference in log-populations.

	State level	District level	
	(1)	(2)	(3)
post	-0.351***	-0.466***	-0.225***
	(0.100)	(0.0643)	(0.0850)
agr	0.00759	-0.0602	-0.0610
	(0.0585)	(0.0649)	(0.0636)
post*agr	0.166*	0.194**	0.196**
	(0.0870)	(0.0829)	(0.0827)
Constant	0.193**	0.237***	0.0755
	(0.0771)	(0.0324)	(0.0482)
District Dummies	NO	NO	YES
post*District Dummies	NO	NO	YES
Observations	158	1172	1172
R^2	0.114	0.093	0.116

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

before 1901 and still present in 1921 as having migrated after 1901. This second point not only creates measurement error, but also bias the coefficient downwards, as the same person will be recorded first before 1901 in the caste it belongs to (which might not be agricultural) and will then be subtracted from an agricultural caste population in 1921, thus artificially decreasing the variation in the difference between the trends of agricultural versus non agricultural tribes before and after 1901. Reconducting the same identification strategies as earlier on (described in Models 1 and 2), but this time removing any influence that migration might have had, I am now able to see if the results obtained were or not only driven by migration.

As can be seen in Tables 5 and 6, despite the very conservative character of the method used and the measurement error it creates, the coefficient of interest agr, post*agr, british*agr and post*british*agr are still of the expected sign in all but one specification, and still relatively precisely estimated in the majority of the specifications (the coefficients are of course, by construction, smaller than their counterpart in the former specifications), thus clearly ruling out the hypothesis that migration was driving the evolution of the population of the agricultural tribes after 1901.

4.2 Better economic conditions for agricultural castes due to the Act

Another potentially very relevant interpretation of the results would be to say that the fact that the agricultural castes grow faster than they used to after the law is enacted just shows that the law has attained its objective of giving better economic conditions to the agricultural castes. Indeed, one might reasonably argue that with the law, the increase in their population just reflects the fact that they entered the demographic transition before the other castes, thanks to the law itself, and the effect that I am identifying is just the success of the law. It is indeed clear that this is likely to be part of the story, but how far can it drive the whole evolution of agricultural castes' population is a question which remained to be answered. Thus, I will show in this section that

Table 6: Migration robustness check : British Punjab vs Princely States. Dependent variable : difference in log-populations.

	State level		District level		
	(1)	(2)	(3)	(4)	(5)
post	-0.248**	-0.136	-0.339***	-0.212***	-0.225**
	(0.106)	(0.167)	(0.0453)	(0.0425)	(0.0854)
agr	0.102	0.170*	0.0661	0.114***	0.107**
	(0.0839)	(0.0892)	(0.0401)	(0.0418)	(0.0425)
post*agr	0.104	-0.00823	0.0691	-0.0574	-0.0563
	(0.115)	(0.173)	(0.0702)	(0.0683)	(0.0702)
br*agr	-0.0312	-0.162*	-0.0783	-0.174**	-0.168**
	(0.0644)	(0.0844)	(0.0661)	(0.0761)	(0.0740)
post*br*agr	-0.0404	0.174	-0.00224	0.251**	0.253**
	(0.0618)	(0.176)	(0.0796)	(0.102)	(0.103)
br		0.131**		0.0955**	
		(0.0651)		(0.0386)	
post*br		-0.215		-0.254***	
		(0.171)		(0.0646)	
Constant	0.131*	0.0622	0.189***	0.141***	0.0755
	(0.0691)	(0.0761)	(0.0212)	(0.0241)	(0.0484)
District Dummies	NO	NO	NO	NO	YES
post*District Dummies	NO	NO	NO	NO	YES
Observations	304	304	2382	2382	2382
R^2	0.044	0.051	0.068	0.076	0.119

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

the demographic transition argument can not realistically explain the evolution of those castes' population.

In order to deal with this concern, I will need to resort to demographic arguments. As has already been discussed, the 1901-1921 period is full of demographic shocks. My argument will thus be very simple, and can be summarized as such: in the absence of those shocks and in the absence of any caste identity manipulation, are the growth rate required for the agricultural castes' population to reach their 1921 share in the British districts' population realistic ? In order to answer this question, I will first nullify the impact of those shocks by constructing a counterfactual Punjab in which those shocks have not happened. To do so, I will assume that the non agricultural castes of the British districts of Punjab would have kept their 1881-1901 growth rate if the epidemics had not take place. Then, I can build the counterfactual population of the agricultural castes in this epidemic-free Punjab: using the shares of the agricultural castes in 1921, I compute the population of agricultural castes corresponding to this share. Table 7 describes the calculation made, and tells us that in order to have the share they had in 1921 in the absence of any epidemics, the agricultural castes would have needed to jump from a growth rate of 16.9% between 1881 and 1901 to a growth rate of 38.1% between 1901 and 1921. In order to understand whether this massive change in the growth rate is or not unrealistic, we need to deepen this analysis, by trying to see what it means in terms of change of death rate. Indeed, I know from the Punjab Census reports of 1891 and 1901 (Rose [1901], Maclagan [1892]) that the average annual death rate in Punjab was 31 per mille between 1881 and 1891 and around 32 per mille between 1891 and 1901. Hence, assuming that all caste groups were on average facing the same death rate during the

Table 7: Construction of the "epidemics-free" counterfactual 1921 Punjab

	population in 1881	population in 1901		1881-1901 growth rate
Agr. Castes	5,893,071	6,884,153		16.9%
Non Agr. Castes	6,912,727	8,354,610		20.1%
			1921	
	population	population share	counterfactual population	Counterfactual growth rate
Agr. Castes	7,636,080	48.5%	9,511,261	38.1%
Non Agr. Castes	8,106,536	51.5%	10,097,246	20.1%

Table 8: Construction of the "epidemics-free" death rate for Agricultural castes.

	1881-1901	
annual death rate	annual rate of natural increase	corresponding annual birth rate
3.1%	0.8%	3.9%
	1901-1921	
corresponding annual death rate	counterfactual annual rate of natural increase	reporting annual birth rate
2.3%	1.6%	3.9%

whole of the 1881-1901 period, I can compute the annual birth rate for the agricultural castes [20] at that time. Hence, as the demographic transition consists generally in having a population's death rate declining decades before the population's birth rates[21], I will take as given that the agricultural castes' birth rate remains unaffected by the law. Therefore, with a given birth rate, the only factor remaining to explain the massive growth rate change around 1901 would be a decrease in the death rates. Table 8 details the calculation of the annual death rate needed to jump from a 0.8% to a 1.6% rate of natural. It can be seen that it requires a drop in annual death rate from 3.1% to 2.3%. To understand what such a change would mean, one has to turn to the variation of England's death rate (found in Galor [2005]), which, from 3% in 1750 did not reach 2% until 1800, in a country which was facing massive structural change due to the first Industrial Revolution. Therefore, in a Punjab whose structures are not deeply changing at the turn of the XXth century, such a massive decline in death rate appears more than unrealistic. As a result, the only remaining explanation for such an evolution is that non agricultural castes members were able to manipulate their caste identity in order to be recorded as agricultural castes members.

5 Conclusion

This paper shows, using different identification strategies, that the enacting of the Punjab Alienation of Land Act in 1901, by creating an "agricultural tribes" category with almost exclusive access to the land market (a huge economic advantage in a Province

[20] From Table 7's growth rates, I can compute the annual rate of natural increase, and deduct the annual birth rate from the sum of the annual death rate and rate of natural increase ,as detailed in Table 8.

[21] According to Galor [2005], the decline in death rates preceded the decline in fertility rates by 140 years in England, and by 100 years in Sweden and Finland.

of Punjab whose population was still rural at almost 90% in 1921) has deeply affected the caste system. Indeed, caste groups were given a very strong incentive to manipulate their caste identity in order to benefit from the Act, and from 1901 on, the trend of the population of agricultural castes as measured by the Census exhibited an increase varying between 16 and 50 percentage points depending on the specifications, as compared to the trend of the population of non agricultural castes, this effect only taking place in the British district of Punjab and not in the Princely States, not concerned by the law. Moreover, I show that neither migration nor demography can alone explain the variation in population, underlining that the results are mainly driven by the ability of caste groups to manipulate their identity in response to administrative incentives.
This paper is thus, to my knowledge, the first to convincingly document the permeability of caste groups and the ability of castes and caste associations to react and adapt their caste identity in the relatively short term to their environment. Moreover, it clearly points to the role played by the British administration in the evolution of the caste system. Hence, it urges towards a deepening of the analysis of the different long term mechanisms of development being analyzed by economists by focusing in their interaction, to allow for a country specific-or even Province specific, as is the case here- analysis of the institutions and of their potential long term impact.

References

Daron Acemoglu, Simon Johnson, and James Robinson. The colonial origins of comparative development: an empirical investigation. *The American Economic Review*, 91 (5):1369–1401, 2001.

Alberto Alesina and Eliana La Ferrara. Ethnic diversity and economic performance. *Journal of Economic Literature*, 43:762–800, 2005.

Alberto Alesina, Reza Baqir, and William Easterly. Public goods and ethnic divisions. *The Quaterly journal of economics*, 114(4):1243–84, November 1999.

Jackie Assayag. the making of democratic inequality. caste, class, lobbies and politics in contemporary india (1880-1995). *Pondy Papers in Social Sciences*, 1995.

Radu Ban and Vijayendra Rao. The political construction of caste in south india. *working paper*, 2007.

Abhijit Banerjee and Lakshmi Iyer. History, institutions and economic performance: the legacy of colonial land tenure systems in india. *American Economic Review*, 95(4): 1190–1213, 2005.

Abhijit Banerjee and Rohini Somanathan. The political economy of public goods: some evidence from india. *Journal of development economics*, 82(2):287–314, 2007.

Abhijit Banerjee, Rohini Somanathan, and Lakshmi Iyer. History, social divisions, and public goods in rural india. *Journal of the European Economic Association*, 3(2-3): 639–647, 2005.

Norman G Barrier. *The Punjab Alienation of Land Bill of 1900*. Duke University, 1966.

Susan Bayly. *Caste, society and politics in India*. Cambridge University Press, 1999.

Latika Chaudhary. Social divisions and public goods provision: evidence from colonial india. *working paper*, 69:269–302, 2006.

Latika Chaudhary. Determinants of primary schooling in british india. *Journal of Economic history*, 2009.

Nicholas B. Dirks. *Castes of Mind. Colonialism and the making of Modern India*. Princeton University Press, 2001.

William Easterly and Ross Levine. Africa's growth tragedy: policies and ethnic divisions. *The Quaterly journal of economics*, 112(3), November 1997.

Stanley Engerman and Kenneth Sokoloff. *How Latin America fell behind: Essays on the economic histories of Brazil and Mexico, 1800-1914*, chapter Factor endowments, institutions, and differential paths of growth maong new world economies: a view from economic historans of the United States, pages 260–304. Stanford: Stanford University Press, 1997.

Oded Galor. The demographic transition and the emergence of sustained economic growth. *Journal of European Economic Association*, 3(2-3):494–504, April-May 2005.

Govinda Ghurye. *Caste and Race in India*. London: Routledge and Kegan Paul, 1932.

Shigemochi Hirashima. The structure of disparity in developing agriculture: a case study of the punjab pakistan. *Institute of developing economies*, 1978.

Elise Huillery. History matters: The long-term impact of colonial public investments in french west africa. *American Economic Journal: Applied Economics*, 1(2):176–215, 2009.

Lakshmi Iyer. Direct versus indirect colonial rule in india: Long-term consequences. *The Review of Economics and Statistics*, forthcoming.

Pandit Harikishan Kaul. *Report on the Census of Punjab 1911*. 1912.

Khan Ahmad Hasan Khan. *Report on the Census of Punjab 1931*. 1933.

Rafael La Porta, Florencio Lopez de Silanes, Andrei Shleifer, and Robert Vishny. The quality of government. *Journal of Law, Economics and Organisation*, 15(1), April 1999.

E.D. Maclagan. *Report on the Census of Punjab 1891*. 1892.

Stelios Michalopoulos. The origins of ethnolinguistic diversity: Theory and evidence. *working paper*, 2008.

Edward Miguel and Mary Kay Gugerty. Ethnic diversity, social sanctions and public goods in kenya. *Journal of Public Economics*, 89(11-12):2325–2368, April 2005.

David Omissi. *The sepoy and the raj: the indian army 1860-1948*. Mac Millan, 1994.

Daniel Posner. *Institutions and Ethnic politics in Africa*. Cambridge University Press, 2005.

Daniel Posner. The implications of constructivism for studying the relationship between ethnic diversity and economic growth. In *Ethnicity, politics and economics*. Chandra, Kanchan (ed), forthcoming.

Herbert Risley. *Report on the Census of India, 1901*. 1903.

H Rose. *Glossary of the Tribes and Castes of the Punjab and North West Frontier*. University of California Press, 1911.

H.A. Rose. *Report on the Census of Punjab 1901*. 1901.

Lloyd I. Rudolph and Susanne Hoeber Rudolph. The political role of india's caste associations. *Pacific Affairs*, 33(1):5–22, 1960.

Edward Said. *Orientalism*. New York : Vintage Books, 1978.

Srinivas. *Social Change in Modern India*. University of California Press, 1966.

Annex 1 : the Punjab Alienation of Land Act

Extract of the Punjab Alienation of Land Act :
Sanction of District Officer (Revenue) required to certain permanent alienations. Save as hereinafter provided a person who desires to make a permanent alienation of his land shall be at liberty to make such alienation where: the alienor is not a member of an agricultural tribe; or the alienor is a member of an agricultural tribe and the alienee is a member of the same tribe or of a tribe in the same group.

Annex 2 : the British Raj and Caste legislation

The impact of the British colonization on the caste system has long been studied by historians and anthropologists. Dirks [2001], for example, argues that *"[...] caste is a modern phenomenon, that it is, specifically, the product of an historical encounter between India and Western colonial rule"*. Indeed, the British rule was a period of deep changes for the Indian society, in particular regarding caste. As finely underlined by Bayly [1999], the British Raj has given Indians incentives to turn caste into the salient ethnic identity it has now become: *"[...]from the early nineteenth century onwards, British rule significantly expanded and sharpened these norms and conventions, building many manifestations of caste language and ideology into its structures of authoritative government."* Indeed, not only did the Sepoy mutiny of 1857 lead to the replacement of the East India Company by the British Crown for the administration of British India Iyer [forthcoming], it also *" made it clear to the British that they knew fat too little about the colonized populations of India"* Dirks [2001]. In a global context in which the "science of race" was widely recognized, caste became more and more at the center of colonial policies and data collection. From the 1880's, caste became a central part of the recruiting policy into the army, in line with the "martial race" theory : some castes and "races" were seen as being more martial, more "warlike" and more disciplined than the others, thus making better soldiers (Omissi [1994]). It was thus those castes and "races" only that were allowed in the Indian army. Along the same lines, the Criminal Tribes Act of 1871 put entire caste groups under the suspicion of being criminal. Indeed, in what has been described as the "Orientalist" (Said [1978]) point of view, caste was to define one's characteristic, and to understand India was to understand caste, and thus to create caste directed legislation, of which the Punjab Alienation of Land Act is also a striking example.

Annex 3 : Bahawalpur Agricultural Tribes

As can be seen in Figure 8, the Bahawalpur state exhibits a very specific trend, with the agricultural and non agricultural castes having a symmetric patterns which might either point to a large permeability between agricultural and non agricultural castes in this state or to the fact that something is not properly done in the recording of caste data in this State.

Figure 7: Evolution of the populations of agricultural versus non agricultural tribes in Punjab's Princely States, Bahwalpur excepted. 1881-1921.

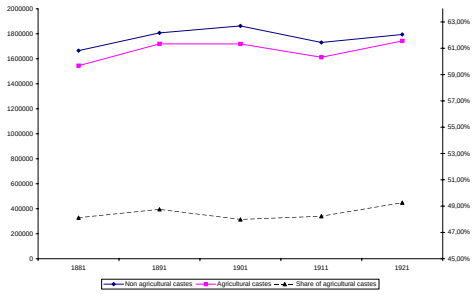
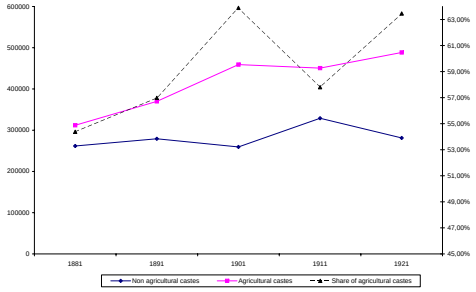


Figure 8: Evolution of the populations of agricultural versus non agricultural tribes in Bahwalpur. 1881-1921.



Annex 4 : Diseases and First World War Robustness checks

In this annex, I propose two different robustness checks in order to rule out the hypothesis that the different demographic shock of 1901-1921 drive my results.

Controlling for the First World War

The first and more straightforward strategy is simply to remove as much demographic shocks as it is possible. Hence, to remove the impact of the First World War and Influenza epidemic, that both happen after 1911, I consider the restricted period of 1891-1911, thus completely negating any impact that those two shocks might have had in the results presented in the paper. I thus use the exact same specification used in model 1 and 2 but using the two 10 years periods 1891-1901 and 1901-1911 instead

Table 9: First World War and Influenza robustness check : within British Punjab. Dependent variable : difference in log-populations.

	State level	District level	
	(1)	(2)	(3)
post	-0.174**	-0.349***	-0.373***
	(0.0827)	(0.0598)	(0.113)
agr	0.0255	-0.142***	-0.144***
	(0.0451)	(0.0426)	(0.0441)
post*agr	0.130	0.299***	0.301***
	(0.0808)	(0.0807)	(0.0840)
Constant	0.0740	0.155***	0.268***
	(0.0447)	(0.0365)	(0.101)
District Dummies	NO	NO	YES
post*District Dummies	NO	NO	YES
Observations	163	1189	1189
R^2	0.041	0.057	0.087

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

of 1881-1901 and 1901-1921. Tables 9 and 10 present the results obtained. With an average impact of 15 percentage points, the results obtained here are in line with the results obtained in the full 40 years sample, thus pointing to the fact that World War I and the influenza epidemic had nothing to do with the results obtained.

Controlling for the plague and malaria epidemics

However, one might still argue that, if not World War I and influenza, it could well be that it is the plague and malaria epidemics of the 1901-1911 period that drive the results. To control for that, I propose to verify whether a change in trend of the agricultural castes population happened around 1911: if the results obtained are driven by the demographic shocks happening during the 1901-1911 period, then we should see a trend specific to the 1901-1911 period, that would not persist after 1911, once the shocks have passed. Hence, if it is plague and malaria that drive the result, the difference in agricultural versus non agricultural castes population trend should be 1901-1911 specific, the identification assumption being here that plague, malaria, influenza and World War I being very different type of shocks, it is very unlikely that they would affect the population of agricultural and non agricultural castes in the same way.
I thus use the exact same specification used in model 1 and 2 but using the two 10 years periods 1901-1911 and 1911-1921 instead of 1881-1901 and 1901-1921. Tables 11 and 12 present the results obtained. We can see that, while the coefficient on agr (in Table 11) and br*agr (in Table 12) is positive and significant in most of the specifications, pointing to the fact that agricultural castes tended to grow faster than agricultural ones in British districts during the whole of the 1901-1921 periods, the coefficient on the interaction between post and agr (in Table 11) is small and non significant, while the coefficient on the interaction between post, br and agr (in Table 12) is also small and non significant in all but one specification, pointing to the fact that there was no change around 1911 in the tendency for agricultural castes to grow faster than non agricultural ones. The

Table 10: First World War and Influenza robustness check : British Punjab vs Princely States. Dependent variable : difference in log-populations.

	State level		District level		
	(1)	(2)	(3)	(4)	(5)
post	-0.0424	0.104	-0.249***	-0.148***	-0.373***
	(0.0711)	(0.123)	(0.0417)	(0.0460)	(0.114)
agr	0.0285	0.0663	-0.0274	0.0129	0.00453
	(0.0534)	(0.0797)	(0.0394)	(0.0410)	(0.0418)
post*agr	-0.0204	-0.166	0.115**	0.0131	0.0254
	(0.0821)	(0.130)	(0.0535)	(0.0569)	(0.0581)
br*agr	0.0315	-0.0408	-0.0753	-0.155**	-0.148**
	(0.0599)	(0.0983)	(0.0458)	(0.0621)	(0.0640)
post*br*agr	0.0191	0.296*	0.0847	0.286***	0.276***
	(0.0638)	(0.157)	(0.0691)	(0.0964)	(0.101)
br		0.0723		0.0798*	
		(0.0802)		(0.0437)	
post*br		-0.277*		-0.202***	
		(0.151)		(0.0680)	
Constant	0.0395	0.00165	0.116***	0.0756***	0.268***
	(0.0454)	(0.0746)	(0.0230)	(0.0257)	(0.101)
District Dummies	NO	NO	NO	NO	YES
post*District Dummies	NO	NO	NO	NO	YES
Observations	309	309	2396	2396	2396
R^2	0.004	0.026	0.035	0.041	0.080

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

negative and significant coefficient on post*br*agr in specification (2) of Table 12 is not in contradiction with the results obtained in the other columns of the table: it has to be related to the fact that the coefficient on post*agr of this specification is positive and significant. Overall, those coefficents mean that the population of agricultural castes grow faster after 1911 in Princely States (coefficient on post*agr) while the evolution of the population of agricultural castes sees no change around 1911 (the sum of post*agr and post*br*agr is close to zero). Moreover, as shown in specifications (5) and (6), as long as the regressions are at the district level, and allow to control for district specific changes, the coefficients on post*agr and post*br*agr become small and non significant, thus pointing to the fact that some of the most populated Princely States, such as Bahawalpur (detailed in Annex 3) for example, see their population of agricultural castes increase faster than non agricultural ones after 1911, but that this effect is not common to all Princely Districts.

Hence, overall, it appears that there is no change in the trend of the population of the agricultural castes around 1911, thus pointing to the fact that the shocks caused by the plague and malaria epidemics did not drive the results obtained, as the trend in the population of agricultural versus non agricultural castes remain constant across the 1901-1921 period.

Table 11: Plague and malaria robustness check : within British Punjab. Dependent variable : difference in log-populations.

	State level	District level	
	(1)	(2)	(3)
post	0.0729	0.200***	0.416***
	(0.0929)	(0.0608)	(0.154)
agr	0.150**	0.172***	0.174***
	(0.0712)	(0.0533)	(0.0547)
post*agr	-0.0615	-0.0678	-0.0663
	(0.101)	(0.104)	(0.108)
Constant	-0.0946	-0.209***	-0.173**
	(0.0647)	(0.0394)	(0.0682)
District Dummies	NO	NO	YES
post*District Dummies	NO	NO	YES
Observations	169	1279	1279
R^2	0.020	0.019	0.047

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Plague and malaria robustness check : British Punjab vs Princely States. Dependent variable : difference in log-populations.

	State level		District level		
	(1)	(2)	(3)	(4)	(5)
post	-0.0979	-0.285***	0.162***	0.119**	0.416***
	(0.0676)	(0.105)	(0.0397)	(0.0481)	(0.154)
agr	0.00692	-0.0999	0.0985**	0.0329	0.0386
	(0.0591)	(0.0778)	(0.0429)	(0.0430)	(0.0428)
post*agr	0.127	0.314***	-0.0936	-0.0502	-0.0616
	(0.0814)	(0.115)	(0.0724)	(0.0773)	(0.0748)
br*agr	0.0506	0.250**	0.00940	0.140**	0.135**
	(0.0366)	(0.102)	(0.0486)	(0.0635)	(0.0654)
post*br*agr	-0.0176	-0.376**	0.0638	-0.0177	-0.00472
	(0.0424)	(0.152)	(0.0935)	(0.120)	(0.123)
br		-0.200**		-0.130***	
		(0.0943)		(0.0407)	
post*br		0.358**		0.0815	
		(0.145)		(0.0747)	
Constant	-0.00166	0.105	-0.145***	-0.0791***	-0.173**
	(0.0471)	(0.0691)	(0.0279)	(0.0281)	(0.0684)
District Dummies	NO	NO	NO	NO	YES
post*District Dummies	NO	NO	NO	NO	YES
Observations	323	323	2730	2730	2730
R^2	0.013	0.040	0.012	0.015	0.043

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1