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Was Capital Expensive in the Colonial Countryside? The View from Uttar Pradesh

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Was Capital Expensive in the Colonial Countryside? The View from Uttar Pradesh

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Abstract

Was capital expensive in Colonial India? This paper addresses this question by examining rents and land prices between 1800 and 1939 in the United Provinces (now Uttar Pradesh) in Northern India. I calculate four different estimates of the rate of return to landownership, which by arbitrage should be linked to the rate of return on land-like capital investment more generally. All show a major decline in real interest rates over the 19th century. By 1870, those used to price landownership were usually less than 5 per cent. By 1900, the rent (net of tax) to price ratio was much the same as in England. The rate of return to land was not far from formal sector interest rates: financial markets were integrated. Over the long run there was rather modest real rent growth. Land prices skyrocketed, however, because of falling interest rates. These results suggest that private property rights were expected to be secure and that capital was not expensive, at the relevant margin for land-like investments, in Colonial India: low investment was due to a low demand for it rather than an expensive supply.

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Introduction and Background

Was capital expensive in Colonial India? Here I examine this question by bringing together long run quantitative evidence on rents and land prices in the colonial period for the state of Uttar Pradesh (shortened here to UP), formerly known as the United Provinces. This lets us examine the capital scarcity view: The rate of return on landownership, by arbitrage, has a link to the rate of return to capital, and ought to be the threshold rate for capital investments that effectively create more land, such as digging a well for irrigation purposes, or other forms of land-like capital. Such a method should be familiar to economists and financial historians. It has been frequently used in studies of the long run rates of return to different asset types (Jorda *et al.*, 2019; Chambers *et al.*, 2021). It has been used by economic historians to examine English agriculture over the long run (Clark, 1998; Offer, 1991; Allen, 1988; Clark, 1988).

This inferred interest rate should be much more relevant for such investments and for capitalist manufacturing than the infamously and persistently high interest rates on small loans to peasants for consumption and short lived intermediate inputs that most sources, both contemporary and modern, point to in support of the high cost of capital argument (Blunt, 1930 - 1931; Moreland, 1911; Nath, 2023). Few equate the high interest rates on working class credit, such as hire-purchase contracts (Scott, 2002), or for small trade loans with expensive capital at the margin in England. Alfred Marshall, for example, quoted a rate of 10 per cent per day on small loans between London costermongers (Marshall, 2013, p. 489). For some, credit was expensive in the financial capital of the world. This paper empirically examines whether it was, at a relevant margin, in a poor agrarian society.[1]

The relevant cost of capital, for our purposes, is the user cost of capital, which is the sum of interest and depreciation times the price of capital goods. Consider the standard first order condition for optimality in the use of capital in the standard neoclassical production model:

[1] Keller *et al.* (2021) point out that the pawnshop (i.e. small poor lender short term) interest rate is not the appropriate one when comparing Qing China to Europe. They instead use the seasonal movement of grain prices to infer real interest rates and find that, at this margin, they were far lower in China than commonly assumed, although still substantially higher than in England. I use a different market and look at India rather than China here.

$$P_Y * MPK = (i + \delta)P_k \tag{1}$$

Where $P_Y * MPK$ is the price of output times the marginal product of capital (which is the endogenous variable here in partial equilibrium), and $(i + \delta)P_k$ is the sum of interest and depreciation rates times the price of capital goods. Depreciation enters symmetrically with interest; it is only their sum that matters. For capital goods like intermediate inputs that depreciate entirely, such as seeds or certain fertilizers, the depreciation term swamps variation in interest rates: if we set the developed country, say English, interest rate for such capital goods at 5 per cent, and if we assume that capital goods cost the same in the two countries, even if interest rates are four times as high in India, then the actual ratio of the user cost would only be $1.2/1.05 = 1.14$. Reliance on the "usurer" is relatively unproblematic for such short lived capital goods, and so it is no surprise that the farmers of India, and elsewhere, often did so.[2] Most estimates of depreciation rates for farm machinery and livestock tend to be at least 10 per cent per year, and so the ratio of capital costs with this rate using the interest rates from the previous example would be two, e.g. Allen (1992, p. 329). By contrast, the depreciation of land, and many land-like investments, is zero, or next to zero, and so the user cost should be extremely sensitive to differences in (implied) interest rates and therefore financial frictions. It is these (implied) interest rates that I focus on here.

Uttar Pradesh is, and was, a highly densely populated alluvial plain. A network of rivers flow through it, most from the North West to the East, of which the Ganges is the most important. It has a long history of civilisation, and was the heartland of a long string of states, up to and including the Mughal Empire. This role shifted to Bengal during British political expansion in India, until the capital was moved to Delhi in the early 20th century. Colonial administration of UP was built up over a long period of time. The first portion to fall under colonial rule was in the East, around the religious center of Benares, during the late 18th century. The Western and Southern portions were absorbed by the British through a mixture of conquest and treaty around 1800. These components became known as

[2] And yet fertiliser usage in India was much smaller than in comparatively high interest rate China where "peasants who had to purchase beancake on credit paid an effective interest rate of 20 percent a month for the five-month period between the application of the fertilizer and the harvest" (Huang, 1990, p. 109). Thus there is much more to the observed lack of usage of capital than it being expensive.

Table 1: Distribution of Tax Payments: United Provinces

Tax Payment in Rs.	Taxpayers	Taxes (Rs. Lakhs)	Implied Post Tax Recorded Rental (Rs. Lakhs)	Share of Payers	Share of rent
<25	1,710,530	100.5	159.1	84.815	14.764
25 to 50	142,890	50	79.2	7.085	7.348
50 to 75	53,288	32.5	51.5	2.642	4.777
75 to 100	28,369	24.6	38.9	1.407	3.61
100 to 1,000	75,813	190.5	301.6	3.759	27.985
1,000 to 5,000	5,089	97	153.6	0.252	14.255
5,000 to 20,000	627	58.9	93.2	0.031	8.649
20,000 to 100,000	148	62.3	98.6	0.007	9.146
100,000 >	29	64.4	102	0.001	9.465

Source: Pant (1948, Vol II, pp. 1-2). **Notes:** Pant (1948, Vol II, p. 87) gives the ratio between post tax rent and revenue payments as 1.583. I use this figure to get the implied post tax rental from revenue payments. 1 Lakh = 100,000. This table ignores landowners who did not pay taxes directly to the government but did so through a superior, of which there were 324,782 in 1945 (Pant, 1948, Vol II, Page 52).

Agra Province. The North and Center of the current state was, until 1856, part of the Princely State of Oudh (alternatively spelt Awadh), internally self governing but with external affairs controlled by the British, with its largest city and capital being Lucknow. Oudh was (infamously) annexed by Lord Dalhousie on the pretext of misrule in 1856, and thereafter it became a province of British India. The two provinces of Agra and Oudh were then eventually merged to form the United Provinces, and after independence the name was switched to Uttar Pradesh.

In the vast majority of cases, an incident of landownership in Uttar Pradesh was the responsibility to pay land taxes.[3] This was described by the Colonial state with the euphemistic term of "the right to engage for the revenue". Land taxes were fixed for a term of years. At the end of the term, the state re-assessed the tax alongside making adjustments to land records, in a process known as "survey and settlement operations". The reports written up for each district following these are the source of the vast majority of my data.

Since paying the land tax was an incident of landownership, tax records allow us to examine the distribution of landownership: Table 1 presents the distribution of land tax payments in the United Provinces in 1947. It shows an extremely skewed distribution of land tax payments, and therefore

[3]With the exception of certain tax free properties whose privileges usually had been acquired in the Mughal period. Landowners were traditionally called *zamindars* in Northern India, *zamin* being the Persianate Hindi term for land.

Table 2: Distribution of Land by Tenure: United Provinces

Year	Landlord Home Farm	Customary Tenants	Tenants-at-Will, Leaseholders, Misc	Life Tenants	Total Area
1899-1900	7,150,000	10,240,000	18,920,000	0	36,310,000
1926-27	6,930,000	16,290,000	2,170,000	13,050,000	38,440,000
1935-36	7,330,000	15,180,000	2,770,000	14,030,000	39,310,000

Source: Pant (1948, Vol II, p. 90). **Notes:** Customary tenants are traditionally called occupancy tenants in Anglo-Indian jargon.

presumably income from landownership.[4] While there appear to be little economies of scale in Indian agriculture, concentrated landownership appears to have been due to widespread insecurity of rural property in pre-colonial India, e.g. Siddiqi (1970, pp. 36-39) and Alam (2013, Ch. 3). To own land you had to invest in defending it, and this technology did have economies of scale, or at least was part of an inequality breeding winner-take-all contest. This reason for inequality gradually disappeared with the British conquest (certainly not overnight), but existing property rights were respected so long as taxes were paid, and would largely go unchallenged by local society until the 1930s. The decline in the rate of return on land that we will find later on may perhaps be considered a novel, market-driven, reason for inequality: thriftless traditional landowners may have been enticed - entirely voluntarily - to sell to a low time preference minority. One implication of this degree of inequality is that financing agricultural fixed capital investment through retained earnings on a large scale was feasible - the rate of return to land should be the relevant hurdle rate and not that on mortgages.

Another was that most land was tenanted. Table 2 presents the area cultivated under different types of tenure for the early 20th century. Just under 20 per cent of the cultivated area was farmed by the landowner, although these owner cultivators almost certainly relied on wage labour to do most of the actual work. The rest was tenanted, but a third to a half of this was held by tenants with long term customary tenancies with security of tenure. Such tenants were known as occupancy tenants. Their

[4]Uttar Pradesh has traditionally been considered as dominated by large landlords in comparison to the peasant proprietors of the neighbouring Punjab. This is, to a large extent, only superficially true - out of the 3.5 million landowners in the Punjab in 1925, 2 million of them held only 12 per cent of the cultivated area (Calvert, 1925). The top 3.7 per cent held 25.7 per cent of the area in the Punjab. The real difference between the two provinces was therefore the degree of inequality within the landowning elite. My impression is that the rent to output ratio was higher in the Punjab and so a given level of land inequality had a greater impact on overall inequality.

rents were stabilised rather than controlled, and when such a tenancy was surrendered to the landowner (perhaps for a monetary consideration) the rights were extinguished.[5] In the 1920s, legislation by the new, elected, provincial governments, despite a landowner-skewed restricted franchise, made the minimum lease length a life time one.[6] As most land was tenanted, and I can distinguish between market and customary rents, my rent observations should be representative. Indeed, most observations are in fact the average rent per acre for the entire district rather than coming from a (perhaps unrepresentative) sample of plots, because they come from comprehensive cadastral survey operations. Sources are stated in the supplementary materials.

Prices

Before I examine nominal rents and land prices, in this section I construct a long run price series for wheat that will be used the deflate nominal prices. This is a proxy for foodgrains as a whole. UP grew a wide variety of crops but food grains were overwhelmingly predominant. Wheat, it is true, was only one of these alongside millets, barley, and rice. Nevertheless it is reasonable to suggest that the price of wheat was cointegrated with the price of these cereals. I run the following regression to extract long term nominal trends, with year dummies and an urban dummy:

$$Ln(Price_i) = \sum_{t=1763}^{1945} \beta_t^{Price} Year_t + \gamma_{Price} Urban_i + \epsilon_i^{Price} \tag{2}$$

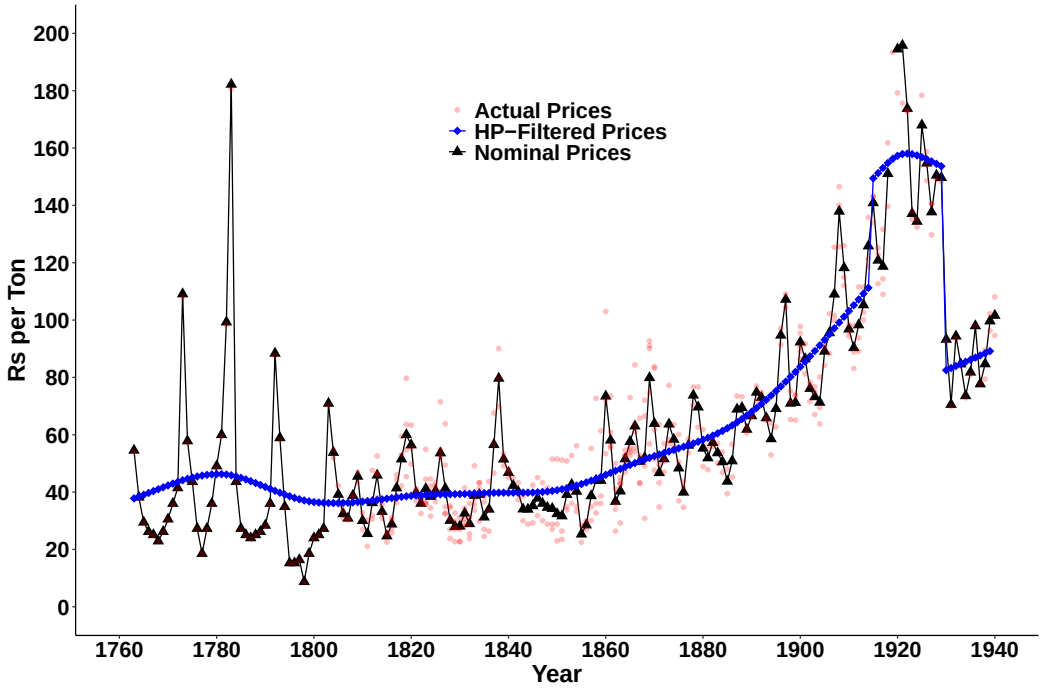
The recovered price in each year in Rs per Maund (around 37 kg, 82.28 lb) is e to the power of the coefficient on the year dummies.[7] I convert these to Rupees per Ton. The raw data and the extracted trend are presented in Figure 1. I have also included a series smoothed by the Hodrick-Prescott filter

[5] 12 years' continuous cultivation in the absence of a written contract to the contrary created a strong presumption of the creation of such rights. This was an incentive towards the grant of written tenancy agreements. There were a comparatively small number of tenants with permanently fixed rents. These were concentrated in the East of the province.

[6] Rent increases were capped during the lifetime but could be reset on the natural expiry of the tenancy or if the tenant surrendered the holding to the landowner. Thus this would be considered "second degree" rent control, which some consider not particularly inefficient (Arnott, 1995).

[7] I.e. the rural price. The urban dummy turns out to be basically (indistinguishable statistically from) zero and have the wrong sign (-0.009).

Figure 1: Nominal Wheat Prices



Sources: See text and supplementary material. **Notes:** The red dots are the raw data, the black triangles are the extracted trend.

(with $\lambda = 5000$, and a break in the trend between 1915 and 1929 and $\lambda = 500$ for that brief period) which abstracts away from short run fluctuations to capture the long run trend. It appears that, before 1860, nominal wheat prices were stationary around a long run mean, and after that year the long run trend for prices was positive.

Rents and Land Prices

The economy of UP was overwhelmingly agricultural, and so land rents were a topic of interest to most of the population. We have data on rents because, as mentioned above, the state also had an interest in them. How was the land tax levied? In the late Mughal and very early Colonial periods it was whatever could be squeezed out of landowners, and tax farming was not uncommon. This ended in British territories after 1815 or so. When tax farming ended, estates had lump sum taxes levied upon them, but as there had been no detailed survey, this was condemned as unequitable (especially as often many

estates had a large number of shareholders), and so in the 1830s the Colonial state decided to survey land in order to set the tax regime in order. As a by product of this, records of ownership and possession were written up, and so Uttar Pradesh got modern land records long before - as far as I am aware - anywhere else in Asia, and, indeed, long before most of England did.[8] This was described as "a system of land registration which for its cheapness, comprehensiveness and accessibility is probably without a parallel in any country in the world" (Darling, 1938, p. 6).[9] Even allowing for official hyperbole, it is safe to conclude that economic underperformance in Uttar Pradesh was not because land rights were not well recorded. Taxes were officially meant to take a certain share of the assets of the land, i.e. the gross rental. Tax rates per acre were based on average rent rates within a given area for that class of land, so as to ensure low marginal tax rates alongside fairly steep average ones, and were fixed for long terms before resettlement.[10] There were also long term tax exemptions, for at least 30 years, for landowners who made improvements (Moreland, 1911, p. 46). Thus high marginal tax rates were not an issue here.

I run the following regression on a dataset of 3,328 rent observations to extract long term nominal rent trends:

$$\begin{aligned} Ln(Nominal\ Rent_i) = &\sum_{t=1795}^{1945} \beta_t^{NO} Year_t + \sum_{t=1859}^{1945} \beta_t^{O} Year_t * Occupancy_i \\ &+ \sum_{k}^{K} \gamma_k District_k + \eta Irrigated_i + \mu FixedRent_i + \epsilon_i^{NO} \end{aligned} \tag{3}$$

Where $Year_t$ is an annual dummy, $Occupancy_i$ is a dummy for whether the rent is for an occupancy tenant or not, $District_k$ is a district dummy, $Irrigated_i$ is an irrigation dummy (only a small subset of rents were explicitly for irrigated land), and $FixedRent_i$ is a dummy for if the rent is a fixed rent tenure and the year is before 1859.[11] The recovered rent in each year in Rs per acre is e to the power of the

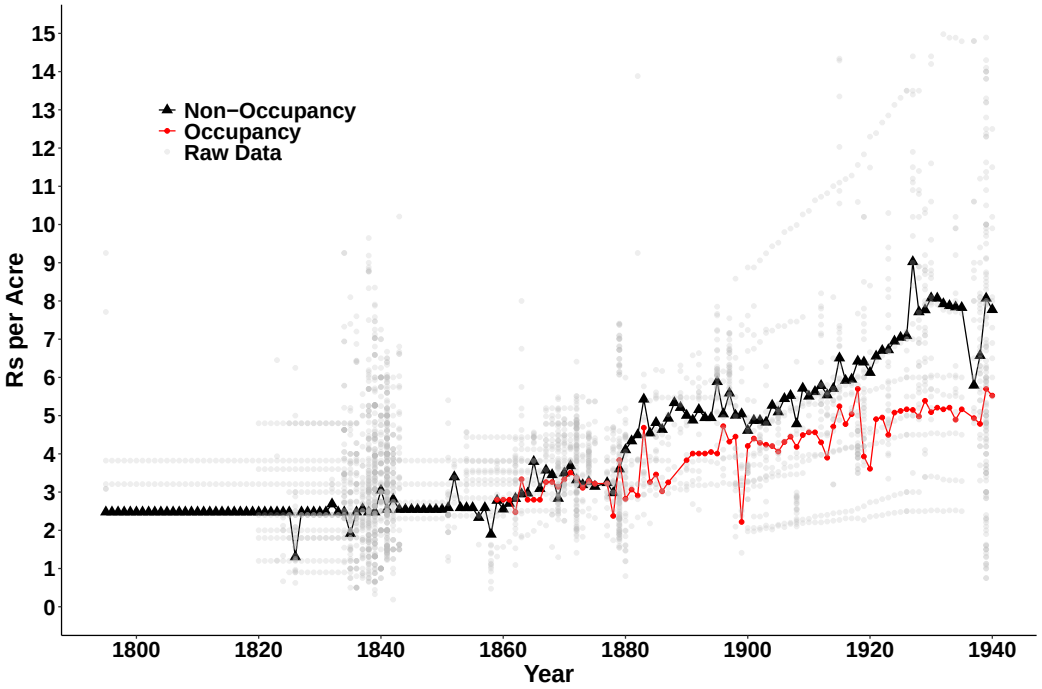
[8] See Chapters XIII to XXII of Moreland (1911) for details.

[9] Or rather that of the neighbouring province of the Punjab, which had essentially the same system of land records as UP.

[10] If taxes are based on average rent rates in a district subdivision, an individual landowner will not internalise the effect of raising rents on taxation. The exception would be for the largest estates.

[11] Nominal rents rose substantially after this point, and so including the fixed rent dummy for these years after 1859 would suggest very high rents for non-fixed rent lands for early years. In practice, the fixed rent tenancies were in the initially high rent east of UP. As these were fixed at an early date, and were not abandoned (the figures were reported in Settlement Reports

Figure 2: Annual Nominal Rents per Acre



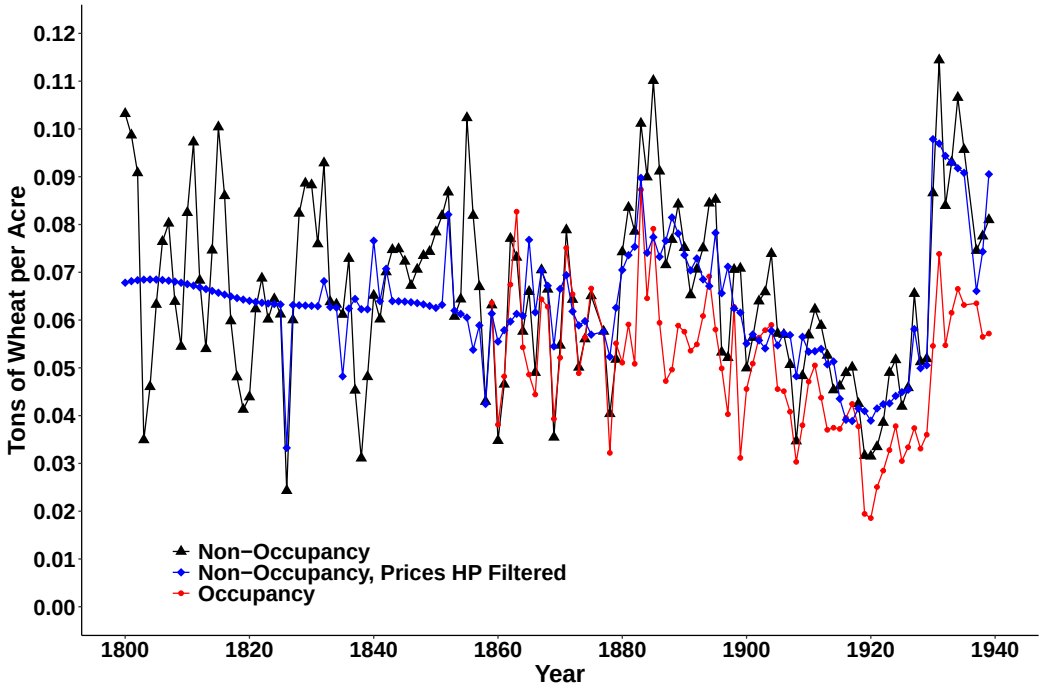
Sources: See text and supplementary material. **Notes:** The black line is for non-occupancy, i.e. competitive and statutory tenancies. The red line is for hereditary (Occupancy) tenancies.

coefficient on the year dummies.

The raw data and the extracted nominal rent trends are presented in Figure 2. Rents in terms of wheat are presented in Figure 3. There was a substantial increase in nominal rents over time, but in real terms rents did not rise by as much. It appears that they lagged behind inflation between 1860-80 and then from 1890-1920; the tenants were benefitting from the landlords' inertia - the "rack-renting" Indian landowners were commonly accused of, by both colonial officials and nationalists, does not appear in the data here. Occupancy rents, as you may expect, were slower to adjust, especially in the interwar period. There is still a long run increase in real rents, even if after 1920 most nominal rents became controlled, and inflation tended to keep the real rate of increase down. The first few years are unrepresentatively high (the 1790s were a period of unrepresentatively low prices across Northern India), and the last few are unrepresentatively low (wartime inflation raised nominal prices rapidly before rents could adjust). Accounting for these, and the inertial nominal rent periods, there was a

around 1880), these figures bias my rent path against growth in the early years where the fixed rent figures dominate.

Figure 3: Annual Rents Expressed as Tons of Wheat



Sources: See text and supplementary material. **Notes:** The black line is for non-occupancy, i.e. competitive and statutory tenancies. The red line is for hereditary (Occupancy) tenancies.

rather slow growth of real, competitive, rents from 0.065 tons per acre to 0.1 tons per acre or so. That is clearest on the non-occupancy series that has been deflated by the HP-filter long run trend in prices. As fairly extensive enquiries were made into rents during survey and settlement operations it is unlikely that rents were being concealed frequently enough to bias these results downwards to make a major difference. Such slow growth in real rents, of course, confirms the slow expansion of the agricultural economy. Inferences about yields, however, require a rent to output ratio. Below we will see that rents were at most 25 per cent of output in the early 20th century. Most sources on the burden of rents (or land taxes, which came out of rents), by contrast, for the 18th century and earlier suggest a ratio of a third to a half, so the rent figures probably understate output growth (Moosvi, 2015, p. 419), (Siddiqi, 1970, p. 48).[12]

I run the following regression on a data set of 1,505 land price observations to extract long term

[12]The cultivated area apparently doubled (Moosvi, 2015, Ch. 2).

nominal land price trends:

$$Ln(Land\ Price_i) = \sum_{t=1795}^{1945} \beta_t^{LP} Year_t + \gamma_{TA} D_i^{TA} + \sum_{k}^{K} \gamma_k^{LP} District_k + \epsilon_i^{LP} \tag{4}$$

I include district fixed effects and a dummy (D_i^{TA}) equal to one where the price was per total acre of the estate rather than per cultivated area. The price per cultivated area is more appropriate when comparing prices to rents, and as most transfers were shares in estates, they included a lot of land that did not pay much in the way of rent. The author of one survey and settlement report considered the recorded selling prices of land to be unreliable, since land was rarely sold free of encumbrances - he thought they "far understate" the real selling value, and quotes much higher prices from enquiries in villages (Stoker, 1891, p. 30).[13] I believe that since I have accounted for whether or not the selling price covered an entire (share in a) property versus an individual specific field, my results do not over-estimate the rate of returns for this reason to any large extent.[14] The recovered price per acre in each year in Rs is e to the power of the coefficient on the year dummies. The raw data and the extracted nominal series are presented in Figure 4. Real land prices are presented in Figure 5. Real land prices rose considerably, due to a combination of rising real post tax rents, and, as I will now show, declining interest rates.

The Rate of Return to Land

Land values have classically been judged by the (net) rent to price ratio. My estimate for this is:

$$\text{Rent To Price}_t = \frac{\text{Rent}_t}{\text{Price}_t} \tag{5}$$

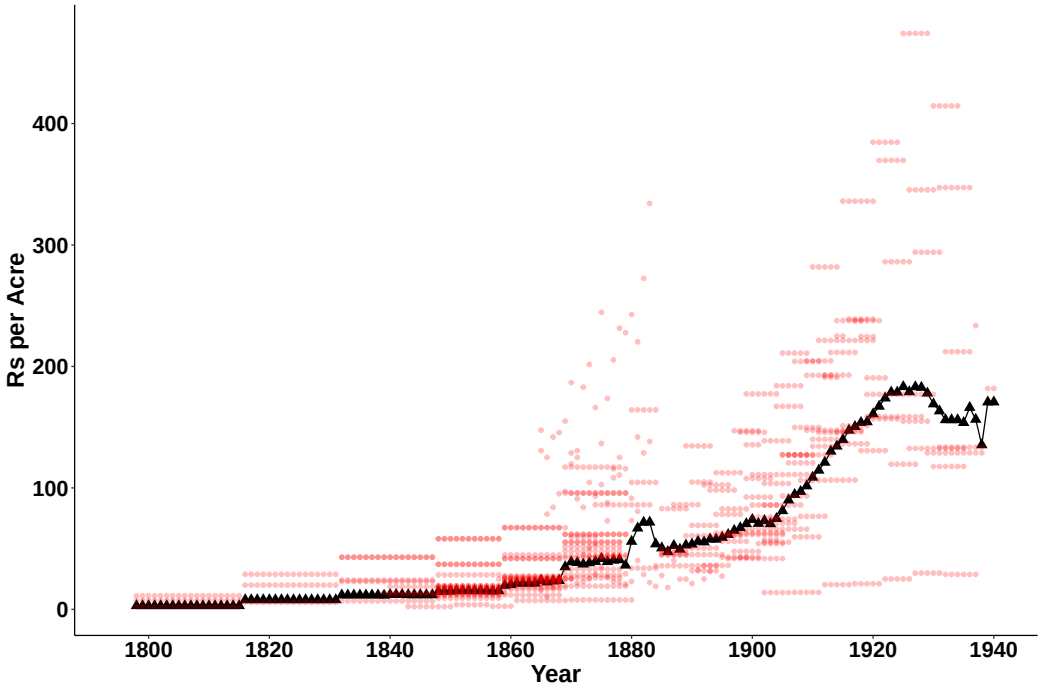
Where the rent is net of taxation. An equivalent measure is the years' purchase, the inverse of the rent to price ratio.[15] This is slightly different to conventional modern asset pricing, where the return to

[13] This was apparently true elsewhere in India (Atchi Reddy, 1996, p. 176).

[14] In the late 1930s the ratio between the net cultivated area and the total area according to the village papers was approximately 0.52, which is within the 95 per cent confidence interval (0.49,0.57) of the ratio implied by my regression coefficient, *Stat. Ab.*, 1930-40, p. 550, figures for 1939-40. The same approximate ratio between prices per total area and price per cultivated area sold appeared in the Punjab too (Rai, 1937). Thus my figure is reasonable.

[15] The districts used in my land price series are a subset of those in the rent one, and in both cases the reference point is the

Figure 4: Nominal Land Prices per Acre



Sources: See text and supplementary material. **Notes:** Land prices were usually reported as an average for a range of years before 1860. As they were growing over the period, my figures have long periods of flat values followed by discrete jumps.

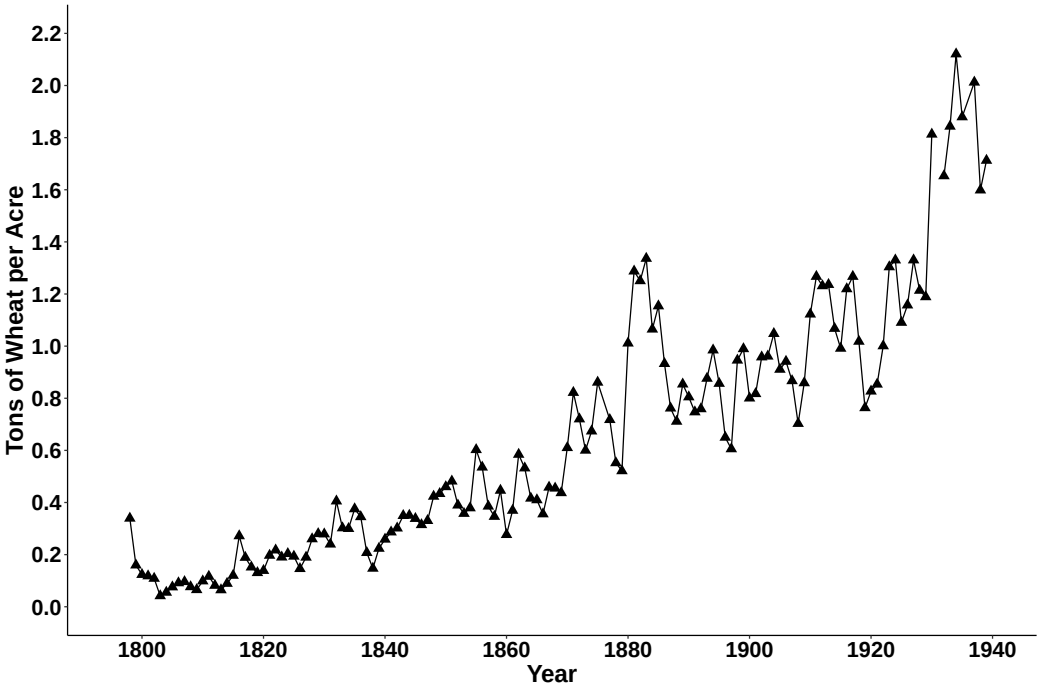
owning an asset is:

$$R_t = \frac{\text{Rent}_t}{\text{Price}_t} + \frac{P_{t+1} - P_t}{P_t} \tag{6}$$

Which also includes real capital gains on land values. The logic of arbitrage tells us that R_t should, on average, equal the real interest rate plus a risk premium. Land was taxed and what land purchasers actually care about is the rental income net of taxes (and administration costs). For simplicity and because no acreage estimates exist for early years, I assume that the land tax equalled 1.7 Rupees per acre initially and that the land tax grew at a constant compound rate in nominal terms until it reached 2 Rs in 1929, before dropping to 1.75 Rs in 1935. For a baseline set of years this approximation is within 10 per cent of the actual value. Figure 6 shows that this tracks the official average target tax to rent ratio

grand mean (not some particular district). Were these representative? I regressed the extracted rent fixed effect on a dummy variable with a value of one if the district was included in the land price sample and zero otherwise. The dummy coefficient was statistically indistinguishable from zero at the 95 per cent significance level. See the supplementary material for details.

Figure 5: Land Prices per Acre Expressed as Tons of Wheat



Sources: See text and supplementary material. **Notes:** The higher than trend price in the first observation is due to very low wheat prices for that year.

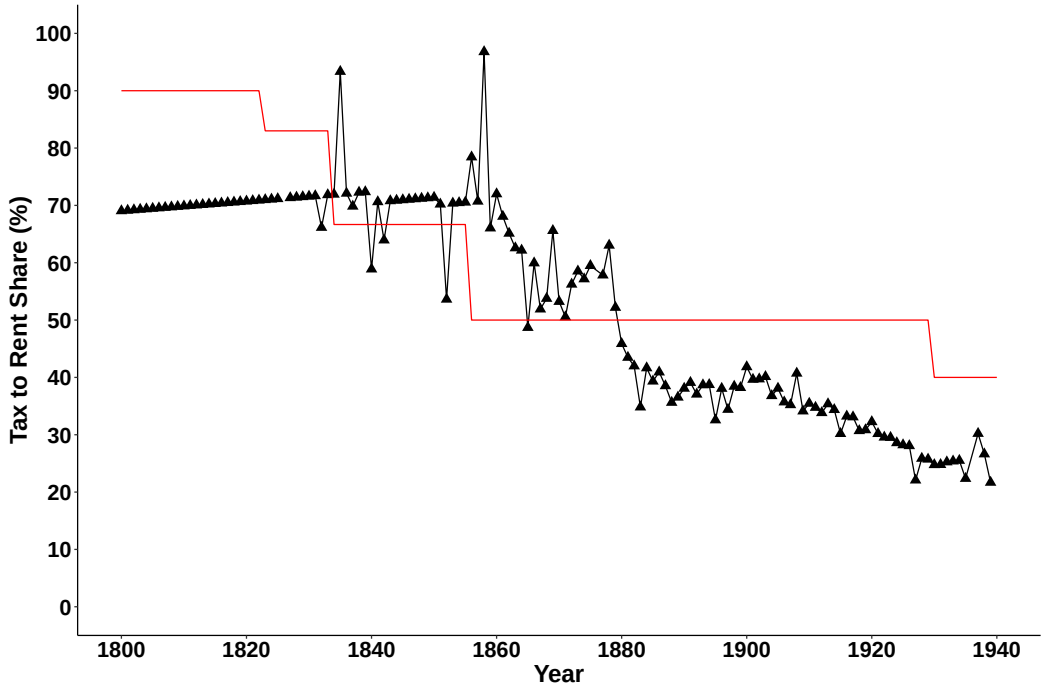
fairly closely. I do not account for other charges involved in owning land, to bias my results upwards.[16]

Rates of return are usually highly variable on a year to year basis. Some sort of long run average is required to smooth out these fluctuations. I will present (i) the geometric average annual rate of return implied by these figures for a purchaser who bought land in period t and held it until 1939, (ii) the 20 year forward geometric mean rate of return, (iii) the internal rate of return on land purchases, and (iv) the rent to price ratio. Note that because I end the holding period at 1939, I exclude the low returns during the war period, as inflation far outstripped rents in those years. Thus, by excluding such a "rare event", I bias my rate of return estimates upwards. The first two have the same formula, but with different terminal years:

$$\text{Geometric Mean Return}_{t,T} = \left(\prod_{i=0}^{T-t} (1 + \text{Return}_{t+i}) \right)^{\frac{1}{T-t}} - 1 \tag{7}$$

[16] One estimate for Bengal put these at around 9 to 14 per cent of revenues in the 1930s (Government of Bengal, 1940 - 1941, Vol 1, pp. 307-10).

Figure 6: Implied Average Tax Rates for Landowners



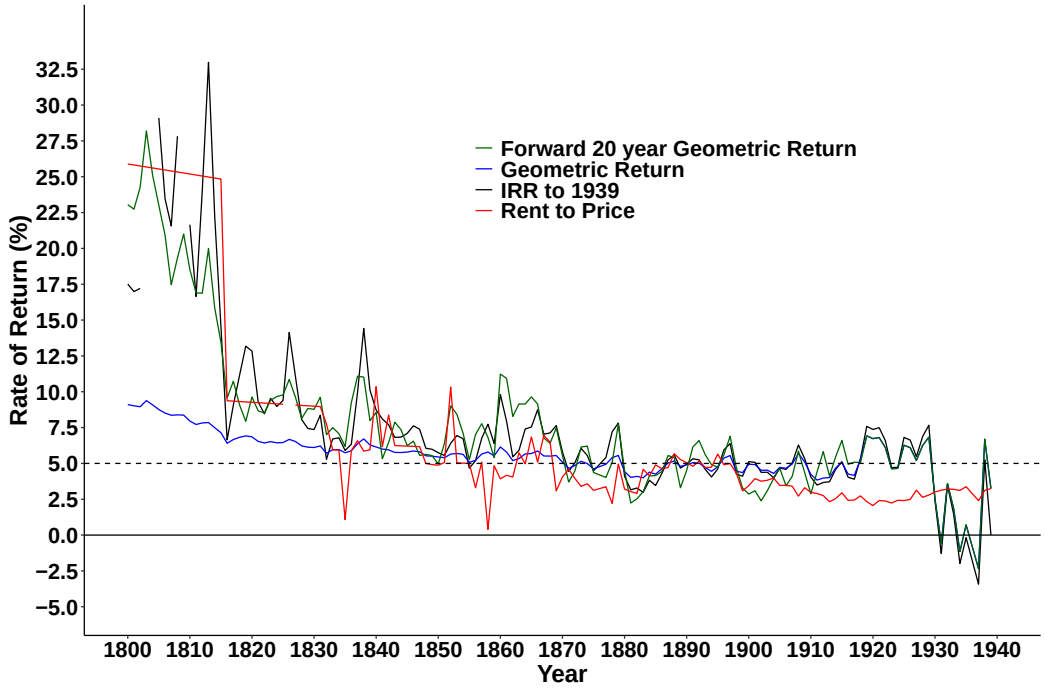
Sources: See text and supplementary material. **Notes:** The black line with triangles represents my estimated series. The red line is the official target average tax rate.

The internal rate of return is more complex. This is defined as the interest rate required to equate the initial purchase price and the net present value of future cash flows:

$$\text{Price}_t = \sum_{i=0}^{T-t-1} \frac{\text{Rent}_{t+i}}{(1+\text{IRR}_{t,T})^i} + \frac{\text{Price}_T}{(1+\text{IRR}_{t,T})^{T-t}} \tag{8}$$

The internal rate of return is frequently used as a hurdle rate for capital investment. Thus it is the most relevant series for the cost of capital for land-like and long lived investments. These rates of return - my main results - are plotted over time in Figure 7. Initially rates of return to owning land were very high. This was presumably due to risk premia, as conditions in the countryside were still rather unsettled, and taxation on an uncertain basis, before colonial rule was consolidated. Around 1815 rates of return dropped considerably, but still to a rather high 10 per cent or so. From then until 1850 there was a gradual decline in rates of return to around 5 per cent. Thereafter they fluctuate, usually being below 5 per cent rather than above it. As the time period shortens most estimates become

Figure 7: Returns to Owning Land



Sources: See text and supplementary material. **Notes:** The four series are explained in the main text. The dashed line is 5 per cent.

volatile. This is to be expected (for the sample size becomes small), but the stability in the rent to price ratio tells us that the source of such erratic movements are capital gains. Note that the rent to price ratio does not spike towards the end of the period, which suggests that landowners were not expecting the oncoming expropriation after independence and thought that the stabilised rents associated with interwar legislation would not fall far behind the market rate.

One reason for confidence in my results is that the rates of return calculated here align with those quoted by contemporary reports:

> In ordinary transactions the value of land is calculated according to the net profits and a price fixed which will render to the purchaser certain number of annas interest monthly on each Rs 100 of the purchase money. Six annas [a month] has generally been considered a fair moderate price. It represents Rs 4-8-0 [4.5 per cent] per annum. Four annas is a high price [3 per cent per annum] and eight [6.2 per cent per annum] to ten [7.75 per cent per

annum] a very low one" (Stoker, 1891, p. 30).

Another source states that:

> "The sale price of land varies to such a degree according to circumstances that it is impossible to make any general statement, but as a rule six per cent, is considered a fair investment" (Nevill, 1905, p. 51).

They also overlap with C. A. Bayly's, the late expert on the history of colonial Uttar Pradesh, view of the return to landownership:

> "[After 1860] A regular return of 5 per cent from landholding backed now by the sanction of law and police became a viable alternative to a return of 10 per cent on less secure trading enterprises, where income was more at the mercy of seasonal factors" (Bayly, 2012, p. 513).

And such rates of return did not only hold in Uttar Pradesh, but held throughout much of British India, including Bengal:

> "The *zamindars* who have purchased the estates ... have generally done so at a price of not less than twenty times the net profit of the property; and so also the tenureholders [permanent leaseholders]. And though the customary rate was at twenty times net profit, it would not be impossible to find out a large number of transactions during periods of prosperity, at a rate much higher than the customary one. And from my personal experience in at least two other provinces, viz., Orissa and United Provinces, I may say that this basis of calculation prevails not only in Bengal but also outside Bengal." (Government of Bengal, 1940 - 1941, Vol IV, Evidence of K. B. C. Sinha, p. 383).

To the extent that we can equate *ex post* realised rates of return with *ex ante* expected ones, the going interest rate in the Indian countryside, for land-like investments, was around 5 per cent or so.[17] This is

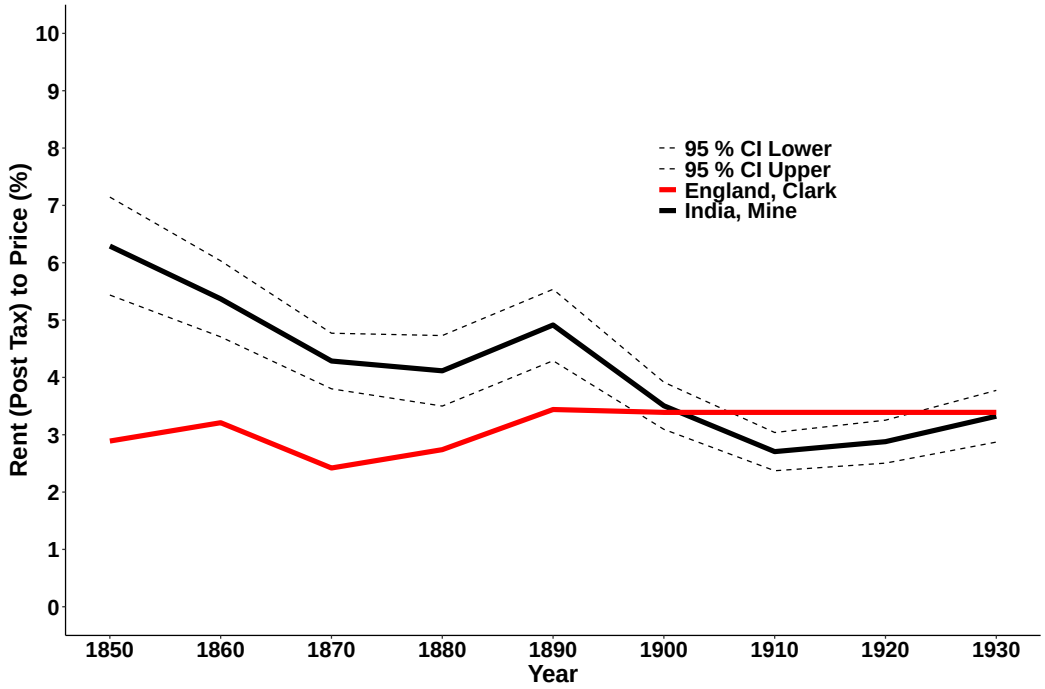
[17] With the exception of the tenth or so of the cultivated area in British India, largely located in Central India and tribal areas, that was not legally transferable.

by no means a high rate of interest. And yet there is a widespread impression that Indian agriculture was held back by capital scarcity. It may be that this mixes up the rate of interest faced by the average ruralite with the relevant rate of interest at the margin for investors. The poor paid high interest rates, it is true, but they should not be expected to make long lived investments in land-like capital. Your average blue collar worker was not investing in cotton and steel mills or other factories himself in developed countries in the 19th century (Allen, 2009). That was a capitalist's job, and so too was it in India. Low investment in Indian agriculture was, it seems, rather due to a lack of demand for capital because there were few profitable investments.

So far my figures do not provide any quantification regarding the uncertainty such estimates inherently contain. I can provide such estimates for the geometric average return by means of the bootstrap method. What this means is that I repeatedly sample (with replacement) from the observed set of annual returns and calculate the geometric mean for each of these samples. This gives me a distribution of geometric means from which I can calculate standard errors, and therefore confidence intervals. To exclude the early, unrepresentatively, high return period, I start the sampling from 1830. This results in a 95 per cent confidence interval of 1.24 to 9.76 per cent; it is highly unlikely that, if you think this is a reasonable approach, the real rate of return to landownership (and, by assumption, fixed capital) was as high as 10 per cent per annum.

I now make two comparisons to put my estimates into context. First, my series for the rent to price ratio can be compared to Gregory Clark's ratios for England (Clark, 1998). Clark estimates two series, one based on individual plots, and the other from the same method as me with the ratio of averages extracted from regressions. I will make use of the latter. Clark reports values for decadal periods, and so I re-ran my regressions with decade instead of year dummies. This should also allow us to quantify uncertainty better. Since my rent to price ratios are the product of e to the power of one coefficient minus another, I use the delta method to construct approximate standard errors for the rent to price ratio, and I use this to construct 95 per cent confidence intervals. Figure 8 plots the results and Clark's series from 1850 to 1930. Clark's series ends in 1900-9, and so I have extrapolated his figure for that year for

Figure 8: Rent to Price Ratios in an International Context



Sources: See text and supplementary material. **Notes:** Clark's series finishes in 1900-09, I extrapolate that decade's figure forward for the next two decades. Standard errors used to construct the confidence intervals were constructed with the delta method as outlined in the text.

the next two decades. This is consistent with the evidence of Chambers *et al.* (2021, Fig. 9).[18] Initially, the rent to price ratio, as you would expect, was much higher in India - twice as high at least - but this gap declined and by 1900 it was the same essentially in both countries.

Second, I compare the return to landownership to observed market interest rates in India. I have brought together 611 observations for nominal interest rates in colonial India between 1790 and 1940. Sources are provided in the supplementary material. I run the following regression to extract trends:

$$\text{Interest Rate}_i = \sum_d \beta_d \, \text{Decade}_d + \sum_c \gamma_c \, \text{Category}_c + u_i \tag{9}$$

That is, regressing the interest rate observations (indexed by i) on a series of decadal dummies (decade indexed here by d) and category of loan dummies (indexed by c). The categories of loans

[18] It is interesting to note that real rents in England never recovered after the inflation of the late 1910s eroded the value of existing ones, and so "under-renting" was not unique to UP. Nominal rent data from Feinstein (1972, p. T60, Tab. 23) and price level data from Thomas & Dimsdale (2017).

Table 3: Interest Rate Spread Estimates

Category	Estimate	Std. Error
Bazaar Rate	2.845***	0.376
Dividend Yield	-0.794**	0.247
Government Debt	-1.15	1.153
Indigenous Banker	2.525***	0.159

Sources: See text and the supplementary material. **Notes:** Each estimate is the spread between the category of loan and the discount rate of the Presidency banks.

considered here are bazaar rates for small traders, those offered by indigenous banking firms (one series from UP and another from the South Indian Chettihars), those on government debt (from the EIC period), the ratio between dividends and the market price of Bank of Bengal stock, and various discount rates offered by the main banks in India, the presidency banks (which were later merged to form the Imperial bank). The baseline series is the discount rate one, as the rate of interest offered to small traders is clearly not the appropriate one for investments in real estate. The presidency bank discount rates were market rates of interest and had nothing to do with monetary policy. They represented the rates on short term loans to businesses.

Since the spreads between different categories of loans are of interest in themselves, Table 3 presents my estimates. The indigenous banker and bazaar rates are around 2.5 percentage points higher than those in the formal, western-style banking system, implying, after 1870, that such loans were, at first glance, 50 per cent or so more expensive. Despite this, the indigenous banking system survived on a large scale (Jain, 1929). Why? The simple answer is that, although they charged higher rates, indigenous firms also provided other services: they asked few questions, they were willing to lend small sums with limited security and on short notice, and they implicitly provided insurance bundled with credit in the form of highly flexible repayment schedules. That said it is likely that some of the difference did in fact represent financial frictions. Figure 9 plots my estimated net rent to price series, and the ex post nominal return to landownership (net rent to price ratio plus long run nominal capital gains, assumed to be 2 per cent per annum, the post 1860 average) alongside the predicted path of interest rates from the above regression. The first two series can be informally considered lower and upper bounds on the ex ante required nominal rate of return on landownership. The interest rate series usually falls within

the lower and upper bounds, which is what the capital market integration view of the world would predict.[19] The Indian countryside was therefore financially integrated with the commercial centers in the coastal cities and was, as a result, so too with the global economy. There does not appear to be much evidence for a "psychic premium" to landownership here, which would have been the case were the return to land series persistently below the interest rate one. There was little money to be made, on average and in equilibrium, by selling your land rights and lending the money out for interest. This also explains why Europeans did not systematically purchase land in India - there were few profits to be made. There were some downsides, however, as low rates of return to land also imply that purchasing outright ownership was beyond the means of the landless and smaller tenants who did face high interest rates and were unable to self-finance such transactions. They would have to make do with aspiring to occupancy rights as an imperfect substitute instead in the absence of a political mechanism for the reallocation of landownership.

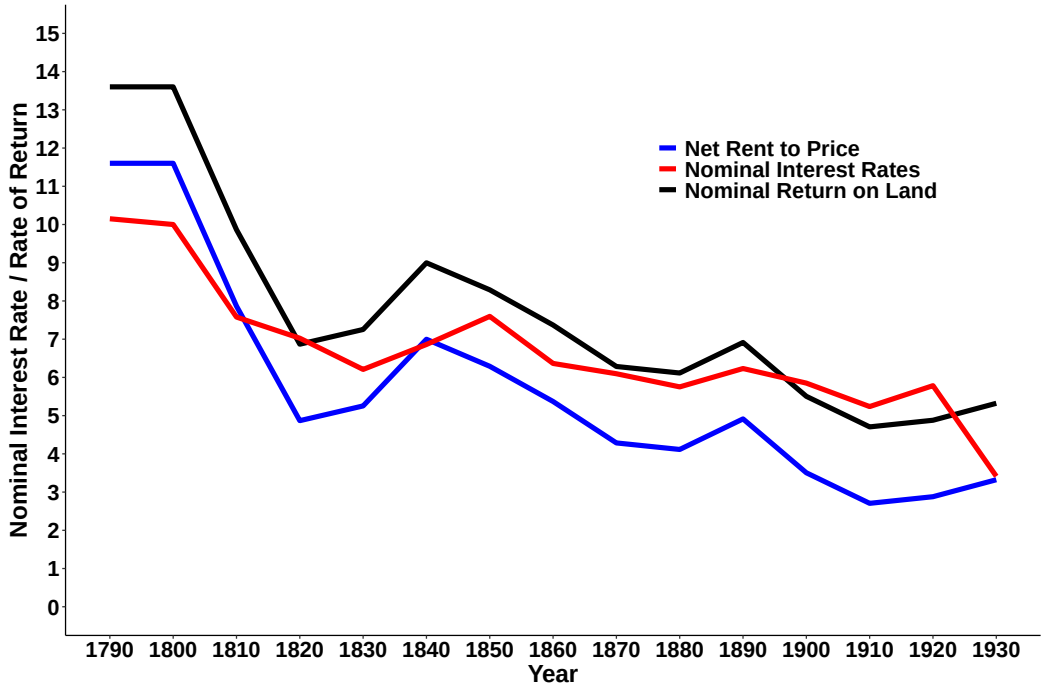
How Burdensome Were Rents?

We do have official direct agricultural output estimates from 1891 onwards (Blyn, 1966, App. Tab. 4c). I use these to calculate implied gross rent to agricultural output ratios, as well as the post tax landowner share of agricultural income.[20] Figure 10 plots these two ratios over time. From 1890 to 1930 the trend in the rental share is downwards. That is most likely because rents failed to keep up with prices, rather than the actual Ricardian surplus declining. Thus tenants were benefitting at the expense of landlords. Following the inflation associated with the breakdown of the gold standard after the First World War, rents were 10 per cent or so of output. What went down had to come back up as the price level did the opposite during the Great Depression. The rent to output ratio almost doubled in the space of a few years, almost entirely due to deflation rather than nominal rent increases. While this clearly sparked much of the anti-landlord agitation of the 1930s and fuelled support for the radical elements of Indian

[19]The main exceptions are 1910 and 1920. There is an obvious explanation, however: rents had lagged behind inflation and landowners were expecting rent increases.

[20]Note that the accuracy of these estimates is debatable. In particular, output and yields may be initially overstated but understated by the interwar period, but in the absence of any others I will stick with them.

Figure 9: Were Land Markets Integrated with the Financial Sector?



Sources: See text and supplementary material. **Notes:** The red line is my predicted nominal interest rate series. The blue line is my net rent to price ratio. The black line is my rent to price ratio plus two, which was approximately the long run annual average rate of nominal capital gains after 1860. Including the early years raises the average to 2.4, but I do not believe those initially high rates were expected, and certainly were not expected going forward. The blue and black lines can informally be considered as lower and upper bounds on the ex ante require rate of return to land.

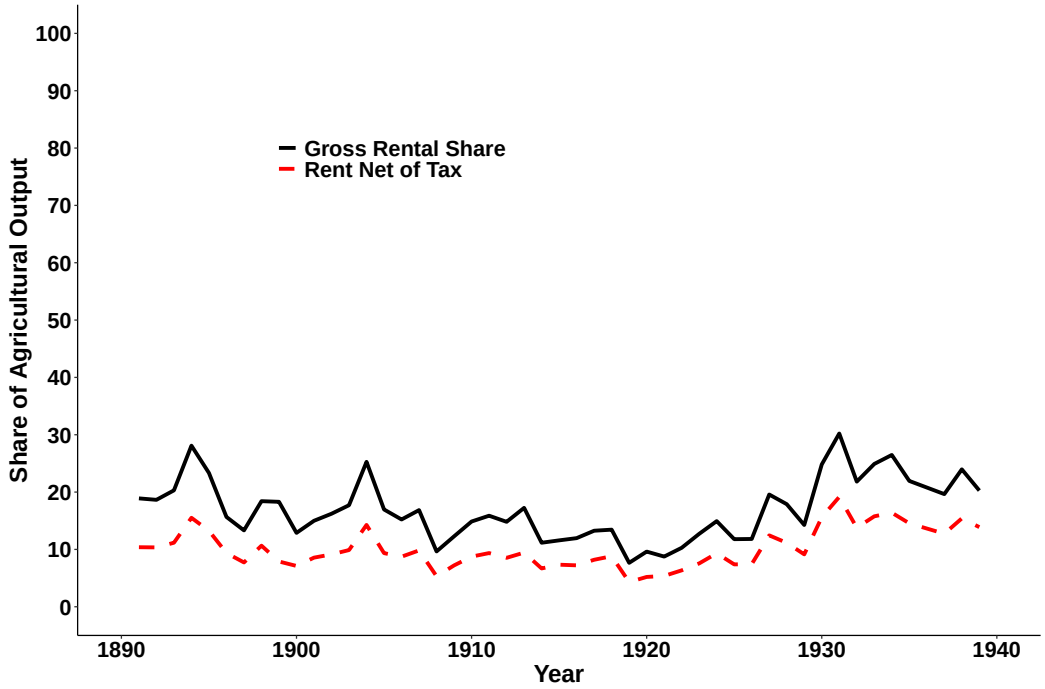
political parties, it was actually just a return to the normal burden of rents.[21] Counter-intuitively, the rent stablisation policies of the 1920s were followed by a severe increase in their burden.

These figures suggest limited landlord "exploitation" in Uttar Pradesh.[22] Why were rents so low relative to output, even at their highest shares? One explanation may be that, despite high population densities and low wages, labour was not actually cheap; low wages reflected low labour intensity levels, as has been found for the industrial sector in British India (Wolcott & Clark, 1999). Such an explanation

[21]The early nationalists often came from the landed interest, but by the 1930s the Congress party had turned towards a socialist perspective.

[22]Unless landowners captured the other portion of the Ricardian surplus through other means, e.g. linking tenancy contracts to those in other markets. There is little evidence for this position. The 1929 Provincial Banking Enquiry estimated credit lent by landlords for agricultural purposes to tenants as only 0.15 of the total - the rest was lent by tenants and professional moneylenders (Blunt, 1930 - 1931, Vol 1, p. 121). The total amount was 60 million Rupees, and even assuming an interest rate as high as 30 per cent, the gross interest income would amount to less than a Rupee an acre. There was a competitive marketing system with many small traders - landlords were not important here.

Figure 10: Rental Shares of Income



Sources: See text and supplementary material for details on rents and taxes. Agricultural output per acre values from the Official agricultural statistics as compiled by Blyn (1966, App. Tab. 4c). **Notes:** The black line is the gross rent to output ratio, and the dashed red line is the net of tax rental income to agricultural output ratio.

would conveniently account for low yields, and a lack of rural-urban migration in an open economy.[23] An alternative would be strong tenant market power.[24] There was indeed substantial inequality in the distribution of tenancy holding sizes, and historians do point towards the existence of a middle class group of farmers who dominated the village on the ground, e.g. Stokes (1978). One issue with this is that it would beg the question as to why strong tenants did not use their share of the Ricardian rent to purchase ownership rights/formalised long term leases, in what could be described as a reverse form of "primitive accumulation", or be bought out by their landowners in order for the land to be granted to better behaved tenants or converted to owner-management.

In any case, not only did landowners get a rather moderate share of output in the form of gross rent, they were also taxed rather heavily on average (if not at the margin). This left them with only 10 per

[23] This explanation relies on a low elasticity of substitution between land and labour.

[24] Note that these figures are based on the non-occupancy rent figures, and therefore exclude the strongest tenants with legally recognised rights.

cent or so as their net of tax share of agricultural output. Assuming that the majority of this income went to approximately 1 per cent of the population (c.f. Table 1), that would imply unexceptional levels of inequality (measured by the top 1 per cent share) within the agricultural sector of UP compared to India as a whole from 1920 onwards (Banerjee & Piketty, 2005).

Conclusion

Was capital expensive in the Indian countryside? The evidence presented here suggests that the answer to that question should be, at the relevant margin for land-like investments, not particularly, except in the period before 1830. And yet investment was low. That suggests that the demand for capital investment was low. The question for further research is why. Since investment in industry was low in addition to that in agriculture, it seems fair to speculate that the same factor, whatever it may have been, was reducing the demand for capital in both sectors, and lowering productivity and therefore output more generally. Since manufacturing used little land, that leaves the finger pointed at labour. Capital, for long lived land-like investments, was not particularly expensive in the colonial countryside and so the source of Indian underdevelopment must be sought elsewhere.

References

Alam, Muzaffar. 2013. *The Crisis of Empire in Mughal North India: Awadh and Punjab, 1707-1748*. Second edition. edn. Oxford India perennials The crisis of empire in Mughal North India. New Delhi: Oxford University Press.

Allen, Robert C. 1988. The Price of Freehold Land and the Interest Rate in the Seventeenth and Eighteenth Centuries. *The Economic history review*, **41**(1), 33–50.

Allen, Robert C. 1992. *Enclosure and the Yeoman*. Oxford; New York; Toronto and Melbourne: Oxford University Press, Clarendon Press.

Allen, Robert C. 2009. Engels' pause: Technical change, capital accumulation, and inequality in the british industrial revolution. *Explorations in economic history*, **46**(4), 418–435.

Arnott, Richard. 1995. Time for Revisionism on Rent Control? *The Journal of economic perspectives*, **9**(1), 99–120.

Asiatic Society of Bengal, issuing body. 1832 - 1904. *Journal of the Asiatic Society of Bengal.*

Atchi Reddy, M. 1996. *Lands and tenants in South India : a study of Nellore District, 1850-1990*. Delhi: Oxford University Press.

Auber, Peter. 1826. *An analysis of the constitution of the East-India Company and of the laws passed by Parliament for the government of their affairs, at home and abroad : to which is prefixed a brief history of the company, and of the rise and progress of the British power in India*. London: Printed for Kingsbury, Parbury, and Allen by Cox and Baylis.

Banerjee, Abhijit, & Piketty, Thomas. 2005. Top Indian Incomes, 1922–2000. *The World Bank economic review*, **19**(1), 1–20.

Bayly, C. A. 2012. *Rulers, Townsmen and Bazaars: North Indian Society in the Age of British Expansion, 1770-1870*. 3rd ed. edn. Oxford India perennials Rulers, townsmen, and bazaars. Oxford: Oxford University Press.

Blunt, Edward. 1930 - 1931. *Report of the United Provinces Provincial Banking Enquiry Committee, 1929-30.* Calcutta: Government of India, Central Publication Branch.

Blyn, George. 1966. *Agricultural Trends in India, 1891-1947: Output, Availability, and Productivity*. Reprint 2016 edn. Anniversary Collection. Philadelphia: University of Pennsylvania Press.

Calvert, H. 1925. *The size and distribution of agricultural holdings in the Punjab*. Rural Section publication / Board of Economic Inquiry, Punjab ; 4. Lahore: C. & M. Gazette Press.

Chambers, David, Spaenjers, Christophe, & Steiner, Eva. 2021. The Rate of Return on Real Estate: Long-Run Micro-Level Evidence. *The Review of financial studies*, **34**(8), 3572–3607.

Clark, Gregory. 1988. The cost of capital and medieval agricultural technique. *Explorations in economic history*, **25**(3), 265–294.

Clark, Gregory. 1998. Land Hunger: Land as a Commodity and as a Status Good, England, 1500–1910. *Explorations in economic history*, **35**(1), 59–82.

C.N. Cooke. 1863. *The Rise, Progress, and Present Condition of Banking in India*. P.M. Cranenburgh, Bengal Print. Company.

Colvin, Auckland. 1872a. *Memorandum on the revision of land revenue settlements in the North-Western Provinces, A.D. 1860-1872*. Calcutta: Wyman & Co.

Colvin, Auckland. 1872b. *Memorandum on the revision of land revenue settlements in the North-Western Provinces, A.D. 1860-1872*. Calcutta: Wyman & Co.

Darling, M. L. 1938. *Report of the Land Revenue Committee (Punjab)*. Lahore: Department of Revenue (Punjab).

Datta, Krishna Lal. 1914. *Report on the enquiry into the rise of prices in India*. Calcutta: Superintendent Government Printing, India.

Department of Commercial Intelligence and Statistics. 1919 - 1940. *Index numbers of Indian prices.*

Directorate of Economics and Statistics. 1949. *Abstract of agricultural statistics of India, 1936-37 to 1945-46*. Delhi: Manager of Publications.

Feinstein, C. H. 1972. *National income, expenditure and output of the United Kingdom, 1855-1965*. Studies in the national income and expenditure of the United Kingdom ; 6. Cambridge: University Press.

Government of Bengal. 1940 - 1941. *Report of the Land Revenue Commission, Bengal : ... with minutes of dissent.* Alipore, Bengal: Superintendent, Government Printing, Bengal Government Press.

Government of Burma. 1930. *Report of the Burma Provincial Banking Enquiry Committee, 1929-30.* Rangoon: Supdt., Govt. Printing and Stationery, Burma.

House of Commons, Great Britain. 1853. *Revenue survey (India). Return to an order of the Honourable the House of commons, dated 22 July 1853; - for, A selection "of papers illustrative of the character and results of the revenue survey and assessment which has been introduced into the North-west provinces of the Bengal presidency, since the year 1833: "And. similar return as to the presidency of Bombay." ... Ordered, by the House of commons, to be printed, 20 August 1853*.

Huang, Philip C. C. 1990. *The Peasant Family and Rural Development in the Yangzi Delta, 1350-1988*. Stanford, California: Stanford University Press.

Jain, Lakshmi Chandra. 1929. *Indigenous banking in India*. London: Macmillan and Co., limited.

Jevons, William Stanley, & Foxwell, H. S. 1884. *Investigations in currency and finance*. London: Macmillan.

Jorda, Oscar, Knoll, Katharina, Kuvshinov, Dmitry, Schularick, Moritz, & Taylor, Alan M. 2019. The Rate Of Return On Everything, 1870–2015. *The Quarterly journal of economics*, **134**(3), 1225–1298.

Keller, Wolfgang, Shiue, Carol H., & Wang, Xin. 2021. Capital Markets in China and Britain, 1770–1860: Evidence from Grain Prices. *American economic journal. Applied economics*, **13**(3), 31–64.

Lachman Singh, Kuar. 1874. *Historical and statistical memoir of Zila Bulandshahar*. Allahabad: North-Western Provinces' Government Press.

Marshall, A. 2013. *Principles of Economics*. 1st ed. 2013. edn. Palgrave Classics in Economics. London: Palgrave Macmillan UK.

Misra, B. R. (Babu Ram). 1942. *Land revenue policy in the United Provinces under British rule*. Benares: Nand Kishore & Bros.

Moosvi, Shireen. 2015. *The economy of the Mughal Empire, c.1595 : a statistical study*. Revised and enlarged edition. edn. New Delhi: Oxford University Press.

Moreland, W. H. 1911. *The revenue administration of the United Provinces*. Allahabad: The Pioneer Press.

Nath, Maanik. 2023. *Capital shortage : credit and Indian economic development, 1920-1960*. 1st ed. edn. Cambridge studies in economic history. Cambridge, United Kingdom ; New York, NY: Cambridge University Press.

Nevill, H. R. 1905. *Agra : a gazetteer*. District gazetteers of the United Provinces of Agra and Oudh ; v. 8. Allahabad: Supt., Govt. Press.

North-Western Provinces (India). Board of Revenue. 1873. *Selections from revenue records, North-West Provinces*. Allahabad: North-Western Provinces' Govt. Press.

Offer, Avner. 1991. Farm Tenure and Land Values in England, c. 1750-1950. *The Economic history review*, **44**(1), 1–20.

Pande, J. K. 1938. *Prices of Cereals in the United Provinces: How They Are Determined at Various Stages*. Allahabad: Superintendent, Printing and Stationery, United Provinces, India. Under the supervision of R. B. Gupta, Statistician, U. P. Government.

Pant, Govind Ballabh. 1948. *Report of the United Provinces Zamindari Abolition Committee.* Allabahad: Printed by M. G. Shome, Superintendent, Printing and Stationery, U.P.

Rai, Gulshan. 1937. *Agricultural statistics of the Punjab, 1901-2 to 1935-6.*

Rau B. Rama. 1954. *Banking and monetary statistics of India.* Bombay: Reserve Bank of India.

Scott, Peter. 2002. The Twilight World of Interwar British Hire Purchase. *Past & present*, 195–225.

Scutt, G.P.S. 1904. *The History of the Bank of Bengal: An Epitome of a Hundred Years of Banking in India*. A.J. Tobias, at the Bank of Bengal Press.

Shirras, G. Findlay. 1920 - 1919. *Indian finance and banking*. London: Macmillan and Co., limited.

Siddiqi, Noman Ahmad. 1970. *Land revenue administration under the Mughals (1700-1750)*. London: Published for the Centre of Advanced Study, Department of History, Aligarh Muslim University [by] Asia Publishing House.

Stoker, H. 1891. *Final report on the settlement of land revenue in the Bulandshahr district, North-Western Provinces.*

Stokes, Eric. 1978. The structure of landholding in Uttar Pradesh 1860–1948. *Pages 205–227 of: The Peasant and the Raj*, vol. Series Number 23. United Kingdom: Cambridge University Press.

Thomas, Ryland, & Dimsdale, Nicholas. 2017. *A Millennium of UK Data*. Bank of England OBRA Dataset.

V. N. Mehta, Chairman. 1946. *Report of the Committee Appointed by Government to Inquire into the Management of Government Estates in the United Provinces excluding those in Kumaun Division*. Allahabad: Allahabad, Superintendent, Printing and Stationery.

Wolcott, Susan, & Clark, Gregory. 1999. Why Nations Fail: Managerial Decisions and Performance in Indian Cotton Textiles, 1890–1938. *The Journal of economic history*, **59**(2), 397–423.

Supplementary Material

Sources

Note: SR = Settlement Report

The Settlement Reports can be found at the Weston Library at the University of Oxford. They were available on loan at the David Reading Room (not on the open shelves) from the main catalogue and collection of the Bodleian and were not in the archives and manuscripts collection. As a result there are no manuscript (MSS) reference numbers, but they can be found by searching on the SOLO website.

Prices

Wheat

W. S. Jevons, Investigations in Currency and Finance, (1884, p. 238).

Bulundshahr Historical and statistical Memoir, (Lachman Singh, 1874, p. 220).

Memorandum on Revision of Land Revenue Settlements, (Colvin, 1872a, p. 38b).

Statistical abstract relating to British India from 1910-11 to 1919-20, p. 220.

Prices and Wages in India, 1902, p. 165.

Prices and Wages in India, 1919, p. 9.

Kheri SR, 1901, p. xi.

Journal of the Asiatic Society of Bengal (Asiatic Society of Bengal, 1832 - 1904, V3, 1834, p. 621).

[Papers on the] Revenue Survey [of India], (House of Commons, Great Britain, 1853, p. 172).

Allahabad SR, 1878, pp. 42-3.

Statistical Abstract for British India with Statistics, where Available, Relating to Certain Indian States from 1917-18 to 1926-27, pp. 609-10.

Abstract of Agricultural Statistics of India, 1949 (Directorate of Economics and Statistics, 1949, pp. 191 and 193).

Prices Of Cereals In The United Provinces, (Pande, 1938, p. 64).

Millet

Index Numbers of Indian Prices, 1861-1931, (Department of Commercial Intelligence and Statistics., 1919 - 1940, p. 16).

Cawnpore SR, 1878, Appendix.

Abstract of Agricultural Statistics of India, 1949, (Directorate of Economics and Statistics, 1949, p. 238).

Prices Of Cereals In The United Provinces, (Pande, 1938, p. 64).

Rents

Settlement Reports

Note: SR = Settlement Report

The prime source for land rental data are the Survey and Settlement Reports. Here I will report the name of the district and the year it was published in alphabetical order.

Agra SR, 1930. Aligarh SR, 1903. Aligarh SR, 1943. Allahabad SR, 1878. Allahabad SR, 1916. Azamgarh SR, 1880.

Ballia SR, 1886. Banda SR, 1881. Banda SR, 1909. Bara Banki SR, 1879. Bara Banki SR, 1899

Bara Banki SR, 1931. Bareilly SR, 1903. Bareli SR, 1942. Basti SR, 1891. Basti SR, 1919. Benares SR, 1887. Bijnor SR, 1899. Budaon SR, 1902. Budaon SR, 1930. Bulundshahr SR, 1919.

Cawnpore SR, 1878. Cawnpore SR, 1907.

Dehra Dun SR, 1941.

Etah SR, 1905. Etah SR, 1947. Etawah SR, 1915.

Farruckabad SR, 1903. Farruckabad SR, 1906. Fatehpur SR, 1878. Fyzabad SR, 1880. Fyzabad SR, 1942.

Gonda SR, 1878. Gonda SR, 1901. Gonda SR, 1903. Gonda SR, 1944. Gorakhpur SR, 1919.

Hardoi SR, 1932.

Jhansi SR, 1947.

Kheri SR, 1901. Kheri SR, 1942.

Lucknow SR, 1898. Lucknow SR, 1930.

Mainpuri SR, 1906. Mainpuri SR, 1944. Meerut SR, 1901. Meerut SR, 1940. Mirzapore SR, 1887. Moradabad SR, 1881. Moradabad SR, 1909. Muttrah SR, 1926. Muzaffarnagar SR, 1921.

Partabgarh SR, 1896. Partabgarh SR, 1930. Pilibhit SR, 1915.

Rae Bareli SR, 1929.

Saharanpur SR, 1921. Shahjahanpur SR, 1901. Shahjahanpur SR, 1943. Sitapur SR, 1899.

Unao SR, 1896. Unao SR, 1931.

Other sources

B. R. Misra, Land Revenue Policy (1942): Misra provides an index for occupancy and non-occupancy rents (Misra, 1942). I link these to the rents per acre given four four "representative" districts in the United Provinces Banking Enquiry Commission Report (Blunt, 1930 - 1931).

A. Colvin, Memorandum on Land Revenue Settlements (1872b).

Report on Government Estates (1946): Contained a districtwise comparison between rents on Government and private estates. (V. N. Mehta, Chairman, 1946).

K. L. Datta, Report on the Enquiry into the Rise of Prices in India, (1914).

Statistical, Descriptive, and Historical Account of the North-Western Provinces of India, Vol XIII, and the standalone Aligarh and Budaon editions.

Selections from Revenue Records (North-Western Provinces (India). Board of Revenue., 1873).

United Provinces Banking Enquiry Comission Report (Blunt, 1930 - 1931).

Land Prices

Settlement Reports

As with rents, the prime source for land price data are the Survey and Settlement Reports. Here I will again report the name of the district and the year it was published.

Aligarh SR, 1943. Azamgarh SR, 1880.

Ballia SR, 1886. Banda SR, 1881. Bareilly SR, 1903. Bareilly SR, 1942. Budaun SR, 1901. Budaun SR, 1930. Bulundshahr SR, 1919.

Cawnpore SR, 1878. Cawnpore SR, 1907.

Etah SR, 1905. Etah SR, 1944. Etawah SR, 1915.

Fyzabad SR,1942.

Gonda SR, 1943.

Jhansi SR, 1947.

Mainpuri SR, 1875. Mainpuri SR, 1906. Mainpuri SR, 1944. Meerut SR,1940. Moradabad SR, 1909. Muttra SR, 1926. Muzaffarnagar SR, 1921.

Partabgarh SR, 1930.

Pilibhit SR, 1915.

Rae Bareli SR, 1929.

Saharanpur SR, 1921.

Other sources

Statistical, Descriptive, and Historical Account of the North-Western Provinces of India Vol XIII, and the standalone Aligarh edition.

Taxation

Planned average tax to land rental shares from B. R. Misra's "Land revenue policy in the United Provinces under British rule" (Misra, 1942, pp. 67 and 90).

Interest Rates

Burma Provincial Banking Enquiry Report, (Government of Burma, 1930, Vol II, pp. 169-72). Indigenous Indian bankers operated on a wide scale in Burma before the Second World War.

Banking and Monetary Statistics Of India, (Rau B. Rama, 1954, p. 696).

Indigenous Banking in India, L. C. Jain, (1929, pp. 103 and 250).

F. Shirras, Indian Finance and Banking, (1920 - 1919, p. 471).

Banking in India, (C.N. Cooke, 1863).

The history of the Bank of Bengal, (1904, pp. 150-1).

An analysis of the constitution of the East-India company, (Auber, 1826, p. 292).

Statistical Abstract for British India, various years, Annual Average of Average of Monthly min and max interest rates.

Table 4: Land Price Observations By District

District	**Count**
Cawnpore	331
Ballia	214
Azamgarh	178
Mainpuri	125
Aligarh	69
Budaun	61
Etah	52
Bareilly	50
Muttra	47
Banda	38
Pilibhit	37
Gonda	36
Jhansi	36
Meerut	36
Rae Bareli	29
Bulundshahr	28
Muzaffarnagar	28
Partabgarh	28
Moradabad	21
Saharanpur	21
Etawah	20
Fyzabad	20

Table 5: Rent Observations By District

District	Count
Agra	72
Aligarh	268
Allahabad	51
Azamgarh	26
Ballia	21
Banda	71
Bara Banki	45
Bareilly	79
Basti	8
Benares	108
Bijnor	28
Budaon	251
Bulundshahr	27
Cawnpore	34
Dehra Dun	60
Etah	95
Etawah	79
Farruckabad	46
Fatehpur	106
Fyzabad	70
Ghazipur	10
Gonda	49
Gorakhpur	120
Hamirpur	4
Hardoi	12
Hattras	16
Jalaun	82
Jhansi	81
Kheri	60
Lucknow	110
Mainpuri	235
Meerut	183
Mirzapore	95
Moradabad	258
Muttrah	60
Muzaffarnagar	29
Nainital	8
Partabgarh	41
Pilibhit	16
Rae Bareli	13
Saharanpur	83
Shahjahanpur	43
Sitapur	24
Unao	33

Figure 11: Observations by Year, Whole Sample

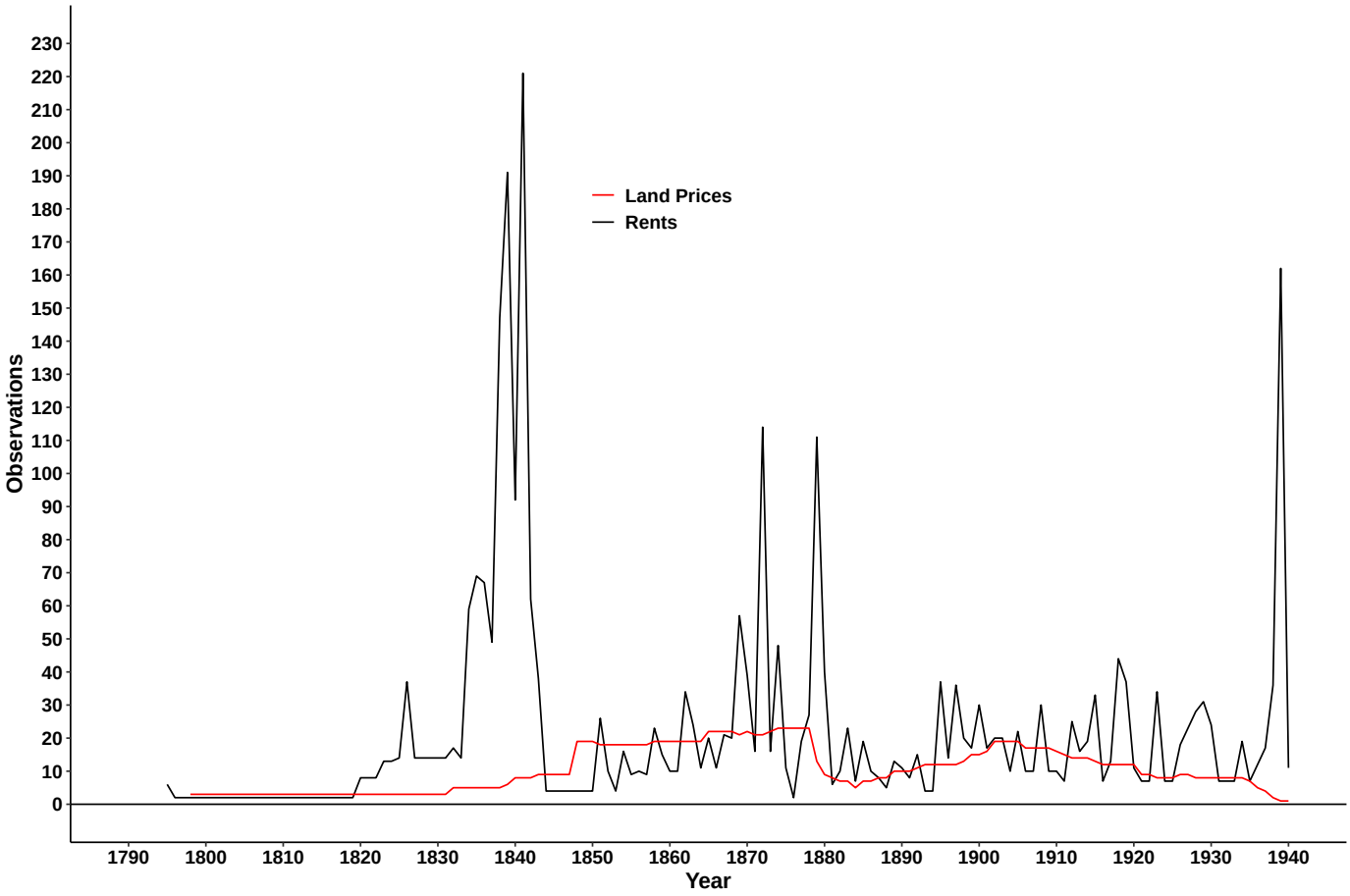
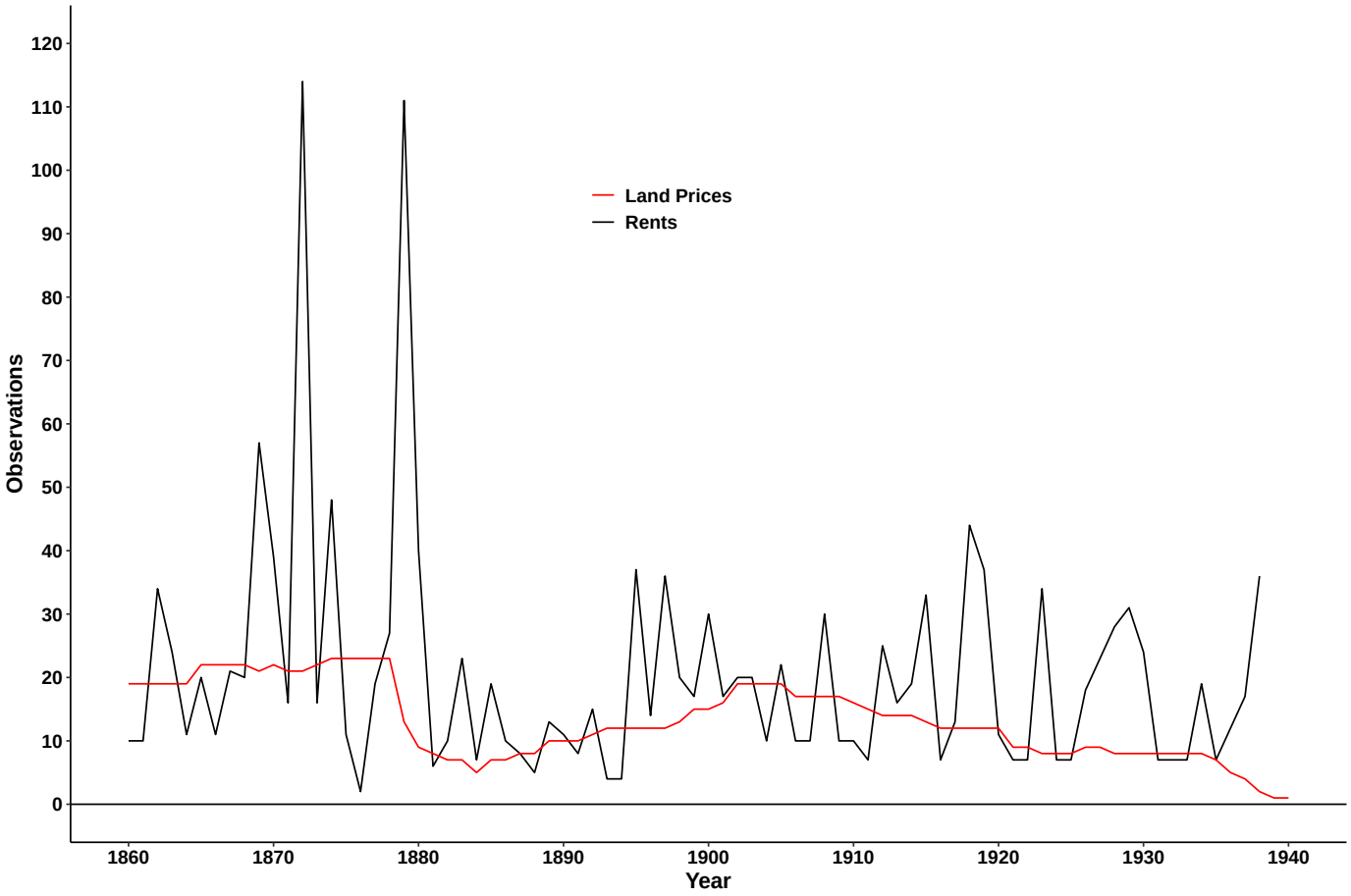


Figure 12: Observations by Year, 1860-1939 Sample



Millet-Wheat Price Relationship

I also collected a more limited range of millet (specifically *Bajra*, pearl millet) prices and ran the following regression:

$$\log(P_{it}^{\text{millet}}) = A_0 + A_1 \log(P_{it}^{\text{wheat}}) + \varepsilon_{it}.$$

With two dummy variables (for when one is a rural price and the other is urban and vice versa). There were 152 overlapping observations, and my estimate for A_0 is -0.21 (p-value 0.0445). As expected, the estimated A_1 was 0.97, i.e. very close to one. An ADF test for non-stationarity in the residuals rejects the null hypothesis of a unit root ($p < 0.01$); the two price series are cointegrated. Thus millet prices moved with but were significantly cheaper than wheat ones (both statistically and economically), implying that they cost 81 per cent of what wheat did on a per ton basis.

District Fixed Effects Representative Cross Checks

Regressing the estimated district fixed effect from the rent regression on a dummy with value 1 if the district is not in the land price data set results in a coefficient of value -0.0956 with standard error 0.1037, so it is statistically indistinguishable from zero at the 95 per cent significance level.

Regressing the estimated district fixed effect from the rent regression on the estimated district fixed effect from the land price regression results in a coefficient of value 1.106 with standard error 0.361, so it is statistically indistinguishable from 1 at the 95 per cent significance level.

Results Tables

Table 6: Land Returns and Interest Rates

Decade	Estimate Rent To Price	Std Error Rent To Price	Estimate Interest	Std Error Interest
1790	11.598	2.236	10.15	1.208
1800	11.598	1.427	10	1.116
1810	7.862	0.967	7.579	1.227
1820	4.873	0.537	7.025	1.397
1830	5.231	0.524	6.209	0.441
1840	7.006	0.525	6.861	0.372
1850	6.299	0.436	7.597	0.303
1860	5.384	0.339	6.365	0.34
1870	4.297	0.248	6.096	0.207
1880	4.127	0.315	5.752	0.207
1890	4.93	0.319	6.233	0.203
1900	3.515	0.21	5.851	0.203
1910	2.714	0.171	5.237	0.198
1920	2.888	0.192	5.784	0.252
1930	3.338	0.231	3.414	0.382

Sources: See main text for details of how the series were constructed, and above for the sources of data.
Note: These are nominal interest rates. Full comparability requires the addition of expected nominal capital gains to the rent to price series. On average this was 2 per cent per year.

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