THE TITHE COMMUTATION ACT
OF 1836:

MEASURING THE EFFICIENCY GAINS OF AGRICULTURAL LAND TAX
REFORMS IN ENGLAND 1842-1855

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C. Abstract

The theoretical advantages of land site value taxation have been known since at least the time of Adam Smith, however the practical gains from switching taxation to this basis have rarely, if ever, been measured. Using data on rural land rents in England around the time the tithe system was being reformed, this paper seeks to measure the cost per unit of revenue raised by taxing gross agricultural output as opposed to taxing land site values (a form of lump sum taxation). If the tithe reform of 1836 in Britain is shown to have led to negligible efficiency gains, then it will suggest in general that tax induced distortions to production choices are perhaps more theoretical than practical issues. If, on the other hand, the reform is shown to have led to significant gains for landowners per unit of tax collected then it will be a nice illustration of the practical importance of designing non-distortionary tax systems (and the potential benefits of land site value taxation). Although these results are based on historical data, this information could prove to be useful in addressing land taxation issues especially in developing (transitional) and/or agricultural based economies

A preliminary examination of 2,169 rural (agricultural) parishes reveals limited information. It is inconclusive as to whether or not the Tithe Commutation Act of 1836 led to extra rent gains for those parishes where the tithe system was still in place relative to those that had replaced the system earlier. It is encouraging that we are consistently able to estimate reasonable effects of enclosure and population density on the change in vpa across our model specifications. Moreover, cross-sectional estimation suggests that places with tithe in 1841 have a lower vpa than places that were tithe free. This potentially supports the possibility that such parishes may in fact have realized rent gains due to tithe reform. Therefore, it is our conclusion that the evidence presented here leads us to believe there is meaningful information to be extracted from this data as to the effects of tithe reform; we just haven't found a way to do it yet.

1. Introduction

There has been much attention ever since the time of Adam Smith to the idea of taxing land site values as a more efficient way of raising revenue than conventional forms of land taxation. Theoretically site value taxation of land is more efficient than output taxes or taxes on rental values since it does not distort land use decisions. That is, a lump sum tax on land "cannot cause the owner to shift production to another location and does not provide a disincentive to new building, renovation and improvement, or more intensive use of the site."[1] The followers of Henry George argue for site value taxation partly on these grounds. But how important is this gain in practice? How much more does it cost to raise one £ 1 (or $1) of revenue through a tax on land rental values, or a tax on gross output? There has been little work that empirically estimates the size of these gains. Publications on the potential of site value taxation are notable for the absence of reference to empirical evidence on this matter.[2] This project will therefore seek to measure the efficiency gains from switching to a system of site value taxation in the case of agricultural land, using the Tithe Commutation Act of 1836 in England as the test case.

Figure 1 illustrates in general how production decisions might be distorted by a percentage tax on gross output. The tax reduces the inputs used by the farmer and lowers the amount of output produced. However, the tax revenue raised is less than the loss in the return to land resulting in an excess burden. This excess burden is in theory the amount of potential gain from reforming this output tax into a lump sum payment. If this excess burden is large relative to the tax revenue collected, then the cost associated with tithing will be large as will the potential

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[1] Youngman and Malme (1998).
[2] See, for example, the essays in Tideman (1994), Lindholm and Lynn (1982). See also the discussion by Skinner (1991) on the prospects of relying more on land taxes in underdeveloped countries. See also Youngman and Malme (1998).

Figure 1: The Expected Effects of Tithe on Rents
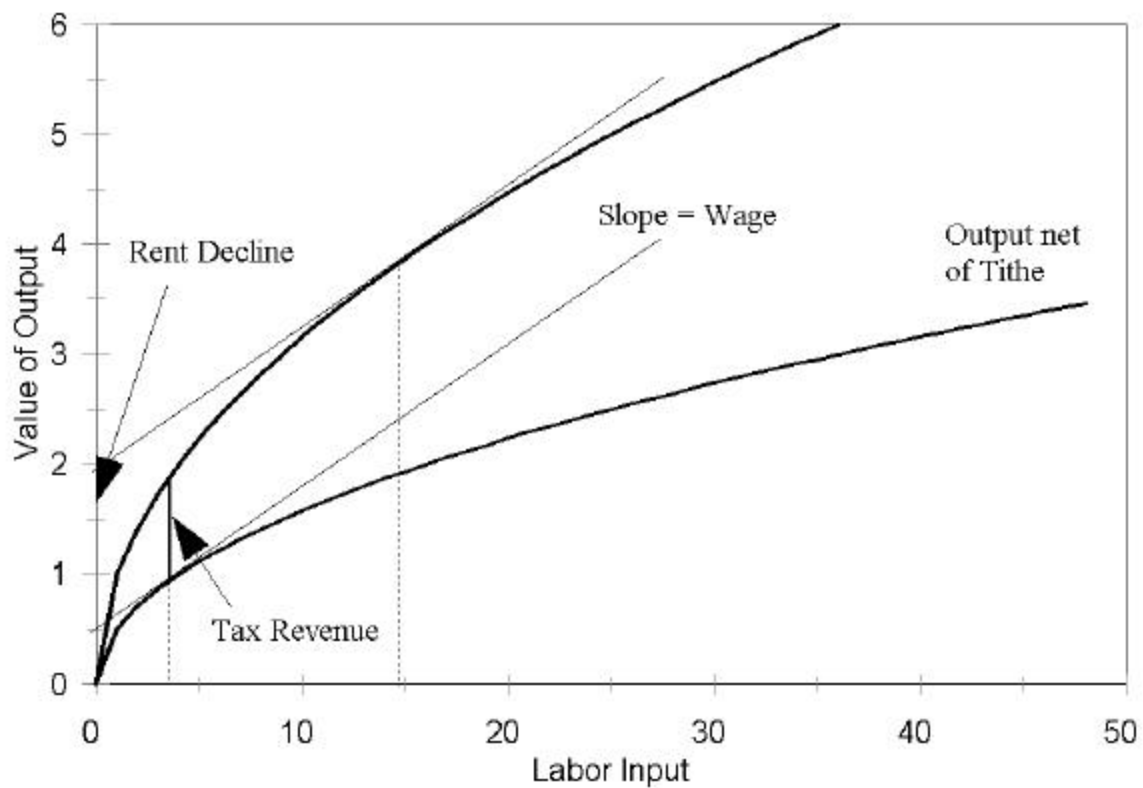
gains from reform. If however this ratio is small, then this issue becomes more theoretical than practical.

Farmland in England in the early nineteenth century was subject to many forms of taxation – the National Land Tax, local rates, and the tithe. Indeed in 1842 the tax burden on farmland could be quite high. Thus in a sample of 120 parishes the taxes paid by tenants for local rates and tithe were as high as 38% of the annual rent. By the 1830s concern about the heavy burden of land taxation led to major reforms of the Poor Law (which was financed by local rates) and of the tithe.

The tithe was originally a tax to support the local church, but by the nineteenth century (as a result of the sale of church estates in the English reformation), one-third of tithe rights were owned by laymen. Tithe owners had the right to collect one-tenth of the gross output of land, including intermediate outputs such as hay – that is one-tenth of all grain, hay, wood, newborn animals, and animal products such as milk and wool. In practice much tithe was collected through payment of a monetary equivalent, since it was estimated that the cost of taking actual delivery was typically 20-25% of the value of tithes.[3]

The tithe was very unpopular for a number of reasons. Since it was based on gross output it fell unequally on land put to different uses. Crops which required greater inputs in labor and in land preparation paid more heavily. The legal right of the tithe owner was to take collection of 10% of gross output at the time of production. However, it was expensive to take actual possession of the output, thus the tithe owner would prefer a cash payment. There was plenty of room for bargaining and dispute in settling on the payment which would lie somewhere between what the output was worth to the farmer and what its value would be to the tithe owner forced to

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[3] This amount was still dependent on gross output, not to be confused with a modus payment which was a fixed amount (see below).

take it at the time of production. The tithe thus imposed social costs in three ways. It distorted production choices by farmers in favor of lightly taxed pastoral output, it discouraged investment in land improvement by driving down the net return on the capital so invested, and it led to resources being devoted to bargaining about the level of payments actually owed.

Consequently, tithe reform was a major political issue in the late eighteenth and early nineteenth centuries. Adam Smith in the Wealth of Nations calls tithe "always a great discouragement both to the improvements of the landlord and to the cultivation of the farmer."[4] Under private agreements tithe was removed or transformed to a fixed annual payment in more than half the parishes in England by 1836.[5] Table 1 lists, for a group of counties in England, the total number of rural (agricultural) parishes compared to the number employing the tithe system in 1842. Table 1 shows that there was a great deal of variation across counties in the number of parishes that employed the tithe system in 1840.

In 1836 the movement to reform tithes came to fruition in the national Tithe Commutation Act. The Bill set up the Tithe Commission, which over the next twenty years, supervised the transformation of all remaining tithes into a lump sum charge independent of the future course of cultivation or fertility of the land. This lump sum was indexed to agricultural prices in general, but was in no way linked to the future productivity of the land.

The process of tithe commutation actually took a number of years. First there would be an agreement as to how much the tithe for a parish or township would be, based on the tithes paid in 1829-35. This was followed by an apportionment of this amount among the various fields of the parish or township thereby making the tithe a lump sum amount. The date of

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[4] Smith (1776), p. 789. See also Evans (1976) for a more complete discussion of the English tithe.
[5] The most common reasons for this were parliamentary enclosure, corn rent annuities, modus payments, or land given to the tithe holder in lieu of any further tithe payments. This issue of where the tithe was in effect as a percent of gross output is not straight-forward and will receive more attention in future work (see Kain and Oliver 1995).

apportionment of the new tithe charges on land was as listed in Table 2.[6] Table 2 illustrates the

variation in the timing of tithe reform for this sample of counties. Until the apportionment, the

incentives that land owners operated under with respect to improvements and cultivation

practices were the same as before (potentially distorted by the tax on gross output). However,

once the tithe charge was apportioned, their marginal tax rate from the tithe dropped to zero and

the potential for distortion disappeared.

In England the Tithe Commutation Act of 1836 shifted the tithe burden on agricultural

land from 10% of gross output (including intermediate goods) to a fixed assessment for each acre

of land based on its tithe payment in the years 1829 to 1835. In essence, an output tax was

shifted to an equivalent site value tax. This study will use the assessed rental value of land from

10,000 rural parishes in England in the years 1842 and 1855 as a way of estimating the efficiency

gains from this reform.

After controlling for other factors, if the reform created efficiency gains then the gross

rental value of land (before taxes) should increase more between 1842 and 1855 in parishes

where the tithe was reformed after the Tithe Commutation Act in 1836 than in parishes where it

had been replaced earlier. The amount of these extra gains relative to the tithe paid indicates the

efficiency costs of the old tithe system.

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[6] See Kain and Prince (1985) and Kain and Oliver (1995) for a detailed account of this process.

Table 1: Share of Rural (Agricultural) Parishes Paying Tithe in 1842 in some Counties

County	All Rural Parishes	Parishes Paying Tithe
Bedford	97	26
Berkshire	107	32
Buckingham	142	49
Cambridge	135	23
Cheshire	319	155
Cornwall	142	18
Cumberland	85	39
Derby	86	50
Devon	383	104
Dorset	206	44
Durham	140	36
Essex	326	79
Total	2,168	655

Note: Parishes were counted as rural (agricultural) if they had less than one-half person per acre in the 1841 census and at least 70% of property value coming from land.

Table 2: The Progress of Tithe Commutation

Year	Numbers of Apportionments completed
< 1836 *	211
1836-39	832
1840-43	745
1844-47	272
1848-51	101
1852-54	3
>= 1855	4
Total	2,168

* Tithe was reformed prior to the Tithe Commutation Act of 1836.
Note: Based on the same sample of rural (agricultural) parishes in the counties appearing in Table1

2. Measuring the Efficiency Gains From Reform Through Rents

The social cost (gain) of the tithe was the amount it cost to raise each pound of revenue through the tax. If the tax created no distortion of farmers' production choices and landowners' investment choices, then the cost (gain) would be zero.[7] The gains from reform will be measurable as a rise in rents in the reformed parishes. That is, once free from the disincentive effects of the tithe, if farmers changed their production choices then the amount they will bid for land will rise by the amount of the gain. Similarly, if landowners invest after reform in more land improvement then the resulting gains in output above the cost of inputs will again show up as rent gains.

For England we have observations for 1842 for each parish in the country on the rental value of the parish as a whole, on land specifically, on the amount of tithe paid, and on the amount paid in local taxes. For 1855 we have information for each parish on the rental value of all property (including the new tithe rent charge) together and on local rates. Suppose we define for each rural parish the gross rent per acre of land as:

$$\text{Gross Rent} = \text{Rent paid by tenants} + \text{local taxes paid by tenants} + \text{tithe payments}$$

If the tithe has distortionary effects then when we observe land rents in 1855 for a parish compared to 1842 we will find that the gross rent increases more on parishes which had tithe in 1842. That is, let us assume that:

$$\text{Gross Rent}_{i,\,1842} = ?_0 + ?_i - ?\text{Dtithe}_{i,\,1842} + ?_{i,\,1842}$$

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[7] The cost associated with tithing is in fact equivilent to the resultant gains from reforming the tithe system.

where i indexes parishes, $?_i$ represents parish specific characteristics that influence land site value, $\text{Dtithe}_{i, 1842}$ is an indicator variable which is 1 for parishes which paid tithe in 1842 and $?_i$ is an error term. When the tithe is converted into a lump sum charge between 1842 and 1855 we will find:[8]

$$\text{Gross Rent}_{i, 1855} = ?_1 + ?_i + ?_{i, 1855}$$

Thus the difference in gross rents will be given by:

$$?\text{Rent}_i = (?_1 - ?_0) + ?\text{Dtithe}_{i, 1842} + ? ?_i$$

If the tithe had no efficiency cost then $?$ will be estimated to be 0. The estimated average efficiency cost as a fraction of the revenue collected by the tithe will be:

Insert calculation here.

In practice we also should control for other variables that will potentially influence the movement of rents between 1842 and 1855. Among these are the share of property values in 1842 which come from housing, since more urbanized areas may experience different rent trends. Further we would expect rents to rise more in rural areas close to urban centers since the population was expanding in these centers in the years 1842 to 1855.[9] Such places would also be closer to larger markets thereby increasing the land value. Also one way tithe was abolished prior to 1836 was by a Parliamentary procedure converting all common lands in the parish into pure private property, a process called "enclosure". At the same time many parishes eliminated tithe by allocating the tithe owners some of the land in lieu of tithe. This means that parishes with

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[8] No parish in this sample still operates under the tithe system in 1855.
[9] Population density or the change in population density may help control for these factors.

tithe in a given county were more likely to undergo enclosure in the years 1842 to 1855 than

parishes without tithe. Because the process of enclosure itself saw significant rent gains, it will

be important to control for this factor.[10] Additional control variables that could be used include

indicators for soil type and land use (crop choice etc.).

This method of estimation will be best if the variations in observed rents in 1842 and

1855 stem mainly from different inherent soil qualities, locations of parishes, and other

observable factors including whether or not a parish was subject to the tithe.[11] If however, the

random components $?_{i, 1842}$ and $?_{i, 1855}$ are important then estimating the effects of the tithe in a

cross section may give a more precise measurement. That is, we can compare rents across

parishes in 1842 which had earlier abolished the tithe or converted it into a fixed payment with

those where the tithe was still present. We will thus also try a cross section estimation of the

effects of tithe.[12]

3. The Data Available (I have not touched this section and will leave as is for this seminar)

Table 3 below shows the published data available for England useful for our proposed

estimation. Though there is a large quantity of data required, it is all available in printed or

machine readable form. Some of the data has already been computer coded for use in an earlier

project sponsored by the National Science Foundation. Thus there is an existing database with

parish names, areas in 1841, locations, soil types, and enclosure histories for England. To carry

out the proposed estimation this database will have to be merged with an available database

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[10] In this draft, I have only included a portion of the controls I eventually plan to use in my analysis. See the section on estimating equations and results for specific controls used here.

[11] Notice that the parish specific characteristics have been differenced out in this method thereby controlling for unobservable heterogeneity across parishes.

[12] It is also possible that parishes that abolished the tithe system prior to the Tithe Commutation Act are in some way inherently different than those that reformed afterwards. Further, it is even possible that among those that reformed after the Act, those with early apportionments may systematically differ from those with later apportionments. Either

which records the information by parish from the Tithe Commutation Commission. This merging process is time consuming because spelling of parish names was not standardized in this period. The other required data on rental values and poor rate payments is on microfiche at the Berkeley Government Documents Library. This will have to be copied to paper then entered in computer form.

Table 3: The Available Published Data

Information	Years	Parishes, Townships	Source
Rental Value of All Property	1842, 1855	15,000	Parliamentary Papers
Rental Value Land, Houses, Tithe etc	1842	15,000	Parliamentary Papers
Total poor payments	1838-41, 1846, 1852, 1855	15,000	Parliamentary Papers
Parish Area*	1841	15,000	1851 Census
Control Variables			
Land Use**	1838-45	5,078	Tithe Reports
Soil Type*	-	9,760	Kelly's Directories
Parish Location*	-	15,000	Ordnance Survey
Enclosure History*	1842-1855	15,000	Tate

Notes: The data marked * has already been coded under National Science Foundation Grant SES-91-22191 "I", 1992-5, "Land Rents, Productivity, and the Search of the Agricultural Revolution 1620-1850" and is available at www.ucdavis.econ.edu/~gclark/. The data marked ** is available in machine readable form.

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of these scenarios will adversely affect the proposed methodology. These issues will be explored more in future work.

4. Summary Statistics

Careful examination of the descriptive statistics for this sample and certain sub-samples warrants discussion. This discussion is not presented here, but will be in part pursued in the next section.

5. Estimating Equations and Results[13]

We will begin by estimating a simple first differenced equation (1) as specified below

and report these results in Table 4. The dependent variable used here will be the percentage

change in value per acre, while d is a dummy variable indicating tithe and X is a vector of

control variables.

$$(1) \quad pdvpa_i = ?_0 + ?_1 d_i + ?'X_i + ?_i$$

It is difficult to determine where the line should be drawn between the affected and unaffected

parishes. That is, the Act went into effect in 1836 and our data looks at the change in land values

between 1842-55. If there is a lag before gains are realized, then maybe the division should be

between reform before and after 1836. If however the gains are more immediate, then perhaps

the division should be somewhat later. Rather than search for the "best" break, I will choose two

logical divisions and later explore other possibilities.[14] Columns 1 and 2 include no controls and

are intended for comparison. Columns 3 and 4 add a vector of county dummies[15] and Columns 5-

8 add measures of enclosure and population density respectively as controls. The process of

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[13] A list of all variables used in estimation appears in the appendix.
[14] These two divisions will be before and after 1836 where is 1836 is omitted and before and after 1840 where 1840 is omitted.
[15] County dummies have been included to control for the effect of being located in a particular county. It is possible this matters even after parish specific characteristics have been differenced out. These variables will be included from now on.

Table 4: Regression Results

Var	1	2	3	4	5	6	7	8
d37	.045** (.020)		.010 (.024)		-.002 (.024)	.004 (.024)		
d41		.014 (.016)		.022 (.016)			.020 (.016)	.021 (.016)
dfenc					.222** (.096)	.212** (.096)	.149** (.060)	.138** (.059)
den41						.223** (.094)		.229*** (.087)
Const	-.025 (.018)	.005 (.010)	-.062 (.022)	-.063 (.020)	-.063 (.021)	-.122 (.033)	-.067 (.019)	-.125 (.028)
BE						+***		+**
BU						+**		+*
CA						+		+
CH						+***		+**
CO						-		-*
CU						+		+
DY						+**		+**
DV						+***		+***
DO						+**		+**
DU						+		+
EX						+***		+***
Cnty Effects	no	no	yes	yes	yes	yes	yes	yes
RSq	.0012	.0004	.049	.058	.053	.055	.060	.064
F	4.89	.79	7.50	5.61	7.14	6.84	5.72	5.55
N	2,164	1,915	2,164	1,915	2,164	2,164	1,915	1,915

enclosure should have a positive effect on rents as common land is privatized, while density should also have a positive effect as an indication of urbanization or proximity to an urban area.

With no controls the tithe effect is positive and statistically significant if we break before and after 1836, whereas if we break before and after 1840 the effect is positive, but indistinguishable from zero. When county dummies are added neither specification shows a statistically significant tithe effect although both are still positive. In Columns 5-8 we see that adding controls for enclosure and density have the expected positive effect on the percentage change in value per acre (pdvpa) and the county dummies are robust to this addition.[16] It is still the case here that the estimated tithe effect in both specifications is statistically insignificant. The results seem to suggest that the impact is larger if we look before and after 1840, however there is no real statistical difference between these estimated effects.[17] [18]

Using column 8, these estimated impacts can be interpreted as follows: A parish that reformed the tithe system in 1841 or later would experience a 2.1% increase in value per acre relative to a parish that had reformed prior to 1840. Given the average vpa for parishes reforming after 1840, this translates into an increase of £ 0.031 per acre (1.49*.021). This taken relative to the average tithe payment per acre among this group of parishes suggests a cost of £ 0.39 for every £ 1 of revenue raised through the tithe (0.031/0.079). This estimate however is quite generous, as we cannot draw any solid conclusions from this estimate based on the reported 95% confidence interval.[19] A parish undergoing complete enclosure between 1841-54 would see a

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[16] It is somewhat troubling that the estimated effects of enclosure are so different in the two models, however the 95% confidence intervals for these estimates overlap hinting that the estimates are not so different. We will perform a standard test for this in later work.

[17] If this were truly the case it would imply that the gains from reform are realized quickly rather than after a lag.

[18] Other models were estimated that allow the tithe effect to be different depending on when reform occurred. These models also produce mixed results for a tithe effect, but are extremely robust with respect to the impacts of enclosure and density.

[19] The purpose of this exercise is more to develop an interpretation of the estimated tithe effect rather than to draw any conclusions about this effect.

13.8% rise in vpa, while a parish that experienced an increase in density of one person per acre would see a 22.9% rise in vpa. Both total enclosure and a one person increase in density are rather extreme changes, however this exercise was more to develop an interpretational framework for these estimated effects.[20]

It is not possible to say anything concrete about the gains from tithe reform based on these specifications, however it is encouraging that this data allows for a fairly reliable estimate of the effect of enclosure. That said, it is troubling that we cannot find any evidence supporting the theory of excess burden due to distortionary production taxes. Looking at the summary statistics, we noticed that there are a great number of parishes that are counted as having tithe, yet show little or no tithe burden. This could be because of a data error or it could be because some places recorded as having the tithe reformed after the Tithe Commutation Act may only have a small portion of land subject to tithe. If the latter is true, it is not appropriate to lump these parishes in with other parishes in an attempt to measure the gains from reform as these places are not likely to notice any gains from reform.[21] There also exist places that are said to not have tithe, yet report a tithe burden. This should not pose a problem as many places switched tithe payments to a fixed amount prior to the Tithe Commutation Act. Such places would still be paying tithe, but this payment was not linked to gross output and therefore would not be distortionary.[22]

Complicating this issue is that we only have data on tithe payments separately for 1842 and therefore can only calculate a tithe burden for 1842. We are specifically interested in the

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[20] Clark (using different data) estimates enclosure of this magnitude to lead to an increase in vpa of approximately 20%. This result is more similar to that appearing in column 6, however both estimates in this paper are in an acceptable range to be comparable to Clark's result.

[21] It is also possible that many places have low tithe burdens because they are "avoiding" the tithe. If this is the case then these places should be included with the affected group as in the first set of estimations.

[22] Again, we must spend more time on the classification of what places had tithe and what places did not have tithe as well as what portions of these places were subject to tithe.

level of burden in places that reformed in 1836 or later. Within this group, the recorded tithe

payment for those reforming between 1836-41 would be that paid as a lump sum under the

reformed system. Because this lump sum amount was based on the percentage tithe payments

between 1829-35, the tithe burden in 1842 should be an adequate measure of burden for places

that reformed between 1836-41. Table 5 shows the range of tithe burden in our sample for

parishes that are recorded as having tithe in 1836. From this listing it is clear that many parishes

in fact have very little tithe burden despite supposedly operating under the tithe system.[23]

Table 5: The Distribution of Tithe Burden Among Parishes Where the Tithe Was Apportioned in 1836 or After.

Number of Parishes	Tithe Burden
829	0
95	0 - .02
65	.02 - .04
96	.04 - .06
102	.06 - .08
143	.08 - .10
146	.10 - .12
128	.12 - .14
110	.14 - .16
69	.16 - .18
52	.18 - .20
118	**> .20**
	(max. .54)
	(avg. .25)
Total 1953	

Note: Based on the same sample of rural (agricultural) parishes in the counties appearing in Tables 1 & 2. Tithe burden is defined as (tithe42/land42)

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[23] Recall we are trying to measure the gains from reforming a distortionary tax. Paying a tax will not be distortionary if it is a lump sum amount. Therefore our goal is to distinguish those places that had not reformed by some cutoff date from those that reformed earlier. Further, we must identify places where tithe covered only snall portions of the land and not count them as those likely to gain from reform.

To further examine this issue of tithe burden we estimate the complete specification of equation (1) including all controls, but with some restrictions involving the level of tithe burden. That is, we will only categorize parishes as having reformed after the cutoff dates of 1836 and 1840 respectively if they record a tithe burden above some threshold. If a parish is said to have tithe, but fails to meet the criteria, then they will be classified as having reformed the tithe system earlier. These results are reported in Table 6 where the first two Columns are Columns 6 and 8 from Table 4 included for comparison. The first threshold is set at 0.02, while the second threshold is set at 0.02, but additionally omits those places that have burden between 0.02 and 0.05 effectively making the threshold 0.05.

The first thing to notice here is that the estimates of the impact of enclosure and density change little across the columns of Table 5 and are still statistically significant.[24] Even more noticeable here is the estimated negative tithe effect in all specifications. This result suggests that given a certain level of tithe burden, those places that reformed the tithe system after 1836 (1840) saw lower percentage increases in vpa relative to those places that had reformed earlier. This is somewhat troubling especially given the statistical significance of these estimates and we do not as yet have a realistic or believable explanation. It could be that those places with a larger tithe burden are in fact not avoiding the tithe and behaving more like tithe-free parishes, while parishes that did not meet the threshold level of burden and were therefore reclassified as early reformers (tithe-free) were actually avoiding the tithe. If this is the case, then it is possible that our affected group could see smaller gains due to reform relative to our new control group. We do not believe this to be the case because the thresholds we specify here of 0.02 and 0.05 do not seem very restrictive. It is more likely that there is something else happening that we have not yet been able to identify.

Table 6: More Regression Results

Variable	1	2	3	4	5	6
d37	.004		-.051***	-.046**		
	(.024)		(.018)	(.019)		
d41		.021			-.032**	-.019
		(.016)			(.015)	(.015)
dfenc	.212**	.138**	.225**	.224**	.155***	.153***
	(.096)	(.059)	(.095)	(.095)	(.060)	(.060)
den41	.223**	.229***	.236**	.267***	.232***	.230**
	(.094)	(.087)	(.093)	(.097)	(.088)	(.092)
Const	-.122	-.125	-.117	-.126	-.117	-.117
	(.033)	(.028)	(.029)	(.030)	(.028)	(.029)
Cnty Effects	yes	yes	yes	yes	yes	yes
Thresh-old			.02	.02	.05	.05
RSq	.055	.064	.059	.056	.065	.068
F	6.84	5.55	6067	6.59	5.45	5.84
N	2,164	1,915	2,164	2,045	1,915	1,826

***Significant at the .01 level
**Significant at the .05 level
*Significant at the .10 level
<u>Note:</u> Columns 5 and 6 omit those with tithe at cutoff with burden between .02-.05.

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[24] The county dummies are not reported here, but these estimates are robust across the columns of Table 5 as well.

From the various specifications examined to this point, it remains unclear what if any effect the tithe reform had on the percentage change in vpa between 1842-55 among those parishes likely to be affected. In an attempt to get more information as to what is really going on, we next examine rents in a cross section of parishes in 1842 comparing those that reformed the tithe system prior to 1840,41,42 to those which still employed the tithe system in 1840,41,42. We estimate equation (2) using OLS and report the results in Table 7.[25]

$$(5) \quad vpa42_i = ?_0 - ?_1 d_i - ?_2 fop41_i + ?_3 den41_i + ?'cnty_i + ?_i$$

We will not put very much emphasis on these results as this specification does not control for unobserved heterogeneity across parishes. The indicator variable d signals whether a parish was subject to tithe in a cutoff year, 1840,41,42 in these models. Because of the negative sign, a positive coefficient will imply a lower vpa in parishes where the tithe system was in effect relative to those that had reformed earlier. The variable $fop41$ measures the fraction of land that was open (common area) in a parish in 1841 and should account for the possible negative effects from a parish having a large amount of common land. Again, the negative sign means that a positive coefficient will imply a lower vpa in parishes with more common area. The density variable will play the same role as previously and is expected to be positive.

The results from these cross-section estimations are very much in line with our expectations. Population density has a positive influence on the vpa of a parish in 1842, while the fraction of the land that has yet to be enclosed in a parish (i.e. the fraction enclosed between 1841-54) has a negative impact on vpa. In addition, parishes with the tithe system in place in 1840,41,42 have a lower vpa relative to those that underwent reform prior to these cutoff dates.

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[25] Again, a list of all variables used appears in the appendix.

Table 7: Yet More Regression Results

Variable	1	2	3	4	5	6
nd40	.057**	.047**				
	(.025)	(.021)				
nd41			.086***	.065***		
			(.025)	(.021)		
nd42					.092***	.058***
					(.026)	(.022)
nfop41		.212**		.207**		.215**
		(.095)		(.095)		(.095)
den41		3.324***		3.317***		3.314***
		(.138)		(.138)		(.138)
Const	1.550	.714	1.556	.719	1.557	.717
	(.044)	(.049)	(.043)	(.049)	(.043)	(.048)
Cnty Effects	yes	yes	yes	yes	yes	yes
RSq	.201	.443	.203	.444	.203	.443
F	60.70	136.98	61.62	137.41	61.69	137.76
N	2,165	2,165	2,165	2,165	2,165	2,165

***Significant at the .01 level
**Significant at the .05 level
*Significant at the .10 level.

The tithe estimates vary in size depending on the cutoff year, but are all statistically in the same neighborhood and are similar with and without controls included.[26] From the model with 1841 as the cutoff (Column 4, we will use this model to interpret all of the effects below), the results suggest a possible gain of (0.065/1.49) 4.2% from tithe reform, which is more than double the impact based on column 8 of Table 4. The estimates of the impact of open land appear reasonable and are also similar across the columns of Table 7. A parish that is 100% open land will have a vpa of £ 0.207 less than one with no common land. This translates into a potential gain in vpa of (0.207/1.49) approximately 14% through full enclosure, which is very comparable to the calculation presented earlier based on column 8 of Table 4. It is somewhat harder to interpret the density coefficient. Consider a parish in Derby with a density of 0.2 persons per acre that is subject to tithe with 20% of its area being common land. This model predicts a vpa of approximately £ 1.41 per acre, which is slightly below the average among our sample in 1842.[27]

5. Conclusion

The theoretical advantages of land site value taxation have been known since at least the time of Adam Smith, however the practical gains from switching taxation to this basis have rarely, if ever, been measured. Using data on rural land rents in England around the time the tithe system was being reformed into a lump sum tax, a preliminary examination of 2,169 rural (agricultural) parishes reveals limited information. It is inconclusive as to whether or not the Tithe Commutation Act of 1836 led to extra rent gains for those parishes where the tithe system was still in place relative to those that had replaced the system earlier. It is encouraging that we are consistently able to estimate reasonable effects of enclosure and population density on the

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[26] These cross-sectional estimates are also very similar for models that specify a tithe burden threshold. These results are however not reported here.

change in vpa across our model specifications. Moreover, cross-sectional estimation suggests that places with tithe in 1841 have lower a vpa than places that were tithe free. This potentially supports the possibility that such parishes may in fact have realized rent gains due to tithe reform. Therefore, it is our conclusion that the evidence presented here leads us to believe there is meaningful information to be extracted from this data as to the effects of tithe reform; we just haven't found a way to do it yet.[28]

Again, the goal of this study is to present evidence as to the cost imposed on society through a potentially distortionary tax system using the Tithe Commutation Act of 1836 in England as the test case. Although theory predicts taxes such as the tithe to be burdensome to society, it may be the case that the potential gains from reform are small. As this work progresses, if we find no evidence of gains due to this reform, then it will suggest in general that tax induced distortions to production choices are perhaps more theoretical than practical issues. If, on the other hand, this reform is shown to have led to significant gains, then it will be a nice illustration of the practical importance of designing non-distortionary tax systems (and the potential benefits of land site value taxation). Although this analysis is based on historical data, this information could prove to be useful in addressing contemporary land taxation issues especially in developing (transitional) and/or agricultural based economies.

This paper is still very preliminary and there is much work to be done. Special attention will be given to the following issues as this work proceeds:

- Exploring the possibility that the effects of tithe reform may vary according to the timing of reform.

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[27] This calculation should lead to a below average vpa as the parish had tithe and common area.
[28] By this we do not mean we believe the reform led to significant gains, but rather we feel confident that we will be able to present evidence to either support or not support this claim.

- Examining the peculiar effect of tithe reform on those parishes with larger tithe burdens.

-Familiarize myself more with the data looking for ways in which parish characteristics may be confounding my results.

-Examine the data for outliers, mistakes, and other potential problems and generally clean up the data set. This includes devoting special attention to the classification of parishes into tithe and tithe-free categories which will involve more detailed research.

- Continue building the data set to include the remaining parishes in England and including a more complete set of control variables

-There exists a smaller, but more detailed data set for individual plots of land that can be used to closer examine the effects of tithe reform over this period. Therefore the last step will be to work with this data in an attempt to corroborate the work done with this larger data set.

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VARIABLES

Vpa = value per acre

dvpa = vpa55-vpa42 change in value per acre 1842-55

pdvpa = percent change in value per acre 1842-55

d37 = indicates tithe apportioned in 1837 or after

d41 = indicates tithe apportioned in 1841 or after

nd40 = indicates the negative of tithe apportioned in 1840 or after

nd41 = indicates the negative of tithe apportioned in 1841 or after

nd42 = indicates the negative of tithe apportioned in 1842 or after

den41 = persons per acre 1841

dfenc = fraction of area enclosed between 1841-54

nfop41 = the negative of the fraction of land that is common area (that fraction of land which was enclosed after 1841)

tburd1 = tithe burden (tithe paid in 1842/land value in 1842)

cnty = vector of county dummies

i indexes parishes