

Was Tax Policy after the Norman Conquest Determined by Ability to Pay?—Using Regression and Data Envelopment Analysis to Find the Answer

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Abstract

The article investigates English tax policy some twenty years after the Norman Conquest, almost 1,000 years ago. Evidence that the tax system was not arbitrary, but reflected modern sentiment in that it was based on capacity to pay is examined. But the main focus is to examine the geld tax assessments listed in Domesday Book to determine whether the estates of King, church and laity were assessed on a common basis. Statistical methods (data envelopment analysis and regression) are used to examine these issues.

Introduction

THE purpose of this article is to determine, by reference to material for one county (Essex), whether the estates of King, church and laity were assessed on a common basis or if one class of estate received preferential treatment. The tools used to make the determination are regression and a form of data envelopment analysis (DEA). The article also reviews the tax policy of King William I, specifically whether it was based upon arbitrary tax assessments, as Victorian historians claimed (even though this would have led to considerable resentment) or upon capacity to pay, modified by political expediency and inertia in changing assessments as circumstances changed, along the lines of contemporary systems.

There are two things certain in life—death and taxes. So it is perhaps no surprise that some 1,000 years ago the landed classes of England suffered the burden of an estate tax, known as the geld. Tax assessments for the geld are listed in Domesday Book, which records the results of an ambitious comprehensive survey of feudal England undertaken by King William I in 1086. Although the assessments are extant, the details of the levying of the geld have largely been lost in the mists of time. The geld was a non-feudal tax that can be traced back to danegeld, introduced by King Ethelred in 911. Danegeld provided finance to fight or bribe the marauding Danes. Originally conceived as a simple levy on estate land, the assessment unit was the hide, the acreage needed to support a man and his family. The hide was initially seen as 120 acres. In practice, though, because land fertility varied, the hide acreage varied from place to place with land productivity. (Oldroyd describes the role of hidage lists and Geld Rolls in public accounting during the

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Anglo-Saxon period.)¹ By Norman times the geld was more broadly based. Still measured in hides and fiscal acres, the assessments were no longer solely based on the land of the estate. In 1086 it was levied annually and was a significant impost on landholders. The rate struck in 1083–84 of six shillings to the hide, implies the tax amounted to about 15 per cent of the net income of the average Essex lay manor.

Data Envelopment Analysis (DEA) has usually been used to examine the efficiency of production units (e.g. farms or factories). An estimate of efficient production is made using the production unit input and output data. Then efficiency measures, the ratio of actual output to output had the production unit been efficient, are calculated for each unit. In this study, the idea is applied to the tax assessments and net incomes of estates. The data are used to estimate a favoured tax index (FTI) value for each estate. The FTI value is the ratio of the actual estate tax assessment to the assessment had the estate received most favoured treatment. (A major advantage of using this DEA method to calculate the FTI values is that it does not assume that the tax assessment—net income relationship has a particular functional form, such as the linear or log-linear form.)

The first stage in the analysis is to calculate estate FTI values. The author then used regression analysis to examine whether the estates of the King, church and lay tenants-in-chief were assessed on a similar basis.

The Domesday Survey and Essex data

The Domesday Survey was carried out in about 20 months, between 1085 and 1087. The counties of England were grouped into seven circuits. Each circuit was visited by a team of commissioners. The commissioners circulated a list of questions to landholders and their responses were reviewed in the county court by the hundred juries. Then county and circuit returns were compiled. The circuit returns were sent to the Exchequer in Winchester where they were summarised, edited and compiled into Great Domesday Book (Great Domesday). These procedures limited the opportunities for giving false or misleading evidence. Questionnaire responses were public knowledge and responses were verified, under oath, in the courts by landholders with local knowledge.

The returns for one circuit, Circuit VII, comprising Essex, Suffolk and Norfolk, were never incorporated into Great Domesday and form part of what is known as Little Domesday Book. These returns contain somewhat more detailed information on the estates, and the author has chosen one of the counties of Circuit VII, Essex, for the study. Information is available, in relation to Essex, on the annual values or net incomes, tax assessments and inputs of estates, the hundred (or local government area) of their location, whether they were estates of the King, church or laity, who the tenant-in-chief was, and the tenure arrangement on the estate. In most cases, the estates can be located geographically.

In Essex there were 925 estates (48 King's estates, 182 church and 695 lay). Of these, information is incomplete for 25 King's, 20 church and 121 lay estates. Although a large number, these are generally very small holdings accounting for only a small proportion of the county-wide tax assessment and annual value totals (thus, they account for less than 3 per cent of the county annual value or net income total). The analysis described in

¹ See D. Oldroyd, "Accounting in Anglo-Saxon England: Context and Evidence" *Accounting History*, NS Vol.2, No.1: 7-34 (1997).

this article is restricted to the 759 estates for which information appears complete. The King's estates had, on average, the largest tax assessments, and the laity, on average, the smallest.²

Earlier research

The details of the way in which estates were assessed for tax are largely unknown. The Victorian historians believed that the tax assessments were an "artificial" construct. Round, for example, on the basis of fragmentary evidence, argued that the assessments were an administrative creation and, as a consequence, that the assessments imposed on individual estates bore little relationship to the capacity of the estate to pay the tax.³

In the 1980s, Graeme Snooks and the author challenged this idea.⁴ They argued that, analogous with many modern tax systems, it was possible that the Domesday assessments reflected an attempt to collect taxes in a politically acceptable way. They postulated that the assessments may have been based on a capacity to pay principle modified by politically expedient concessions and could be expected to exhibit some unevenness resulting from the administrative process. This unevenness occurred because the assessments were revised infrequently and, consequently, the link between assessment and capacity to pay became somewhat eroded. Also, it is thought that assessments were revised at different times within the various counties and in the hundreds of a county, and with slightly more rigour in some administrative units as opposed to others. There is strong empirical evidence for this hypothesis. Capacity to pay can be measured by the estate's annual value or net income accruing to the lord from working the estate. Regressions of estate tax assessments on net income indicate that capacity to pay explains around 60 to 90 per

² Great Domesday, Little Domesday Book, the history of the period, the Domesday economy and gold tax, are dealt with in greater detail in J. McDonald, "Manorial Efficiency in Domesday England" *Journal of Productivity Analysis*, 8, 3, 199–213 (1997), *Production Efficiency in Domesday England*, (Routledge, London, 1998), "Domesday Economy: An Analysis of the English Economy Early in the Second Millennium" *National Institute Economic Review*, 172, 2, 105–114 (2000), "Tax Fairness in Eleventh Century England" *The Accounting Historians Journal*, 29, 173–193, (2002), "Using William the Conqueror's accounting record to assess manorial efficiency" *Accounting History*, 10, 125–145 (2005), "Efficiency in the Domesday Economy, 1086: Evidence from Wiltshire estates" *Applied Economics* [forthcoming], J. McDonald and G.D. Snooks, "Were the Tax Assessments of Domesday England Artificial? The Case of Essex", *Economic History Review*, 38, 4, 353–373, "The Determinants of Manorial Income in Domesday England: Evidence from Essex" *Journal of Economic History*, 45, 4, 541–556 (1985), "Statistical Analysis of Domesday Book (1086)" *Journal of the Royal Statistical Society*, series A, 148, 147–160 (1985), J. McDonald, and G.D. Snooks, *Domesday Economy: A New Approach to Anglo-Norman History* (Clarendon Press, Oxford, 1986), "The Suitability of Domesday Book for Cliometric Analysis" *Economic History Review*, 40, 2, 252–261 (1987), "The Economics of Domesday England", in *Domesday Book Studies*, A. Williams (ed.), (Alecto Historical Editions, London, 1987), "A Case of Mistaken Identity: National Taxation and Local Authority Administration in Domesday England", School of Economics Research Paper 90:8, (Flinders University, Adelaide, 1990), "The Taxation System of Domesday England", School of Economics Research Paper 90:12, (Flinders University, Adelaide, 1990), *Domesday Economy*, Oxford Scholarship Online Edition (Oxford University Press, Oxford 2003) and references in these materials.

³ See J.H. Round, 1895. *Feudal England: Historical Studies on the Eleventh and Twelfth Centuries*. Reprinted 1964. (Allen & Unwin, London) at 48–49.

⁴ See J. McDonald and G.D. Snooks, "Were the Tax Assessments of Domesday England Artificial? The Case of Essex", *Domesday Economy: A New Approach to Anglo-Norman History* and "The Suitability of Domesday Book for Cliometric Analysis", fn.2.

cent of variation in individual estate assessment data for the counties of Buckinghamshire, Cambridgeshire, Essex and Wiltshire, and from 72–81 per cent for aggregate data for 29 counties.⁵

Capacity to pay seems to explain the greater part of the variation in tax assessments, but some variation remains. Were some tenants-in-chief and some kinds of estate more favourably treated than others? The author has explored these questions elsewhere, basing the analysis on Essex lay estate data.⁶ A further, and perhaps more interesting, question is whether lay, church and King's estates were similarly assessed or whether one class of estate received special treatment? This unresolved question is the focus of the current study.

Calculating estate FTI values

The tax assessment and net income data for the 759 Essex estates were used to calculate FTI values for each estate. The index is based on the idea that an estate has received special treatment if it has a lower tax assessment than another estate with the same or lower net income. Formally, the FTI value for estate i is the ratio of the actual tax assessment of estate i to the maximum tax assessment of all estates with the same or lower net income than estate i . An FTI value of one corresponds to no special treatment, and a value less than one to some favourable treatment.⁷

Did one class of estate receive special treatment?

The mean FTI values for King's, church and lay estates were 0.362, 0.422 and 0.333, respectively, and the difference in these mean values is significant (p -value = 0.000) when the difference in means is tested using a heteroskedastic-consistent test. (The test was carried out by estimating a least squares, LS, regression similar to the LS regression in Table 1.) On the face of it, lay estates appear (on average) to have been favoured. But it may be that lay estates were favoured because they tended to have the characteristics of estates that received favourable treatment for other reasons such as location in a hundred which had not recently had its assessments revised, or other factors that may have affected assessments. If we control for these factors, were the three classes of estate, King's, church and lay, treated equally?

The regressions described in Table 1 control for the hundred location, the size of the estate, the kind of agriculture undertaken on the estate (the grazing/arable mix) and the tenancy arrangement.

⁵ See J. McDonald and G.D. Snooks, "Were the Tax Assessments of Domesday England Artificial? The Case of Essex" *Domesday Economy: A New Approach to Anglo-Norman History*, "The Suitability of Domesday Book for Cliometric Analysis", "A Case of Mistaken Identity: National Taxation and Local Authority Administration in Domesday England" and "The Taxation System of Domesday England", fn.2.

⁶ See J. McDonald, *Production Efficiency in Domesday England* and "Tax Fairness in Eleventh Century England", fn.2.

⁷ See J. McDonald, *Production Efficiency in Domesday England*, fn.2, Ch.6.4, and "Tax Fairness in Eleventh Century England", fn.2 at 178–182.

Table 1 Regressions of estate favoured tax index (FTI) on estate characteristics: Essex Estates 1086.

Characteristics	LS marginal effects	2LT tobit marginal effects
King's estate effect	0.243 (.000)	0.219 (.000)
Church estate effect	0.281 (.000)	0.259 (.000)
Lay estate effect	0.252 (.000)	0.230 (.000)
Hundred (local government area) effect	— (.000)	— (.000)
Size effect	0.0000523 (.363)	0.0000551 (.156)
Kind of agriculture effect	−0.0000283 (.363)	−0.0000273 (.334)
Tenure effect	0.0101 (.482)	0.0088 (.523)

Notes

- (1) LS and 2LT tobit marginal effects with p-values in parenthesis. The LS marginal effects are the LS estimates and the LS p-values were calculated using White's heteroskedastic-consistent method.⁸ The tobit marginal effects were calculated at explanatory variable sample mean values.
- (2) $n = 759$. The p-values for tests of the null hypothesis that King's, church and lay effects are equal were 0.305 for the LS regression and 0.196 for the 2LT tobit regression.
- (3) The King's, church and lay effects were indicated by binary variables and the hundred location by 22 binary variables. An index of whether production was mainly arable or grazing is given by the grazing/arable ratio, defined as livestock less cattle and beasts, which were required for ploughing, divided by the number of ploughteams on the estate. Livestock less cattle and beasts is a weighted average of swine, sheep and goats with prices as weights. Five estates had no ploughteams. For them, the ratio was set at 2,000, the largest ratio value for estates with some ploughteams being 1,376. Tenure was measured by binary variable taking the value 1, if the estate was held in demesne; 0, otherwise. The regressions were estimated without intercepts. If an intercept is included, there is exact multicollinearity, because, for each observation, the sum of the King's, church and lay binary variables is 1.


The dependent variable values, the estate FTI values, were treated as descriptive measures and, because the estate FTI values are a form of fractional data, the regressions were estimated using LS with p-values calculated using the heteroskedasticity-consistent

⁸ See H. White, "A Heteroskedastic-Consistent Covariance Matrix and a Direct test for Heteroskedasticity" *Econometrica*, 48, 817–838 (1980).

method.⁹ Two limit (2LT) tobit with limits at 0 and 1 is often used to estimate second-stage DEA regressions similar to this regression equation.¹⁰ For comparison purposes, 2LT tobit marginal (partial) effects are also listed, but, as the estate FTI data are fractional not censored data, tobit is not an appropriate procedure (although it often, as in this case, results in inferences similar to LS).


The main inferences from the regressions estimated by the two methods are the same. The preferred LS regression statistics indicate that the hundred effect is highly significant (p -value = 0.000), but the other factors did not have a very significant influence on the tax assessments (p -values for the size, kind of agriculture and tenancy variable coefficient estimates are greater than 0.200). When we control for the factors, the difference (on average) between the tax treatment of King's, church and lay estates is largely eliminated. The table indicates that the estate class effects are very similar (0.243, 0.281 and 0.252 for King's, church and lay estates, respectively) and this difference is not significant at the 30 per cent level.

Conclusion

The Essex estate geld tax assessments of 1086 varied with capacity to pay as measured by estate net income. Estate FTI values suggest that administrative factors also had an influence. There was a clear hundred tax assessment differential in Essex which could have resulted from the assessments being only infrequently revised, revisions being made at different times in the hundreds, and assessments being made with more rigour in some hundreds than others. Mean FTI values for King's, church and lay estates suggested that lay estates were treated more favourably but, when allowance was made for the hundred effect, one class of estate was not (significantly) favoured above another. 

⁹ Described by White, see fn.8. See J. McDonald, "Using least squares and tobit in second stage DEA efficiency analyses." *European Journal of Operational Research*, 197, 792-798 (2009).

¹⁰ Second-stage DEA regressions are regressions in which DEA methods are used to calculate the dependent variable values and these values are then regressed on explanatory variables.

 Legal history; Taxation administration