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Institutional Innovation and Infrastructure Investment: An Evaluation of the Turnpike System in Eighteenth Century England

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Abstract

This paper investigates whether turnpike trusts increased road infrastructure spending in eighteenth century England. A turnpike trust was a non-profit organization that financed road improvements by levying tolls and issuing debt. They replaced the authority of parishes and townships, which financed road improvements using local property taxes. The paper uses a new data set to show that the turnpike system substantially increased road expenditure. It also introduces supporting evidence from a 'natural' experiment, in which roads remained under the authority of parishes and townships, because petitions to create a turnpike trust failed to receive passage from Parliament.

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Introduction

The inadequate state of the road network was a major concern for European economies during the eighteenth century because it increased transportation costs and limited trade.¹ One of main reasons for the poor quality of roads was a lack of maintenance and investment expenditures. In many countries, ancient laws or customs dictated that local governments were responsible for the financing of road improvements. In some countries, this traditional system was altered in an effort to increase road spending. For example, in France and Spain, the central government replaced the authority of local governments along the primary roads leading into Paris and Madrid. In England, a different system emerged, in which turnpike trusts were granted control over a substantial portion of both primary and secondary roads.²

Turnpike trusts were unique because they were non-profit organizations that financed road improvements by levying tolls and issuing mortgage debt. They were established by individual Acts of Parliament, beginning in the 1660s and 1690s and continuing until the 1830s. The Acts named a local body of trustees and gave them authority over an existing road that was previously managed by the parishes and townships along the way. Parishes and townships (henceforth, villages) were different from turnpike trusts because they financed road maintenance using local property taxes, rather tolls.

The English turnpike system was also unique because it evolved into one of the most expansive toll road networks in history. By the 1830s, there were approximately 1000 turnpike trusts managing 20,000 miles or 17% of the entire paved road network.³

¹For example, see the writings of Daniel Defoe, *A Tour Through the Whole Island of Great Britain*, Arthur Young, *Travels through France*, and Adam Smith, *An Inquiry into the Nature and Causes*.

²Turnpike Trusts were also adopted in the U.S. during the late eighteenth and early nineteenth century. For this literature see, Daniel Klein, "Voluntary Provision" and John Majewski, *A House Dividing*.

³Data on the length of the paved road network comes Great Britain, *Sessional Papers*, 1841, Vol. XXVII. For

A number of historians have argued that the turnpike trust system represented an important institutional innovation because it resolved a problem of under-investment.⁴ For example, Eric Pawson suggests that turnpike trusts had higher expenditures than villages because the tolls allowed them to shift a greater portion of the costs to road-users.⁵ Another argument suggests that the turnpike system generated more road expenditure because it delegated control-rights to local citizens that directly or indirectly benefitted from the investment. The nineteenth century writer and civil engineer, Henry Parnell, made exactly this claim in his book, *A Treatise on Roads*.

The legislature, by giving powers to persons willing to come forward as subscribers, commissioners, or trustees, and act together for the purpose of making new roads, or improving old ones, adopted the wisest principle for securing an abundance of good roads. Had the legislature refused to incorporate those persons who have executed the duties of turnpike trustees, and given the management of the roads to the government, or left them wholly with the parishes, this country could never have reached the degree of wealth and prosperity to which it has achieved, for want of proper means of inland communication.⁶

While historians have developed a number of compelling arguments, they have not directly tested the hypothesis that turnpike trusts had higher road expenditure than villages. The only empirical evidence comes from John Ginarlis and Sidney Pollard, who estimate total turnpike trust and village road expenditure from 1750 to 1850.⁷ After adjusting for inflation, their estimates

information on contemporary toll road networks see Silva, Gisele, "Toll Roads."

⁴Historical works on turnpike trusts include Sydney Webb and Beatrice Webb, *Kings Highway*, W. T. Jackman, *Development of Modern Transportation*, William Albert, *Turnpike Road System*, and Eric Pawson, *Transport and Economy*.

⁵Pawson, *Transport and Economy*, pp. 65-70.

⁶Parnell, *A Treatise on Roads*, p. 288.

⁷Ginarlis and Pollard, "Roads and Waterways."

suggest that between 1750 and 1800 increases in total turnpike expenditure were offset by reductions in total village expenditure. This finding conflicts with the arguments of many historians, because it implies that turnpike expenditure was a substitute for village expenditure.

The research of John Ginarlis and Sidney Pollard represents an important contribution to the literature, however, the data limitations associated with their study suggest that their findings are preliminary, rather than definitive. Therefore, it still remains an open question as to whether the turnpike system increased road expenditure during the eighteenth century. This paper addresses this gap in the literature by introducing new archival data on turnpike trust and village road expenditure. It uses the data to develop two principal findings. First, it shows that the establishment of turnpike trusts resulted in a significant increase in individual road expenditure. Second, it revises the estimates of Ginarlis and Pollard and shows that the rise of the turnpike trust system led to a substantial increase in total road expenditure.

The preceding results are significant because they are consistent with the argument that turnpike trusts caused road expenditure to increase. However, it is also possible that villages would have undertaken the same level of road expenditure, once demand was sufficiently high. To address this potential endogeneity problem, the paper also examines a natural experiment, in which roads remained under the authority of villages because petitions for turnpike trusts failed to receive passage from Parliament. The paper provides evidence that petitions failed because of politics and lobbying, rather than the demand for investment. Next, it shows that along roads where petitions failed, villages continued to have relatively low road expenditure when compared to the average turnpike trust. Therefore, the additional evidence adds support to the argument that turnpike trusts were responsible for the increase in road expenditure during the eighteenth century.

Historical Background

Before describing the data, it is useful to provide more background information on village and turnpike trust road provision.⁸ According to the Statute of Highways of 1555 and the General Highway Act of 1691, villages were responsible for the financing of road improvements within their jurisdiction.⁹ Villages carried out this responsibility using two types of taxes. The first involved the conscription of labor and materials from villagers. In particular, every laborer had to provide at most six days of 'statutory' labor per year and anyone who owned a plough had to provide a cart and any necessary tools. Village road improvements were also financed with property taxes, known as highway rates. These taxes were levied upon the assessed value of property income in the village, which in most cases was equivalent to the total land rent.

The Highway Acts also required that villages report to local magistrates on the status of their road improvements. For example, a village had to receive the permission of the magistrate before they could levy a highway tax. The magistrates also had the right to indict villages for a failure to maintain or improve their roads. The typical consequence of an indictment was a written warning or small fine levied upon the village. However, in some cases, magistrates levied substantial fines and then used the proceeds to finance additional road improvements within the village.

The village system of road provision functioned into the late nineteenth century, but its role was substantially diminished by the development of the turnpike system. As discussed earlier, each turnpike trust was created by an Act of Parliament and continued under a series of renewal Acts, passed at least every 21 years. Each Act named a body of trustees, which generally included

⁸The most detailed source on village road provision is Sydney Webb and Beatrice Webb, *King's Highway*. The most detailed work on the institutional features of the English Turnpike System is William Albert, *The Turnpike System*.

⁹The Acts are 2 & 3 Phillip & Mary, c. 8 and 3 William and Mary, c 12.

local landowners, merchants, or industrialists. Trustees were granted a number of important privileges. First, they could claim at most six days of statutory labor from the villagers along the road. Second, they were given the right to levy tolls and use the revenues to purchase land and materials, hire labor, and pay interest and legal fees.

Each turnpike Act restricted the tolls by defining a maximum schedule, which distinguished between different types of traffic, including coaches, wagons, packhorses, and livestock. In some cases, the schedule also discriminated between wagons carrying different types of commodities, such as wheat and coal.

Turnpike Acts also authorized the trustees to borrow on the income of the tolls by issuing mortgage debt. Under this arrangement, a mortgagee could foreclose upon the tolls if the turnpike trust failed to pay the required interest. In practice, foreclosure was relatively rare because bondholders accepted lower interest or they allowed the unpaid interest to be added to the principal.

Most Turnpike Acts also contained a final provision that trustees must not directly profit from the road. In particular, the Act stated that all revenues from the tolls must be devoted to operational expenses and debt servicing. This provision precluded trusts from issuing equity and effectively mandated that they operate as non-profit organizations.¹⁰

Although turnpike trusts did not offer opportunities for direct profit, they were adopted with great frequency. Figure 1 presents a graph of the cumulative number of turnpike trusts and the cumulative mileage managed by turnpike trusts. The figure shows three distinct phases of development. The leading phase begins in the 1690s and ends in 1750. During this period, many turnpike trusts were established along roads connecting London with major provincial cities and along the radial roads leading into medium-sized cities.

¹⁰In this respect, turnpike trusts were different from canal and railroad companies, which were for-profit organizations.

The next phase of development is known as the ‘turnpike boom.’ Beginning in 1750 and ending in 1770, the boom period involved the creation of over 350 new trusts on approximately 10,000 miles of road. The factors underlying the boom have been a major topic in the literature. T.S. Ashton has argued that the boom was driven by declining interest rates.¹¹ William Albert has challenged this view by showing that declining interest rates were an important, but not a decisive factor. Instead, he argues that changes in local demand drove most of the adoption.¹²

Whatever its causes, the boom led to a dramatic diffusion of turnpike trusts. As an illustration of this fact, figure 2 displays Eric Pawson’s map of the turnpike trust system in 1770.¹³ The map shows that turnpike trusts were highly diffused throughout the economy. It also shows that there was a particularly dense network of trusts stretching from the port cities in the Southwest to the manufacturing cities of the North, such as Birmingham, Leeds, Sheffield, and Manchester. Lastly, the map shows the attraction of London in the development of the turnpike network in the eastern half of the country.

The final phase of development is known as the lagging phase. It lasted from 1770 and continued until the early 1830s. It included two short-lived booms, during 1790s and 1820s, in which trusts were established in the suburban areas of rapidly growing cities or in areas where industrialization was accelerating.

The Data

The following sections will investigate whether the transition from villages to turnpike trusts increased road spending. The present section describes the data sources. The first data source

¹¹ Ashton, *Economic Fluctuations*.

¹² Albert, *Turnpike Road System*, pp. 120-11.

¹³ Pawson, *Transport and Economy*, p. 151.

are the British *Sessional Papers*. These records include a ‘census’ of turnpike trusts conducted in 1838.¹⁴ The census describes the mileage for every turnpike trust and the villages through which their road passed. In many cases, it also provides information on the date at which each turnpike trust was established.¹⁵

The Sessional Papers also contain a number of inquiries into the road expenditure of individual turnpike trusts and a summary of all turnpike trusts. Unfortunately, the surveys were only conducted during the early nineteenth century, in particular, the years 1818-1820, 1821, 1829, followed by every year after 1833.¹⁶ *The Sessional Papers* also contain surveys on total village road expenditure, but they are restricted to the years 1812-1814, 1827, and every year after 1834.¹⁷

The omission of published information for the eighteenth century is a serious problem because most turnpike trusts were established during this earlier century. To address this problem, the paper draws upon archival records. The Historical Manuscript Commission was used to develop a sample of archival records for 37 turnpike trusts. The list of turnpike trusts is described in a table in the appendix. The data set consists of all turnpike trusts in 14 counties, for which a complete description of accounts have survived. While the data set is not large, it represents approximately a 5% sample of all turnpike trusts established before 1819.¹⁸

The Historical Manuscript Commission was also used to develop a sample of archival records for 55 villages from several counties. Although the sample represents only a small fraction of all

¹⁴Great Britain, House of Commons, *Sessional Papers*, 1840, Vol XXVII.

¹⁵Additional information of the date of establishment comes from Albert, *Turnpike Road System*, and Pawson, *Transport and Economy*.

¹⁶The source for 1818-1820 is Great Britain, House of Commons, *Sessional Papers*, 1821 Vol IV. The source for 1821 and 1829 is Great Britain, House of Lords, *Sessional Papers*, 1834 Vol X.

¹⁷The source for 1812-1814 is Great Britain, House of Commons, *Sessional Papers*, 1818 Vol. XVI. The source for 1827 is Great Britain, House of Commons, *Sessional Papers*, 1830-31, Vol XI.

¹⁸The sample resembles a random draw of all turnpike trusts, given that the survival rate of records appears to be random.

villages, it appears to be representative of those villages that financed road expenditures, especially in the latter half of the eighteenth century. The list of villages is described in a table in the appendix.

The paper also uses Quarter Session Order Books (henceforth, County Order Books) as an alternative source of information on village road expenditure. These volumes are relevant because villages had to receive the permission of county magistrates before they levied a highway tax. These requests were recorded annually, along with the tax rate upon property associated with each highway tax.

County Order Books are a valuable source because they provide the basis for a panel data set describing the incidence and the level of *all* village highway taxes within a particular county. They also provide information on fines levied by county magistrates for the purposes of road improvements. The paper uses a sample of nine County Order Books.¹⁹ It represents a 20% sample of all counties and it is fairly representative in that counties are drawn from diverse economic and geographic regions. Unfortunately, the data from County Order Books are only reliable before 1773, when a new Act was passed, changing the administrative procedure for recording highway taxes.²⁰

The information on village highway taxes is combined with data on village-level tax assessments to estimate tax revenues associated with each highway tax. Annual tax revenues represent a good approximation to annual expenditure because highway taxes were 'earmarked' and because villages could not borrow to finance road improvements. Tax assessments are not available for every village in every year throughout the eighteenth century. Therefore, as a substitute, the paper

¹⁹The counties include Bedfordshire, Cambridgeshire, Hertfordshire, Leicestershire, Buckinghamshire, Worcestershire, Shropshire, North Riding of Yorkshire, and the West Riding of Yorkshire.

²⁰The Act was called the General Highway Act, 13 Geo. III, c. 78.

uses the 1815 property income assessment to proxy for eighteenth century tax assessments.²¹ This choice introduces an upward bias in village road expenditure because property income in 1815 was substantially higher than at any point during the eighteenth century. As a result, the data will already contain a bias against the hypothesis that turnpike trusts spent more than villages.

Turnpike Trusts and Individual Road Expenditure

This section examines whether turnpike trusts increased road expenditure along individual roads. It begins by focusing on the change in financial expenditures associated with highway taxes and toll revenues and then it considers non-financial expenditures, such as statutory labor. A useful starting point is the cross-sectional evidence from *the British Sessional Papers* in the early nineteenth century. Table 1 compares financial expenditure per-mile under the two systems at various dates after correcting for inflation using Greg Clark's farm wage series.²² Wages are used because labor represented one of the primary inputs into road maintenance and improvement.

The table shows that turnpike trusts spent between £50.0 and £90.1 per-mile, while villages spent between £8.7 and £13.7 per-mile. Based on this evidence, it is very clear that turnpike trusts were spending far more than villages during the early nineteenth century.

However, the results from table 1 do not imply that turnpike trusts always spent more than villages. In fact, it is possible that turnpike trusts spent more simply because they managed roads requiring greater capital and maintenance expenditures. To address this issue, it is necessary to examine the change in road expenditure before and after turnpike trusts were established. Figure 3 uses a sample of 33 turnpike trusts to estimate a 90% confidence interval for average road

²¹The assessment is available in Great Britain, House of Commons, *Sessional Papers*, 1830-31 Vol. XI.

²²Clark, "Farm Wages," p. 502-503.

expenditure per-mile during the first 40 years after turnpike trusts were established. Once again, the expenditures are adjusted for inflation using the Clark farm wage series.

Figure 3 shows that during their first two years, trusts had expenditure levels that were two to three times the average expenditure during subsequent years. The accounts also show that turnpike trusts financed the vast majority of these initial expenditures by issuing mortgage debt. Some of the initial expenditures were associated with non-road expenditures, such as Parliamentary fees and the construction of toll houses and gates, however, the vast majority were associated with capital improvements, including the purchases of land and materials.²³

How do village road expenditure patterns compare? To answer this question, this section uses the turnpike ‘census’ of 1838, the sample of nine County Order Books, and tax assessments from 1815. Recall that the census identifies all turnpike trusts, the date they were established, and the villages where they were established. This record was used to identify 152 roadways in the nine counties where turnpike trusts were established. Next, the information from Order Books and tax assessments were used to estimate road expenditure per-mile during the five years before each of the 152 turnpike trusts was established.²⁴ Finally, the expenditure levels are adjusted to 1819 prices to correct for inflation.

Table 2 presents the results. It shows average village expenditure per-mile and the standard deviation across the 152 roadways over the five year period before turnpike trusts were created. For comparison, the table also presents road expenditure per-mile across the sample of 33 turnpike trusts.

The results suggest that average village expenditure per-mile was much lower than average

²³A survey undertaken by the House of Lords and published in the *Sessional Papers*, 1834 Vol X, provides an itemized account of all turnpike trust expenditures in 1829. The accounts indicate that for new trusts expenditures on fees, toll houses, and gates were less than expenditures on capital improvements.

²⁴The village expenditure figures also include any fines issued by county magistrates.

turnpike expenditure per-mile. This can be confirmed by a t-test of the null hypothesis that average turnpike expenditure per-mile in any year between year 0 and 40 was equal to average village expenditure per-mile in year -1, which is the year immediately preceding the establishment of the turnpike trust. The results of this test suggest a strong rejection of the hypothesis that village expenditure equalled turnpike trust expenditure.²⁵

The preceding comparison is made over two separate samples of roads, and therefore, it is possible that the sample of 152 village roads required less improvement than the sample of 33 turnpike roads. This concern can be addressed by focusing on the subset for which there is information on village and turnpike expenditure along the same road. Figure 4 illustrates this comparison for the 11 common roadways in the data set.

Figure 4 shows that in 10 out of the 11 cases, turnpike trust expenditure per-mile exceeded village expenditure in every year.²⁶ The finding reaffirms the results in table 2 and shows that road specific factors cannot explain the higher level of average turnpike expenditure per-mile.

Before reaching the conclusion that turnpike trusts increased individual road expenditure, it is still necessary to consider any changes in statutory labor. Recall that statutory labor was the requirement that villagers perform at most six days of unpaid labor per year for either the village authorities or the turnpike trusts. Unfortunately, there is no direct evidence on the amount of labor performed under each system, however, there is indirect evidence that statutory labor was not fully exploited by either turnpike trusts or village authorities.²⁷ There is also evidence

²⁵The t-statistics were significant at the 1% confidence level.

²⁶The one exception was the Hinckley and Lutterworth road, where in one year village expenditure per-mile was roughly equal to turnpike expenditure in years one through four.

²⁷The turnpike 'census' in Great Britain, House of Commons, *Sessional Papers*, 1840 Vol XXVII shows that only 42% of all turnpike trusts considered statute labor an important source of expenditure. Turnpike Acts in the early eighteenth century also indicate that trusts were typically granted only 3 of the 6 days of labor. For villages, the evidence comes from the incidence of highway taxes. By law, a village had to exhaust its legal limit of six days of labor before it could levy a highway tax. According to County Order Books, less than 15% of villages ever levied

that statutory labor represented only a small fraction of total road expenditure during the early nineteenth century.²⁸ As a result, the inclusion of statutory labor should not change the general conclusion that turnpike trusts raised individual road expenditure.

Turnpike Trusts and Total Road Expenditure

This section shows that total road expenditure increased after the turnpike boom of the 1750s and 1760s. It also provides evidence that turnpike trust and village road expenditure were complements rather than substitutes. To demonstrate these results, the section presents estimates of total turnpike trust and total village road expenditure. It also introduces additional evidence which supports the accuracy of the results.

In the case of turnpike trusts, total road expenditure is estimated using the published figures from 1819 and the sample of expenditures from 37 turnpike trusts.²⁹ In the case of the villages, total expenditure is estimated using the published figures from 1812, a sample of 55 village accounts, and the sample of County Order Books.³⁰ The estimates and the methodology are described in the appendix.

Figure 5 plots the estimates for total turnpike trust road expenditure for every decade from 1730 to 1810, along with published figures for 1819, 1829 and 1839. The figure also plots the estimates of total village road expenditure between 1730 and 1810, along with published figures for highway taxes prior to the trust. This finding suggests that very few villages were fully exploiting statute labor prior to the trust.

²⁸The value of statutory labor was estimated for the years 1812-1814. According to this author's calculations, it represented approximately 38% of total village expenditure and 15% of total road expenditure.

²⁹The published figure for total turnpike expenditure in 1819 comes from Great Britain, House of Commons, *Sessional Papers*, 1821 Vol IV.

³⁰The published figure for total village road expenditure in 1812-14 comes from Great Britain, House of Commons, *Sessional Papers*, 1818 Vol XVI.

1812, 1827, and 1839. Both series are deflated using Clark's farm wage series.

Figure 5 illustrates three key features. First, it shows that turnpike expenditure grew substantially during the 1750s and 1760s and again during the 1810s and 1820s. Second, it shows that village road expenditure started at a lower level and grew more slowly until the early nineteenth century when it increased dramatically. Third, the figure suggests that the trends in the two series are related, particularly during the early nineteenth century.

The patterns displayed in Figure 5 suggest that the turnpike boom of the 1750s and 1760s had a significant impact on total road expenditure. In particular, the estimates indicate that total road expenditure more than doubled in real terms between 1750 and 1770. If total road expenditure is measured as a fraction of Greg Clark's estimates of national income, then the results suggest that the turnpike boom elevated road expenditure from around 0.25% of national income in 1750 to around 0.5% in 1770.³¹

Lastly, the series suggest that turnpike trust and village road expenditure were ultimately complements rather than substitutes. The complementarity argument is consistent with the simultaneous rise in village and turnpike trust expenditure during the 1750s and 1760s and again during the 1810s and 1820s. It is also consistent with case study evidence which suggests that turnpike improvements along primary roads stimulated village improvements along secondary roads.³²

As mentioned in the introduction, the preceding results are at odds with the estimates of John Ginarlis and Sidney Pollard.³³ After correcting for inflation, their estimates show a more gradual

³¹National Income figures come from the appendix to Clark, "Debt, Deficits, and Crowding Out." National income is around £84.6 million in 1750 and £110.1 in 1770. Estimated total road expenditure is around £212,000 in 1750 and £587,000 in 1770.

³²County Order Books provide a number of examples, in which villages began spending more on their highways after turnpike trusts were established in their jurisdiction. There is also some indications that neighboring villages began spending more after turnpike trusts were established in their area.

³³Ginarlis and Pollard, "Roads and Waterways."

rise in turnpike expenditure and a gradual decline in village expenditure between 1750 and 1800. The difference between the two estimates is significant because it leads to different interpretations of the impact of turnpike trusts.

The accuracy of the present results can be checked by introducing alternative sources of information. In the case of turnpike trusts, the trend in total expenditure should be related to the trend in total turnpike miles. Figure 6 illustrates the comparison and confirms that the trend in expenditure generally follows the trend in turnpike miles. The figure also shows that the expenditure series lies above the mileage series until the 1810s. This result follows from the expenditure patterns in the sample, which show that turnpike trusts adopted after 1770, tended to have lower expenditure per-mile.

In the case of villages, the accuracy of the present estimates can be checked more directly by using evidence from a Parliamentary survey that inquired into total village expenditure.³⁴ The survey did not itemize all village expenditures, however, it does distinguish between payments for poor relief and payments for all other items such as roads, church maintenance, and the constabulary.

Table 3 displays the information on total village expenditures, excluding payments to the poor and compares these with the present estimates of total village road expenditure. The table illustrates two important results. First, the estimates of village road expenditure follow the more general trend in total village expenditure. Second, the estimates of total village road expenditure are below total village expenditure, excluding poor relief. By contrast, the estimates of Ginarlis and Pollard do not follow the trend in total expenditure and more importantly they exceed this upper bound by a substantial margin in 1750, 1775, and 1785.

In summary, the additional evidence provides fairly strong support for the accuracy of the

³⁴Great Britain, House of Commons, *Sessional Papers* 1830-31 XI, p. 207.

present estimates of total turnpike trust and village road expenditure.

Evidence From a Natural Experiment

This final section investigates whether turnpike trusts were responsible for the increase in road expenditure during the eighteenth century. The evidence presented thus far is certainly consistent with an argument that turnpike trusts were instrumental; however, it does not preclude the possibility that villages would have invested as much as turnpike trusts once demand was sufficiently high.

To deal with this endogeneity problem, this section exploits a natural experiment, in which certain roads remained under the village system because petitions for turnpike trusts failed to receive passage from Parliament. The evidence will show that failure was largely driven by politics and lobbying, rather than the demand for investment. This feature is important because the likelihood of failure needs to be exogenous with respect to the demand for investment.

Table 4 draws upon the data from Julian Hoppit's work on Parliamentary legislation.³⁵ It lists the number of turnpike petitions that failed, along with the number of petitions that passed for each decade from 1690 to 1770. The table also compares the failure rate for turnpike petitions with the failure rate for all legislation, excluding turnpike Acts.

Table 4 shows that it was not uncommon for turnpike petitions to fail. In particular, failure rates were relatively high during the three decades from 1690 to 1719; before falling during the 1720s and then again during the 1740s, 1750s, and 1760s.

Table 4 also shows that the failure rate for turnpike petitions follows the general trend in failure rates among all forms of legislation. This finding suggests that when Parliament was unsuccessful

³⁵Hoppit, *Failed Legislation*.

in passing general legislation, it was also unsuccessful in passing turnpike legislation. It is possible that this correlation reflects the spillover effects from partisan disputes over issues such as war and religion. If this was the case, then failed turnpike petitions would appear to be an excellent source of policy variation.

Further support comes from evidence that turnpike petitions failed because of lobbying by interest groups opposed to the turnpike trust. Eric Pawson has shown that it was not uncommon for counter-petitions to be introduced, especially in the early eighteenth century.³⁶ One example of a counter-petition comes from the inhabitants of the city of Buckingham in 1712, in which they argued that the proposed turnpike road from Bicester to Aylesbury would injure the trading interests of their city. In this case, the counter-petition was successful because the turnpike petition failed to become an Act of Parliament.³⁷

More evidence comes from an examination of the relationship between failure and the location characteristics of roads being considered by turnpike petitions. Location characteristics are useful because they are a good proxy for traffic levels and ultimately demand. Table 5 examines the sample of all 150 roads that were subject to either a successful or an unsuccessful turnpike petition before 1750. The roads were classified into three categories: (1) roads connecting London with major cities with populations above 2500 in 1700, (2) roads lying within a ten-mile radius of major cities, and (3) all other roads.³⁸ The table illustrates the distribution of characteristics for 35 roads with at least one petition that failed from 1690 to 1749 and 115 roads for which the petition passed during the same calendar year.

³⁶Pawson, *Transport and Economy*, p. 119.

³⁷The counter-petition can be found in the *Journals of the House of Commons* in 1712.

³⁸The list of roads as well as some information on location characteristics is drawn from Albert, *Turnpike Road System* and Pawson, *Transport and Economy*. The list of major cities are drawn from Peter Corfield, *Impact of English Towns*, which defines all major cities as having a population above 2500 in 1700. Additional information was drawn from the seventeenth century travel guide, Ogilby, *Britannia*.

If the location characteristics of failed turnpike petitions were different, then there should be a different distribution across the three categories. Table 5 shows that the distribution for the two categories of petitions are almost identical. In other words, roads with failed petitions don't seem to have any observable characteristics that separate them from roads where petitions were immediately successful. This finding is important because it suggests that Parliament was not selecting failure based upon the economic viability of the trust.

Taken together, the preceding evidence suggests that failed turnpike petitions can provide useful information about how villages would have behaved in the absence of the turnpike system. To pursue this aim, the section examines the expenditure behavior of villages along a sample of 16 roads for which turnpike petitions initially failed, but were ultimately successful. A table in the appendix lists the 16 roads in the sample, the counties where the road was located, and the dates between the unsuccessful and successful turnpike petitions. The time between unsuccessful and successful petitions ranged between 2 and 58 years, with a median value of 8 years.

Given the structure of the data, it seems reasonable to examine the behavior of villages during the intervening period between the unsuccessful and the successful petitions. The most informative observations in the sample are those for which the intervening period was sufficiently long. The length of the period is relevant because villages may have been willing to forego financing current road expenditures, if they expect that a turnpike trust will be established in the following session.

Table 6 describes average annual expenditure per-mile beginning with the year after the initial turnpike petition was unsuccessful and ending with the year when a new petition was ultimately successful. The table orders the observations according to the length of the intervening period within a range of 20 years. Village road expenditure is again estimated using information on

highway taxes in County Order Books.³⁹

The table shows that along roads where the time between successful and unsuccessful petitions was less than five years, village expenditure was always £0 per-mile.⁴⁰ It also shows that in those cases where the intervening period was five years or more, village expenditure varied substantially. Along the Islington to London, Aylesbury to Bicester, and the Croyden to London roads, the estimates suggest that villages spent between £35 and £94 per-mile. However, along most of the roads listed in table 6, village expenditure was much lower, ranging between £0 and £25 per-mile. Across the entire sample of 16 roads, annual village expenditure per-mile ranged between £10.9 during years 0 to 5 and £15.6 during years 11 to 15.

When compared with the expenditure behavior of villages prior to the adoption of turnpike trusts, the results in table 6 suggest that villages spent more on their roads after turnpike petitions failed. However, the results also suggest that villages still had lower expenditure than turnpike trusts. In particular, the results from table 6 imply that the counterfactual level of average village road expenditure per-mile would have equalled at most 22% ($= 15.6 \text{ per-mile} / 71 \text{ per-mile}$) of average turnpike expenditure per-mile. In general, this finding suggests that endogeneity concerns cannot overturn the conclusion that turnpike trusts were responsible for the increase in road expenditure during the eighteenth century.

³⁹ Village road expenditure is assumed to be equal to village highway tax revenues, calculated by the tax rate times the assessed value of property in 1815. There were two exceptions. For Islington-London, there was information on the actual amount of revenues raised. For Croyden-London, the 1815 tax assessment was extremely large given that these villages lied just outside of London. As a result, the tax assessments were valued at £10,000 per village, which is still extremely high by the standards of the early 18th century.

⁴⁰ As discussed earlier, the minimal expenditure response of villages with short delays between failed and successful turnpike petitions is likely to be a reflection of strategic considerations, therefore, it is perhaps not so surprising that all of these villages spent nothing.

Conclusion

This paper examined the relationship between turnpike trusts and road infrastructure spending in eighteenth century England. It showed that road expenditure increased after turnpike trusts were created. It also revised the estimates of John Ginarlis and Sidney Pollard and showed that total road expenditure increased after the turnpike boom of the 1750s and 1760s. The paper concluded by examining evidence from a natural experiment, in which roads remained under the village system because petitions for turnpike trusts failed to receive passage from Parliament. The evidence showed that villages increased their expenditure after petitions failed, however, it was still less than the average turnpike trust.

The results of this paper add empirical support to the argument that turnpike trusts were an important institutional innovation, yet it still remains unclear why turnpike trusts were more successful than villages in financing road expenditure. There are a number of explanations that can potentially account for the relative effectiveness of turnpike trusts. One set of hypotheses focuses on the benefits of tolls. Tolls may have been important because they encouraged greater internalization of the costs and benefits of road improvements.⁴¹ It is also possible that tolls enhanced the ability to borrow by providing a source of collateral. Lastly, it is possible that tolls encouraged complementary investments by introducing a 'commitment' to road expenditure.

A second set of hypotheses focuses on the effects of local administrative control. This feature of the turnpike system may have addressed the concern that tolls would be used as a source of general tax revenue for the government.⁴² It is also possible that local control encouraged a form of inter-jurisdictional competition, in which cities and regions attempted to attract economic activity by

⁴¹See Pawson, *Transport and Economy*, pp. 65-70 and Jackman, *Development of Modern Transportation*.

⁴²See Parnell, *A Treatise on Roads*, p. 288.

providing infrastructure investment.

Finally, there is an argument that turnpike trusts were more effective because of the particular aspects of English legal and political institutions. For example, one could argue that parliamentary rule enhanced the effectiveness of the turnpike system by increasing regulatory certainty and minimizing the risk of expropriation. This latter argument is certainly consistent with the thesis of Douglass North and Barry Weingast, who argue that the rise of Parliament enhanced the general security of property rights.⁴³

The English turnpike system also looks fairly successful when compared to the partially centralized systems of road provision in France and Spain. Although a rigorous comparison is not possible with current data, the initial evidence suggests that France and Spain had lower levels of road expenditure than England, especially along secondary roads.⁴⁴ Therefore, it is possible that the English turnpike system was the most effective mechanism for generating road expenditure during the eighteenth century.

Appendix 1

This appendix describes the data sources. Table 7 lists the turnpike trusts in the expenditure sample, along with the year when they were established, the record office, and the archival reference. Table 8 lists the villages in the expenditure sample, along with the record office and the archival reference. Table 9 lists the sample of 16 roads where turnpike petitions failed and for which there are observations on village expenditure.

Complete information in County Order Books was collected from approximately 1700 to 1773

⁴³North and Weingast, "Constitutions and Commitment."

⁴⁴For the French literature see Szostak, *the Role of Transportation*. For the Spanish literature see Ringrose, *Transportation and Economic Stagnation*.

for the nine counties of Bedfordshire, Cambridgeshire, Hertfordshire, Leicestershire, Shropshire, North Riding, the West Riding, Worcestershire, and Buckinghamshire. Supplemental information, associated with villages where turnpike petitions failed, was collected for five counties: Surrey, Berkshire, Cheshire, Middlesex, Durhamshire, and Cumberland. The references for these records are listed under Great Britain, Court of the Quarter Sessions of the Peace. Many of these records are available on microfilm at the Family History Library of the Church of Latter Day Saints.

Appendix 2

This appendix describes the method used to estimate total turnpike trust and total village road expenditure. The estimates are provided in Table 10.

The estimates of total turnpike trust expenditure are based on the sample of turnpike accounts and published records stating total expenditure for all turnpike trusts between 1818 and 1820 (Great Britain, 1821). The idea was to use the information in the sample to project expenditure backwards from the known level of expenditure in 1818.

Towards this goal, the paper estimates the population expenditure index, where the base year is 1819. The population expenditure index in year t is equal to population expenditure in year t divided by the population expenditure in 1819. Given an estimate of the population expenditure index, it is possible to estimate total expenditure in any year t simply by multiplying the expenditure index for year t with the actual level of expenditure in 1819. The key issue, therefore, is how to estimate the population expenditure index. One method is to draw a sample of trusts (i.e. a set of complete expenditure histories) and simply aggregate across the sample in every year. As the sample size increases and approaches the population total of 799, then the aggregate sample expenditure series will approach the population expenditure series.

The paper follows this methodology, however it also introduces a weighting procedure to correct for the over-sampling or under-sampling of trusts established in a particular period. The sample used in this paper is slightly skewed towards the period before 1770. In particular, It consists of 7 trusts (19%) established between 1700 and 1749, 21 trusts (57%) established between 1750 and 1769, and 9 trusts (24%) established between 1770 and 1819. These divisions are slightly different from the population divisions across the three sub-periods. In the population, there were 146 trusts (18%) established before 1750, 340 trusts (46%) established between 1750 and 1769, and 313 trusts (36%) established between 1770 and 1819.

To correct this sampling problem, three separate expenditure series were calculated by aggregating across all observations for three age subgroups, 1700-1749, 1750-1770, and 1771-1819. Next the three series are aggregated using frequency weights. The frequency weights are designed to correct for over-sampling or under-sampling from different segments of the population. In this case, the frequency weights would be $(146/7)$ for the sub group of trusts formed between 1700 and 1749, $(340/21)$ for the sub group established between 1750 and 1769, and $(313/9)$ for the group formed between 1770 and 1819. This yields the following sample expenditure series E_t , where E_{00-49} , E_{50-69} , and E_{70-19} are the expenditure series for the three groups:

$$E_t = (146/7) \times E_{00-49} + (340/21) \times E_{50-69} + (313/9) \times E_{70-19}$$

Next, a sample expenditure index is created. The sample index is then multiplied with the actual level of expenditure in 1819 to arrive at the final estimate of turnpike trust road expenditure. It is worth pointing out that the unweighted estimate, in which expenditure is simply aggregated across the sample, yields a very similar estimate.

The estimates for village road expenditure use the same basic technique, although there are

some important differences. The estimates are based on the frequency of village highway taxes from 1730 to 1770, a sample of village account books from 1770 to 1812, and published figures on total village expenditure from 1812 to 1814.

Ideally, the paper would use the information in county order books to estimate the growth in village expenditure before 1812. Recall that county order books describe all villages in a given county that levy highway taxes and at what tax rate. Unfortunately, this data source becomes unreliable after 1773, because of changes in the administrative procedure of recording highway taxes. Therefore, it is necessary to use an alternative source of information for the period between 1770 and 1812. As a substitute, the paper uses a sample of 55 village accounts, covering the period from 1770 to 1812. In this case, village road expenditure was estimated using a methodology similar to the one used for turnpike trusts, except that no weighting procedure was used. First, a sample expenditure series was constructed by summing across all observations. Next, a sample expenditure index was constructed with base year 1812. Finally, an estimate of nominal expenditure in every year t was obtained by multiplying the sample expenditure index by the published figures for all villages in 1812.

For the pre-1770 period, the paper uses the sample of County Order Books because they provide more complete information. In the sample of 9 Order Books, only 14 villages were levying highway taxes in 1730, compared with 13 in 1740, 16 in 1750, 34 in 1760, and 51 in 1770. Based on this information, it is assumed that nominal expenditure grew at the same rate as the number of villages levying highway taxes. This assumption implies that village expenditure in 1730 was 27% (or $14/51$) of its 1770 level, in 1740 it was 25% ($13/51$), in 1750 it was 31% ($16/51$), and in 1760 it was 67% ($34/51$). Combining these growth rates with the 1770-1812 series, yields an estimate of total village road expenditure beginning in 1730.

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Tables

Table 1
Turnpike Trust and Village Road Expenditure Per-Mile in England and Wales, 1814, 1821, 1827, 1829, and 1839

Year	Village expenditure per-mile (1819 prices)	Turnpike Trust expenditure per-mile (1819 prices)
1814	£8.7	
1821		£50.0
1827	£12.5	
1829		£90.1
1839	£13.7	£87.2

Sources: The sources for turnpike trusts are Great Britain, House of Lords, *Sessional Papers*, 1834 Vol X and Great Britain, House of Commons, *Sessional* 1841 XXVII. The sources for villages are Great Britain, House of Commons, *Sessional Papers*, 1818 Vol. XVI, 1830-31, Vol XI, and 1841 XXVII. The expenditure figures are adjusted to 1819 prices using the national wage series from Clark, "Farm Laborer," p. 502-503.

Table 2
Average Village Road Expenditure per-mile during the Five years before Turnpike Trusts were Established and Average Turnpike Expenditure per-mile during the first 40 years

Year (0 = Year Trust is Established)	Average Village expenditure per-mile in 1819 prices (standard deviation)	Average Turnpike Trust expenditure per-mile in 1819 prices (standard deviation)
-5	£1.65 (6.4)	
-4	£2.18 (8.7)	
-3	£2.07 (7.7)	
-2	£2.41 (9.85)	
-1	£5.24 (13.6)	
0		£264.5 (264.7)
1		£177.8 (220.1)
2		£96.5 (70.5)
3		£86.6 (132.4)
4		£79.4 (113.4)
5		£72.7 (86.9)
6-40		£71.0 (110.7)
<i>N</i>	152	33

Sources: Village Road Expenditure is estimated using data on highway tax levies in Great Britain, Court of Quarter Sessions, in Bedfordshire, Cambridgeshire, Leicestershire, Shropshire, North Riding of Yorkshire, West Riding of Yorkshire, Buckinghamshire, and Worcestershire. Data for Hertfordshire county comes from William Hardy, *Hertford County Records*. Information on the length of village roads comes from the turnpike 'census,' Great Britain, House of Commons, *Sessional Papers* 1840, Vol. XXVII. Turnpike Expenditure comes from the Turnpike Trust Sample. See sources for Figure 3.

Table 3
Total Village Expenditure, Excluding Poor Relief and Estimated Total Village Road Expenditure, 1750 - 1812

Year	Total Village Expenditure, Excluding Poor Relief (in nominal prices)	Estimated Total Village Road Expenditure (in nominal prices)
1750	£40,100	£34,200
1760		£73,900
1770		£110,300
1775	£172,700	
1780		£201,000
1785	£235,500	
1790		£286,400
1800		£400,100
1802	£1,224,200	
1810		£636,400
1812	£2,185,300	£840,000

Sources: Total Village Expenditure, Excluding Poor Relief comes from Great Britain, House of Commons, *Sessional Papers* 1830-31 XI. For estimated Total Village Road Expenditure see sources for Figure 6.

Table 4
Failed Turnpike Petitions, 1690-1769

Decade	Failed Turnpike Petitions	Successful Turnpike Petitions	Failure Rate Turnpike Petitions	Failure Rate for all Petitions
1690-99	3	5	37.5%	56.8%
1700-09	5	10	33.3%	42.3%
1710-19	7	22	24.1%	36.3%
1720-29	7	46	13.2%	28.3%
1730-39	8	25	24.2%	34.2%
1740-49	7	38	15.5%	31.2%
1750-59	14	170	7.6%	22.0%
1760-69	19	170	10.0%	18.5%

Sources: The figures for this table are derived from data provided by Julian Hoppit. General information for the data can found in Hoppit, *Failed Legislation*. The failure rate for all legislation, excludes turnpike petitions.

Table 5
 Characteristics of Roads with at least one Failed Turnpike Petition versus Roads with no Failed Turnpike Petitions

Location Characteristic	Roads with a Failed Petition	Roads with no Failed Petitions
London-Major Cities	48.6%	51.3%
Hinterland of Major Cities	25.7%	26.1%
Other	28.7%	22.6%
<i>N</i>	35	115

Sources: Turnpike Roads and location characteristics are identified using Albert, *The Turnpike Road System*. Major cities are defined as cities with a population above 2500 in 1700, which comes from Peter Corfield, *The Impact of English Towns*. For information on failed turnpike petitions, see the sources for Table 4.

Table 6
Village Road Expenditure per-mile after the initial Turnpike Petition Failed and before the Successful
Turnpike Petitions was Introduced

Road	Estimated Annual Expenditure Per-Mile Years 0- 5 (1819 prices)	Estimated Annual Expenditure Per-Mile Years 6-10 (1819 prices)	Estimated Annual Expenditure Per-Mile Years 11-15 (1819 prices)	Estimated Annual Expenditure Per-Mile Years 16-20 (1819 prices)
Islington-London	£94.2	£62.5	£54.2	£0
Aylesbury-Bicester	£0	£35.0	£46.7	£46.7
Stockton-Darlington	£0	£0	£3.3	£24.8
Farringdon-Fyfield	£0	£0	£0	£1.8
Kingston-Petersfield	£12.4	£2.2	£4.0	£16.2
Church Hulme-Newcastle	£2.8	£3.8	£2.8	£0
Penrith-Cockermouth	£0	£0	£0	£0
Aylesbury-Buckingham	£0	£16.3		
Worcester-Birmingham	£0	£0		
Croyden-London	£65.6	£0		
Kensington-Colnbrook	£0			
Boroughbridge-North Allerton	£0			
Leeds-Wakefield	£0			
Worcester-Bewdley	£0			
Evesham-Broadway	£0			
York-Thirsk	£0			
Mean	£10.9	£13.3	£15.6	£12.8

Sources: Village Road Expenditure is estimated using data on highway tax levies in Great Britain, Court of Quarter Sessions, in Middlesex, North Riding of Yorkshire, West Riding of Yorkshire, Buckinghamshire, Cheshire, Sussex, Surrey, Durhams hire, Cumberland, and Worcestershire.

Table 7
Turnpike Trust Sample with Archival References

Turnpike Trust name	Year Established	Record Office	Reference
Chestnut	1725	Hertford RO	TP1/1-4
Essex and Hertfordshire	1744	Hertford RO	TP3/1-11
Sparrow Herne	1763	Hertford RO	TP4/25-31
Wadesmill	1663	Hertford RO	TP7/1-4
Watton	1757	Hertford RO	TP8/1-2
Hockliffe and Woburn	1728	Bedford RO	X/21/4-5
Brentford	1718	Hounslow Library	
Isleworth	1767	Chiswick Library	
Cambridge and Ely	1763	Cambridge RO	T/E/AM1-AM2
Hinckley and Lutterworth	1762	Leicester RO	T/MB/2/1-2
Leicester and Hinckley	1754	Leicester RO	T/SA/4/1
Huddersfield and Pennistone	1777	West Yorkshire RO	
Manchester and Wilmslow	1754	Manchester City	M124
Bawtry and Selby	1793	West Yorkshire RO	RT 13/5
Harrowgate and Hewick	1752	West Yorkshire RO	RT 44
Knaresborough and Pateley	1759	West Yorkshire RO	RT 52
Redhouse and Crofton	1741	West Yorkshire RO	RT 73
Ripon and Pateley Bridge	1756	West Yorkshire RO	RT 44
Donnington	1757	Lincolnshire RO	
Grimsby	1765	Lincolnshire RO	
Leadenham	1759	Nottingham RO	DDT/27/1-2
Mansfield and Southwell	1807	Nottingham RO	DDM/111/57
Hartford Green	1769	Cheshire RO	DC 170/6
Nottingham and Ilkestone	1764	Derbyshire RO	D 5050/2
Islington	1717	Islington Library	
Burford and Preston	1754	Gloucester RO	D1070/8/1
Cheadle-Ipstones	1770	William Salt Library	52/31
Blackburn and Burscough	1755	Lancashire RO	TTE/3
Northampton and Wellington	1797	Northampton RO	
Ludlow, First District	1750	Shropshire RO	LB13/1
Ludlow, Second District	1756	Shropshire RO	LB18/25
Caynham	1780	Shropshire RO	LB18/86-89
Madeley	1773	Shropshire RO	1681/196/1-2
Cheadle, Oakmoor	1762	Staffordshire RO	D239/M/4/48
Cheadle, Huntley	1763	Staffordshire RO	D239/M
Cheadle, Dilhome	1790	Staffordshire RO	D239/M
Cheadle, Alton	1799	Staffordshire RO	D239/M

Table 8
Village Sample with Archival References

Village, County	Record Office	Reference
Ayott St. Peter, HT	Family History Library	FHL #1537956
Waltham Cross, HT	Family History Library	FHL #1593498-9
Chestnut, HT	Family History Library	FHL #1593499
Great Hadham, HT	Family History Library	FHL#1593527-8
Hertford St. Andrew, HT	Family History Library	FHL#1538075
Hitchin, HT	Family History Library	FHL#1538105-6
Little Berkstead, HT	Family History Library	FHL#1537964
Aldenham, HT	Family History Library	FHL#579621
Isleworth, MX	Chiswick Library	
Anstey, LE	Leicester RO	DE/199/6
Ashby Magma, LE	Leicester RO	DE/437/1/9
Belgrave, LE	Leicester RO	17 D64/E/2
Blaby, LE	Leicester RO	DE 3352/247
Bruntingshorpe, LE	Leicester RO	DE 765/9
Borough on the Hill, LE	Leicester RO	DE 990/22
Cole Overton, LE	Leicester RO	
Cossington, LE	Leicester RO	DE 40/36
Seagrave, LE	Leicester RO	DE 3897/10
Shenton, LE	Leicester RO	6 D 43/6/5
Cheetham, LA	Manchester City	M10/7/4/1
Almondbury, YW	West Yorkshire RO	D 12/176A
Welburn in Bulmer, YN	Yorkshire Arch. Society	MS 524
Fishlake, YW	Doncaster Archives	PR Fish 1/4/1-4
Garton Grimston, YW	Yorkshire Arch. Society	MS 490
Harden in Bingley, YW	Yorkshire Arch. Society	MD 290/9
Kirkheaton, YW	Yorkshire Arch. Society	MS 704/A
Rawmarsh, YW	Sheffield RO	PR 80/17
Sheffield, YW	Sheffield RO	CB 1640/1-15
Sykehouse, YW	Sheffield RO	PR Syke 1/411
Thorne, YW	Sheffield RO	PR Thor 43
Hartlington, BD	Bedfordshire RO	
Houghton Conquest, BD	Bedfordshire RO	DDP 11/21
Meppershall, BD	Bedfordshire RO	P 29/21/1
Upper Stondon, BD	Bedfordshire RO	P 55/21
Hyde Staleybridge, CH	Tameside Archive	
Sutton in Macclesfield, CH	Cheshire RO	MF 335/9
Handforth, CH	Cheshire RO	P10/21/1
Handley, CH	Cheshire RO	P3/5
Farndon, CH	Cheshire RO	P45/13
Winwick, CH	Cheshire RO	P155/17/1-6
Nether Peover, CH	Cheshire RO	
Halton, CH	Cheshire RO	
Nether Alderley, CH	Cheshire RO	P 143/15/1-2
Tattenhall, CH	Cheshire RO	P5/17/1
Warburton, CH	Cheshire RO	P68/28/1
Wettenhall, CH	Cheshire RO	P40/22
Denby Abbey, DY	Derbyshire RO	D1061/A/PS/1
Turksdean, GL	Gloucestershire RO	P341/su/2/1
Balderton, SH	Shropshire RO	P201/N/1/1
Llanymyne, SH	Shropshire RO	P168/N/1
Preston on Weald Moors, SH	Shropshire RO	P233/N/1/1
Porkington Selattyn, SH	Shropshire RO	P240/N/1
Armitage, ST	Staffordshire RO	D805/4/1
Tettenhal, ST	Staffordshire RO	D571
Haughton, ST	Staffordshire RO	

Table 9
Sample of Roads where Turnpike Petitions Failed

Road	County	Year when first Turnpike Petition failed	Year when Turnpike Act Passed
Islington-London	Middlx.	1693	1717
Aylesbury-Bicester	Buck.	1712	1770
Aylesbury-Buckingham	Buck.	1712	1721
Kensington-Colnbrook	Middlx.	1714	1717
Stockton-Darlington	Durham.	1726	1747
Boroughbridge-N.Allerton	N. Riding	1742	1745
Leeds-Wakefield	W. Riding	1754	1758
London-Croyden	Surrey	1714	1720
Worcester-Birmingham	Worc.	1706	1714
Worcester-Bewdley	Worc.	1723	1726
Evesham-Broadway	Worc.	1726	1728
York-Thirsk	N. Riding	1749	1753
Farringdon-Fyfield	Berks.	1699	1733
Kingston-Petersfield	Surrey	1710	1749
Ch. Hulme-Newcastle	Chesh.	1710	1731
Penrith-Cockermouth	Cumb.	1745	1762

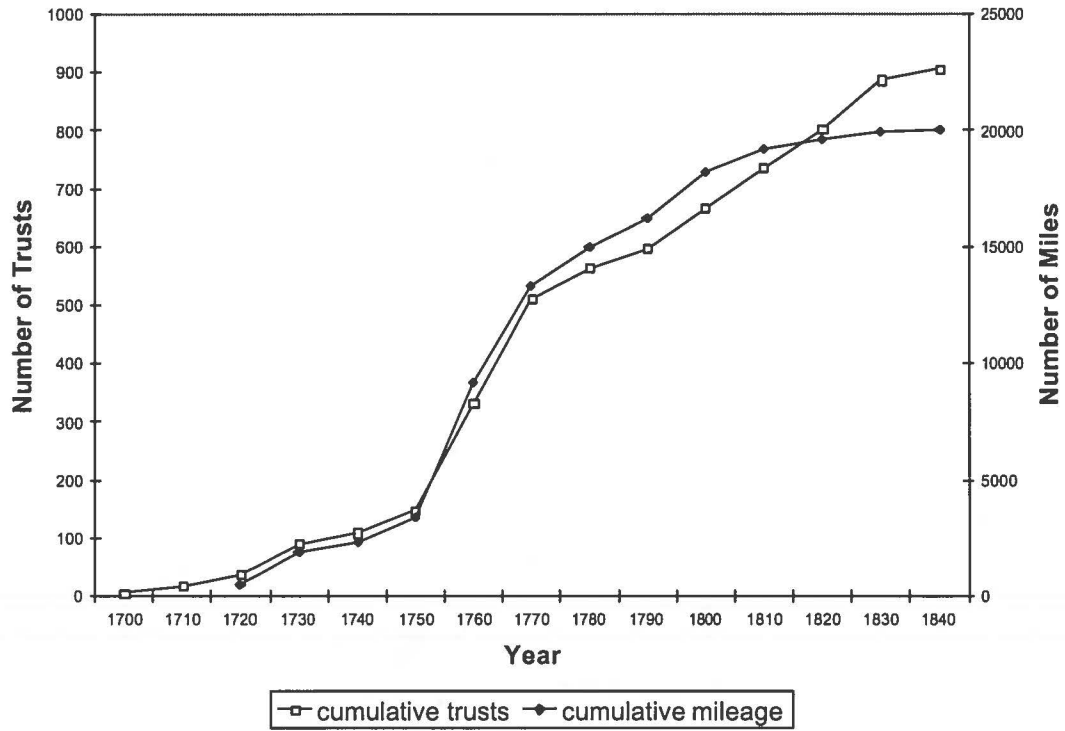
Table 10
Estimates of Nominal Turnpike Trust and Village Road Expenditure in England and Wales, 1730 – 1840

Year	Turnpike Trusts	Villages
1730	£108,200	£29,800
1740	£135,500	£27,600
1750	£177,700	£34,200
1760	£350,900	£73,900
1770	£476,400	£110,300
1780	£503,200	£201,000
1790	£573,400	£286,400
1800	£772,200	£400,100
1810	£902,600	£636,400
1812		£840,000
1821	£1,034,100	
1827		£1,121,800
1829	£1,499,600	
1839	£1,623,600	£1,267,800

Sources: For the estimates of turnpike expenditure prior to 1821 and for villages prior to 1812 see appendix 2. For all other dates see the sources for table 1.

Figures

Figure 1
The Cumulative Number of Turnpike Trusts and Turnpike Mileage, 1700-1840



Sources: The data for this graph are drawn from Albert, *Turnpike System*, Appendix B, pp. 202-223, and Pawson, *Transport and Economy*, pp. 155-156.

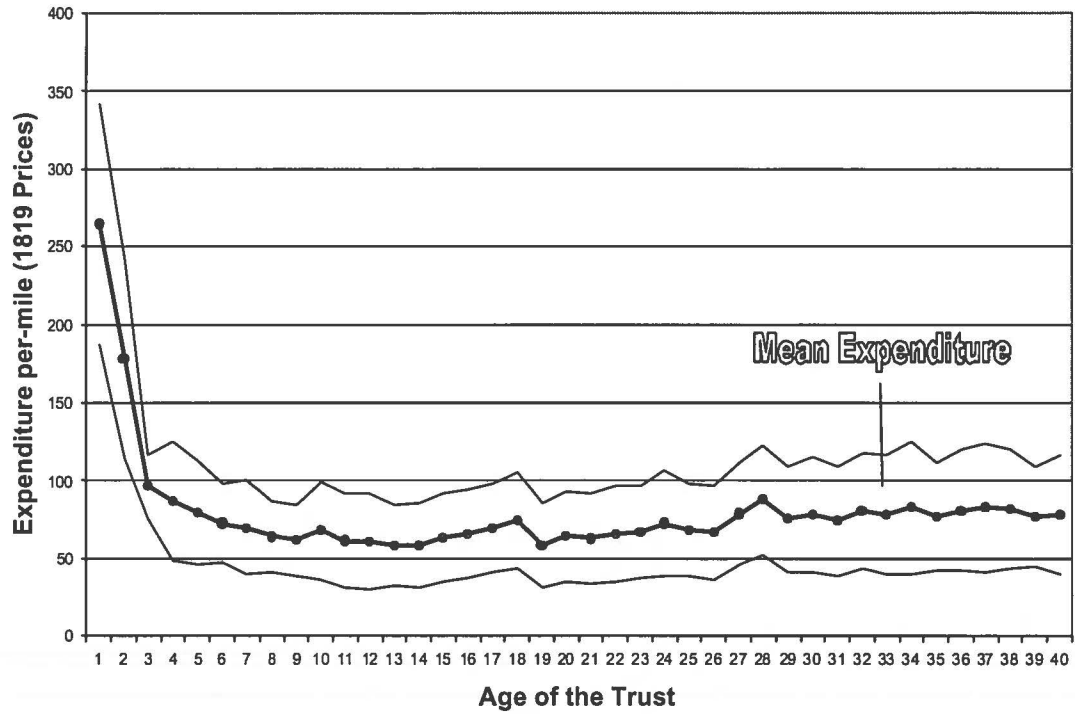
Figure 2
The Turnpike System in 1770



Sources: This map was published in Pawson, *Transport and Economy*, p. 151

Figure 3

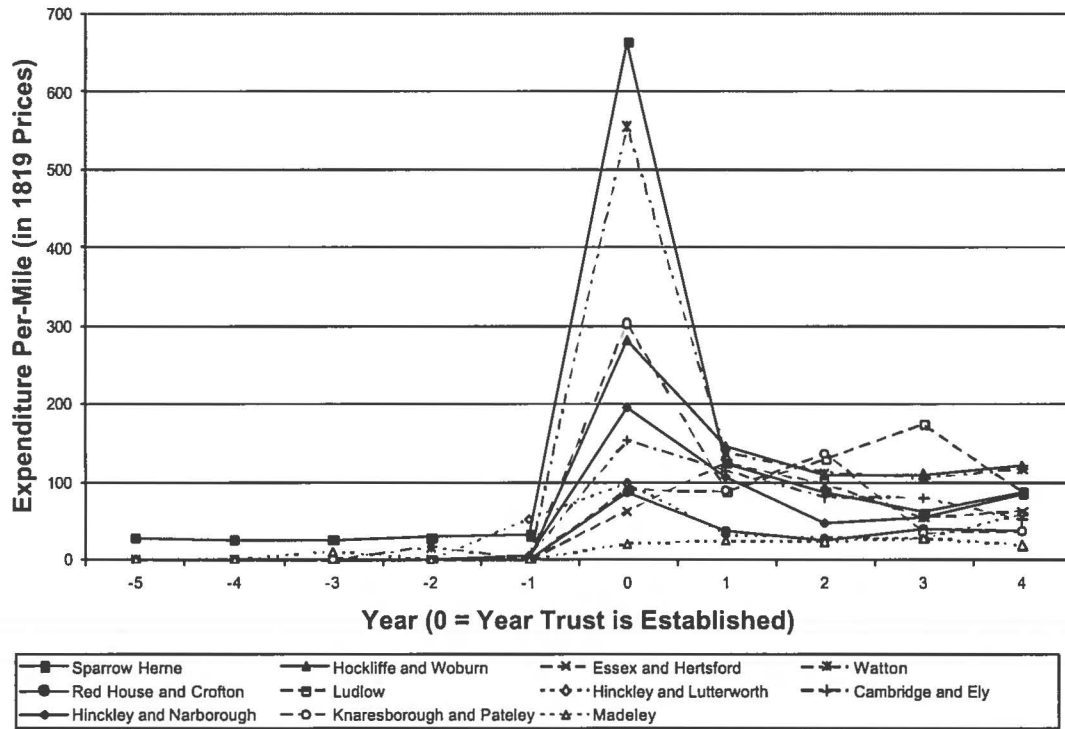
A 90% confidence Interval for Average Turnpike Trust Expenditure Per-Mile during the first 40 Years



Source: see Turnpike Trust Sample in the appendix. The road length of each trust was taken from the 'census' of turnpike trusts in Great Britain, House of Commons, *Sessional Papers*, 1840 Vol XXVII.

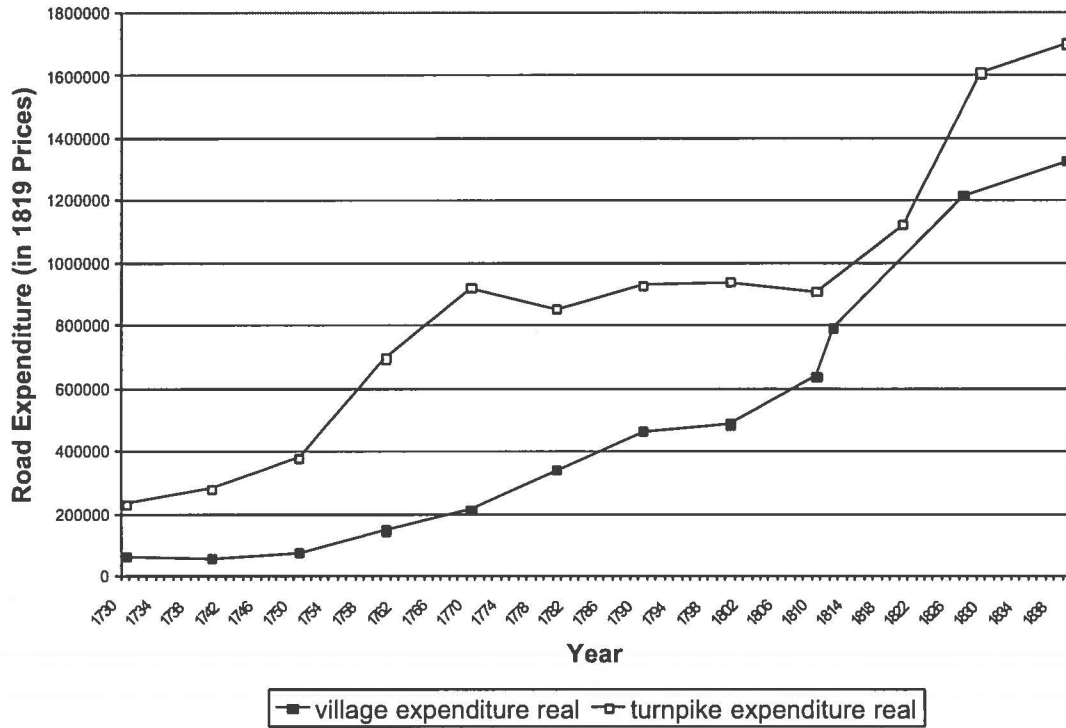
Figure 4

The Change in Road Expenditure Per-Mile after Turnpike Trusts Replace the Authority of Villages



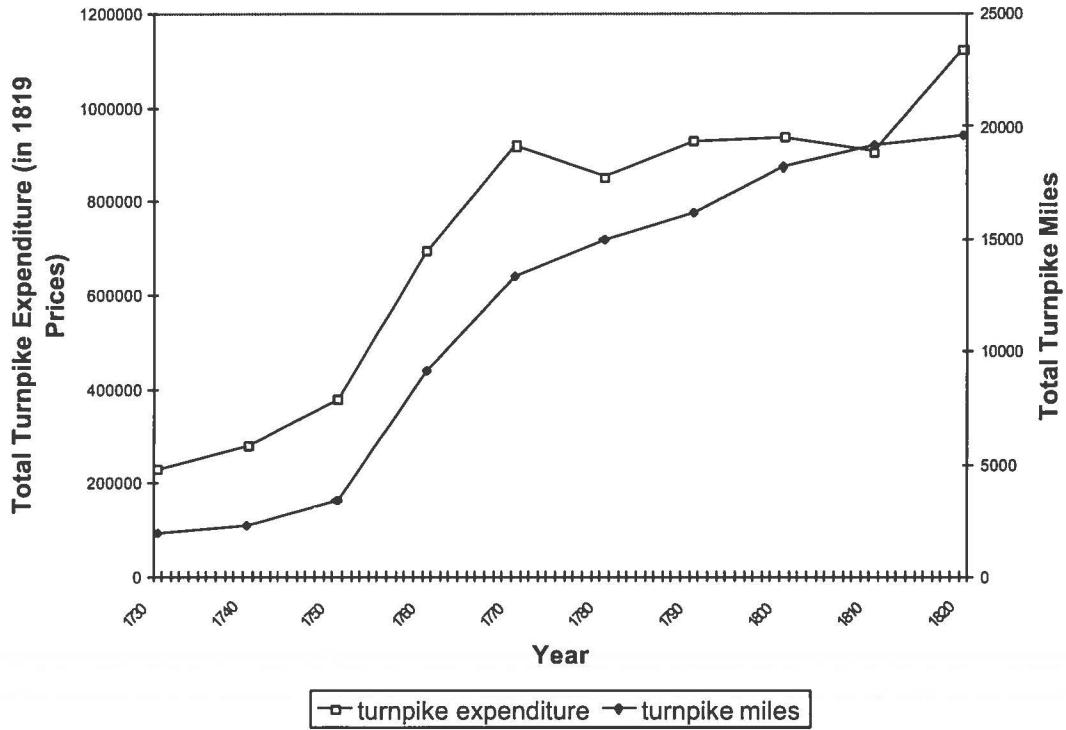
Sources: For Turnpike Expenditure see notes to Figure 3. For village expenditure see notes to Table 2.

Figure 5
 Estimated Turnpike Trust and Village Road Expenditure, 1730-1840 (in 1819 prices)



Sources: See appendix 2.

Figure 6
Turnpike Expenditure and Turnpike Miles, 1730-1819



Sources: For Turnpike Expenditure see Figure 5. Total Turnpike Miles is drawn from Pawson, *Transport and Economy*, p. 155-56.