

# Did Turnpike Trusts Increase Transportation Investment in Eighteenth century England?

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## Abstract

Why did greater transportation investment emerge 18th century England? This study addresses this question by examining the contribution of turnpike trusts to greater road expenditure. Turnpike trusts were organizations that financed road improvements by levying tolls and issuing debt. They replaced the authority of parishes, which relied upon local property taxes. The study uses a new data set to show that turnpike trusts increased road expenditure, rather than replacing existing or forthcoming parish expenditure. It also illustrates how institutional changes contributed to process of economic development in England.

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## Introduction

Economic historians have long been interested in the relationship between transportation improvements and the English Industrial Revolution. One of the central questions is why did greater transportation investment emerge during the 18th century, rather than in earlier periods. One argument is that the development of institutions increased incentives for investment. An alternative view is that population growth and economic development provided the impetus for investment and that changes in institutions were secondary in importance.

This study evaluates the effects of institutions on transportation investment by examining the contribution of turnpike trusts to greater road expenditure. Turnpike trusts were private organizations that financed road improvements by levying tolls. They were established by individual Acts of Parliament. The Acts named a body of trustees, who were generally local property-owners, and gave them the authority to levy a maximum schedule of tolls and to issue mortgage debt secured upon the income from the tolls. Trustees were also granted the power of eminent domain, which they used to widen or divert existing roads. Lastly, most Acts required that trustees could not earn direct profits, by mandating that all revenues be devoted to road improvements and other operating expenses.

Turnpike trusts were established throughout the 17th, 18th, and early 19th centuries. The most significant period of adoption occurred during the 1750s and 1760s, when over 300 trusts were created along 10,000 miles of road (see Figure 1). By the 1830s, the turnpike network expanded further to include around 20,000 miles or 17% of the entire road network.<sup>1</sup>

The geographic features of the turnpike system are best illustrated by Eric Pawson's map of the network in 1770 (see Figure 2). It shows that turnpike trusts managed all of the major highways leading into London as well as a dense network of roads in the industrial regions of the West Midlands and the North.

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<sup>1</sup>For information of the length of the road network, see the Parliamentary Papers, *Appendix to the Report of Commissioners appointed to inquire into the State of the Roads*, p. 79.

Turnpike trusts emerged as the most important supplier of road maintenance and investment, but they were not the first to have this responsibility. Nearly all turnpike trusts were established along existing roads that were previously maintained by parishes. Unlike turnpike trusts, parishes did not have access to external sources of funding, such as tolls or bonds. Instead, they financed road improvements by levying local property taxes and by claiming up to six days of labor per year from their residents. Parishes were also different because they were subject to the oversight of county magistrates, who had the discretionary authority to levy fines upon parishes if they failed to provide adequate road repair.

The transition from parishes to turnpike trusts clearly changed the way road improvements were organized and financed in 18th century England. However, it is not obvious that this transition was necessary for greater road expenditure. It is possible that parishes were already spending a substantial amount before turnpike trusts were established. In other words, parishes may have been willing to finance greater road expenditures with their own tax revenues, but they preferred turnpike trusts because the tolls shifted the tax burden to external road-users.

An alternative hypothesis is that turnpike trusts increased expenditure by replacing parishes who were under-investing in their roads. Parishes may have provided too little investment because their private benefits from road improvements were below the social benefits earned by external road-users. Another possibility is that parishes had difficulty coordinating their investments across complementary roadways.

Turnpike trusts may have offered a solution to both of these problems. First, they could have resolved the through-traffic problem by levying tolls upon road-users, thereby forcing them to contribute to the cost of investment. Second, they may have resolved some of the coordination problems by creating inter-locking bodies of trustees and by centralizing decision making authority over an entire road or a network of roads.

These two hypotheses have long been debated in the literature. In a well known study, Sidney Webb and Beatrice Webb examined a variety of written testimonies concerning parish and turnpike road expenditure. Despite being fairly critical of turnpike trusts, Webb and

Webb concluded that they were much more effective than parishes in providing road expenditure. They even asserted that without turnpike trusts, parishes would not have undertaken any considerable road improvements for most of the 18th century.<sup>2</sup>

A number of other scholars have examined the relative effectiveness of parishes and turnpike trusts by using evidence from the transport sector. William Albert and Eric Pawson showed that freight charges and passenger travel times fell during the 1750s and 1760s, when many turnpike trusts were established.<sup>3</sup> These results were important because they provided indirect evidence that turnpike trusts invested more than parishes. However, the conclusions of these earlier scholars have been challenged by the work of John Ginarlis and Sidney Pollard.<sup>4</sup> As part of a larger project on capital formation during the Industrial Revolution, Ginarlis and Pollard provided the first estimates of total parish and turnpike trust road expenditure between 1750 and 1850. Surprisingly, their estimates suggest that parish road expenditure was already significant by 1750 and that total road expenditure did not increase in real terms between 1750 and 1800 because rising turnpike expenditures were offset by falling parish expenditures. If these results are accurate, then they suggest that turnpike trusts did not increase road investment; and instead, they simply redistributed the tax burden from parishes to road-users.

This investigation reassesses the findings of Ginarlis and Pollard and shows that turnpike trusts did not replace existing parish expenditures. Instead, it argues that turnpike trusts increased road investment and thereby made an important contribution to the process of economic development in 18th century England. To develop these conclusions, this study uses a new data set of account books from over 40 turnpike trusts and 50 parishes between 1700 and 1819, along with a collection of County Order Books, which describe all parish highway taxes within 10 counties between 1700 and 1773. It also uses new data from the Parliamentary Papers, which describes total parish expenditures, excluding aid to the poor, at various dates between 1750 and 1803.

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<sup>2</sup>Webb and Webb, *the Story of the King's Highway*, p. 146.

<sup>3</sup>Albert, *The Turnpike Road System*, pp. 168-187, and Pawson, *Transport and Economy*, pp. 287-299.

<sup>4</sup>Ginarlis and Pollard, "Roads and Waterways," pp. 182-224.

The new data on total parish expenditure, excluding aid to the poor, is especially important because it provides an upper bound for total parish road expenditure between 1750 and 1803. When Ginarlis and Pollard's estimates are compared with this upper bound, it is immediately clear that they over-estimated total parish road expenditure by a substantial margin. As a result, their conclusion that parish road expenditure was already significant by 1750 cannot be accurate.

In order to reassess the changes in total road expenditure, this study provides new estimates of total parish and turnpike trust road spending between 1730 and 1840. The new estimates show that turnpike trusts accounted for the majority of a four-fold increase in total real road spending between 1730 and 1800. They also indicate that parishes and turnpike trusts combined to finance a second increase in total road expenditure during the 1810s and 1820s.

Besides examining the impact on total road expenditure, this investigation also measures the change in road expenditure per-mile before and after turnpike trusts were established. This analysis is important because the estimates of total road expenditure cannot determine whether parishes increased their spending just before the adoption of turnpike trusts in their jurisdiction. In other words, they cannot rule out the possibility that parishes started improving their roads before realizing that they could shift the tax burden to road-users by promoting turnpike trusts. The new evidence from County Order Books and a sample of turnpike trust accounts confirms that parishes did not increase their expenditure and that trusts spent over 20 times more than parishes during their first two years and around 10 times more during subsequent years.

The magnitude of the differences in total road expenditure and expenditure per-mile provide clear evidence that turnpike trusts did not replace existing parish spending. However, it is possible that turnpike trusts may have crowded-out forthcoming parish expenditure. This concern arises because turnpike trusts were not randomly assigned to roads and instead they were generally adopted in areas where there was an increasing demand for road investment. As a result, it is possible that parishes would have increased their road expenditure, had

turnpike trusts not been available. To address this issue, this study makes use of the fact that petitions to establish turnpike trusts were not always successful in Parliament. It shows that turnpike petitions failed for reasons unrelated to the demand for road services. Then it demonstrates that parishes who managed roads where turnpike petitions failed did not substantially increase their expenditure. This finding is important because it provides definitive evidence that rising demand was not sufficient and that turnpike trusts were necessary for greater road investment.

This new analysis of the effects of turnpike trusts has a number of implications for the general literature on the Industrial Revolution. First, the finding that turnpike trusts substantially increased total road expenditure suggests that they made an important contribution to economic development in 18th century England. Greater road expenditure had a direct impact by increasing the capacity of the road transport sector and by lowering travel times, freight charges, and passenger fares.<sup>5</sup> Greater road expenditure also had indirect effects by encouraging a growth in travel and inter-regional trade as well as encouraging firms to increase their scale and adopt new technologies and methods of organization.<sup>6</sup>

Secondly, this analysis provides an illustration of how institutional change contributed to the Industrial Revolution. As Douglass North has argued, institutions do not always evolve to enhance economic efficiency and instead they may develop in order to redistribute income to certain groups in society.<sup>7</sup> At first glance, the turnpike trust system appears to be an example of a redistributive institution because it introduced tolls and replaced the parish system which relied on local property taxes. However, as this investigation shows, it also increased economic efficiency by resolving a problem of under-investment in road infrastructure. Therefore, the turnpike trust system provides an important example of an institution that combined redistribution with greater efficiency.

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<sup>5</sup>For more evidence on the effects of turnpike trusts on the transport sector see Chartes and Turnbull, "Road Transport," Gerhold "Productivity Change," and Bogart, "Turnpike Trusts and the Transport Revolution."

<sup>6</sup>For an analysis of transport improvements and the British Industrial Revolution, see Szostak, *The Role of Transportation*, p. 29.

<sup>7</sup>North, *Institutions*, p.73-82

## Turnpike Trust and Parish Road Expenditure

One of the key questions concerning turnpike trusts is whether they increased road expenditure or whether they replaced existing parish expenditures. The argument that turnpike trusts increased road expenditure is based on the idea that they replaced parishes who were providing too little maintenance and investment. The alternative hypothesis suggests that parishes were willing to finance greater expenditure, but their inhabitants preferred turnpike trusts because the tolls shifted the tax burden to road-users.<sup>8</sup>

To discriminate between these two hypotheses, it is necessary to consider financial road expenditures as well as statute labor, which consisted of unpaid labor performed by the inhabitants of local parishes. Financial road expenditures included outlays on labor, land, and materials. Parishes financed these expenditures from taxes levied upon the assessed value of property income. They also collected revenues from individuals who paid their way out of the statute labor requirement. By contrast, turnpike trusts financed these expenditures with toll revenues and the issuance of debt. The tolls were restricted by a maximum schedule defined in each Act and they usually distinguished between different types of traffic, including wagons, coaches, and livestock.

Turnpike trusts allocated their revenues to a number of expenditure categories. Table 1 illustrates the breakdown of financial expenditures for all turnpike trusts in 1829. The largest expense consisted of team labor, materials, and improvements. The rest of the expenditures were divided relatively evenly between manual labor, salaries and legal expenses, interest, and debt payments, while only minor payments were made towards the purchase of land and repairs to toll houses and gates.

A similar itemization of parish financial expenditure is not available during this period; however we know that parishes were exempt from many of the expenses associated with turnpike trusts. For example, parishes did not pay wages for toll collectors or the costs of constructing toll houses and toll gates. They also avoided many of the legal fees, such as the

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<sup>8</sup>For a theoretical discussion of the motivations for adopting tolls over local property taxes, see Levinson, *Financing Transport Networks*, pp. 1-12.

expense of passing or renewing an Act of Parliament. Lastly, parishes did not pay interest because they were not authorized to issue debt.

The second type of road expenditure involved the use of statute labor or unpaid labor. Parishes had the right to claim at most six days of statute labor from their inhabitants per year. Turnpike trusts were also granted statute labor, but they had to share this service with the parishes along their route. As a result, turnpike trusts could be allocated anywhere between one and six days, depending on the terms of their Act of Parliament.

The inclusion of statute labor complicates the evaluation of turnpike trusts and parishes because it is possible that turnpike trusts increased financial spending, but decreased statute labor resulting in no net effect. Therefore, an assessment of the differences between turnpike trusts and parishes requires a thorough assessment of both types of road expenditure.

## **The First Assessment of Parish and Turnpike Trust Financial Expenditure**

John Ginarlis and Sidney Pollard provided the first estimates of parish and turnpike trust financial road expenditure between 1750 and 1850.<sup>9</sup> Their estimates were based on published information from the Parliamentary Papers and a sample of account books covering the earlier period. The Parliamentary papers provide information on total parish road expenditure in England and Wales beginning in 1812 as well as total turnpike trust expenditure beginning in 1818.<sup>10</sup> To provide estimates for the earlier period, Ginarlis and Pollard extrapolated from the published figures in the 19th century using a sample of parishes and turnpike trusts.

To examine the trends in Ginarlis and Pollard's series over time, it is necessary to adjust for changes in the cost of providing road maintenance and improvement. This study uses

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<sup>9</sup>Ginarlis and Pollard, "Roads and Waterways," pp. 182-224. The original estimates come from John Ginarlis' dissertation, which is discussed in J.P. Higgins and Sidney Pollard, *Aspects of Capital Investment in Great Britain*. Because these estimates were not published, until the coauthored work with Pollard, I refer to them as the Ginarlis and Pollard series.

<sup>10</sup>See the appendix for a description of these sources.

Greg Clark's wage series for agricultural laborers as a price deflator for road expenditure.<sup>11</sup> Wages represent a good proxy for the general changes in costs, because labor was one of the largest components of total expenditure.<sup>12</sup>

Figure 3 plots Ginarlis and Pollard's estimates after deflating their series with the Clark wage index based in 1819.<sup>13</sup> The most striking aspect of their estimates is that total road expenditure remained largely unchanged in real terms between 1750 and 1800 because rising turnpike expenditures were offset by declining parish expenditures. These results have important implications because they suggest that turnpike trusts did not increase road expenditure, and instead they provided a substitute for existing parish expenditure.

The accuracy of Ginarlis and Pollard's series can be checked with new information from the Parliamentary Papers. As mentioned earlier, the first date in which there is direct information on parish road expenditures is 1812. However, there is information on total parish expenditures, excluding poor relief, in 1748-50, 1775-76, 1783-5, and 1802-3.<sup>14</sup> This residual category includes spending on highways, churches, and constables. After comparing Ginarlis and Pollard's estimates with the figures for total parish expenditure, it is immediately clear that they over-estimated parish road expenditure between 1750 and 1802. According to Ginarlis and Pollard, total parish road expenditures equaled £826,000 in 1750, but total parish expenditure was only about £40,000 in 1750. In a similar manner, they estimated that parish road expenditure was £865,000 and £851,000 in 1775 and 1783, while total parish expenditure equaled only £138,000 and £164,000, respectively.

It is useful to investigate why Ginarlis and Pollard over-estimated parish road expenditure so substantially before 1800. Their estimates were based on a sample of parish highway

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<sup>11</sup>Clark, "Farm Laborer," pp. 502-503.

<sup>12</sup>The Clark series on agricultural laborers was preferred to the Feinstein wage series because the latter does not begin until 1770. The Clark series was preferred over the Phelps Brown & Hopkins wage series because it is more complete in its geographic coverage.

<sup>13</sup>The base year of 1819 was chosen because the Parliamentary Papers published the first figures on total turnpike expenditure between 1818 and 1820.

<sup>14</sup>Parliamentary Papers, *An Abstract of the Returns of the Amount Levied and Expended on the Poor*, 1830-31 Vol XI, p. 207.

accounts drawn from five counties. As they indicate, accounts are available for only a small portion of the parishes in any given county. Therefore, Ginarlis and Pollard had to make an assumption about the expenditure behavior of parishes outside their sample. They assumed that all unobserved parishes were spending the same amount as the average parish in their sample.<sup>15</sup> The problem with this assumption is that very few parishes spent money on their roads. This fact can be illustrated by new information on the proportion of parishes who were levying highway taxes. The data comes from a sample of 10 County Order Books, which record all parishes that levy a highway tax within each county in every year before 1773.<sup>16</sup> The sample is drawn from counties throughout England and contains information on 3450 parishes and townships, which represents about 25% of the total population.

Table 2 lists the number of parishes or townships in each county, along with the number levying highway taxes in 1730, 1740, 1750, 1760, and 1770. It shows that very few parishes were levying highway taxes before 1770. In fact, it is likely that only 2% of all parishes were spending money on their roads in any given year.

Based on this new evidence, it is not surprising that Ginarlis and Pollard over-estimated parish road expenditure by assuming that all parishes outside their sample were spending the same as the parishes within their sample. They attributed the behavior of a minority of parishes to the overwhelming majority who were not levying any highway taxes.

## **A New Assessment of Parish and Turnpike Trust Financial Expenditure**

It is important to provide new estimates of total financial road expenditure because they have implications for the evaluation of turnpike trusts and parishes. They are also useful in assessing the contribution of greater road spending to economic development in 18th century

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<sup>15</sup>For example, if they collected expenditure on 10% of all parishes in the county, they multiplied their sample total by a factor of 10 in order to arrive at an estimate for all parish expenditure in the county. They used a similar procedure to extrapolate from the county estimates to the national total. See p. 204 for a discussion of their methodology.

<sup>16</sup>In 1773, a new law changed the administrative procedure by which highway taxes were recorded.

England.

The data underlying the new estimates of total parish expenditure come from the published figures beginning in 1812, a sample of highway accounts from nearly 60 parishes, and the sample of Order Books from 10 counties. The estimates of parish expenditure between 1770 and 1812 are based on a backwards extrapolation, which assumes that total parish road expenditure grew at the same rate as total expenditure across the sample of parish highway accounts. The estimates between 1730 and 1770 are based on another extrapolation, which assumes that parish road expenditure grew at the same rate as the number of parishes levying highway taxes across 10 counties. This procedure is different from Ginarlis and Pollard's approach, because it does not assume that all parishes were levying highway taxes. It also exploits the comprehensive information in County Order Books before 1773.

The new estimates of total turnpike expenditure are based on published figures beginning in 1818 and a sample of accounts from 43 turnpike trusts. The sample of trusts was drawn from a list of surviving records provided by the National Register of Archives. It represents approximately 5% of all trusts established before 1820 and it is fairly representative in terms of its geographic coverage and levels of expenditure.<sup>17</sup> The estimates of total turnpike expenditure between 1730 and 1818 are based on an extrapolation, which assumes that total expenditure among all trusts grew at the same rate as total expenditure across the sample of 43 turnpike trusts.<sup>18</sup>

Figure 4 plots the new estimates of turnpike trust and parish financial road expenditure in England and Wales after deflating both series with the Clark wage index. They show that total parish road expenditure was very minimal prior to the late 18th century, while total turnpike expenditure rose dramatically during the 1750s and 1760s. When combined, the two series indicate that turnpike trusts did not replace existing parish expenditures, and instead they accounted for over 80% of the increase in total road expenditure between 1730

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<sup>17</sup>For more information the sample, see the appendix.

<sup>18</sup>The procedure also weighs the expenditure of individual trusts differently according to the date that they were established. The weighting adjustment corrects for the over-sampling or under-sampling of trusts from various time periods. For more discussion on the estimation procedure, see the appendix.

and 1770 and over 60% of the increase between 1730 and 1800.<sup>19</sup>

The dramatic rise in parish road spending during the 1810s and 1820s is also noteworthy because it shows that parishes were capable of financing substantial levels of road expenditure. Part of the impetus for the rise in parish expenditure came from greater road spending by turnpike trusts and the construction of canals. Another important factor may have been the new techniques of road building developed by John Macadam and Thomas Telford. These two engineers are often associated with turnpike trusts, yet their ideas about building roads with convex surfaces and layers of gravel of various sizes may have diffused to parish surveyors as well.<sup>20</sup> Finally, it is likely that both parish and turnpike expenditures were spurred by the acceleration in population and income growth during the 1810s and 1820s.

The new estimates of total parish road expenditure are quite different from Ginarlis and Pollard's estimates. The greater accuracy of the present series can be confirmed by a comparison with the figures on total parish expenditure, excluding poor relief (see Table 3). While there are some small discrepancies in 1750 and 1780, the new estimates lie below total parish expenditure and they follow its trend of rapid growth between 1750 and 1812.

The new estimates of turnpike road expenditure are similar to Ginarlis and Pollard's series, except that they show more rapid growth between 1750 and 1770 and slower growth between 1800 and 1820. The more rapid growth in the new series between 1750 and 1770 is a reflection of the greater expenditure by turnpike trusts established during this period. For example, the average annual expenditure per-mile for trusts created during the 1750s and 1760s was £84 (in 1819 prices) during their first ten years. However, it was only £58 for trusts established after 1770. The differences across trusts may be due to a number of factors, but the most likely explanation is that trusts were established on roads with lower levels of traffic after 1770.

One of the most important conclusions from the new estimates is that total road ex-

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<sup>19</sup>See table 10 in the appendix for the estimates of parish and turnpike trust road expenditure.

<sup>20</sup>Albert, *Turnpike Road System*, p. 80.

penditure increased substantially between 1730 and 1840. The absolute change was most dramatic between 1810 and 1830, when it increased from about 1.5 million pounds to 2.8 million pounds (in 1819 prices). However, the greatest relative change occurred during the 1750s and 1760s when total road expenditure more than doubled. The initial rise in expenditure is perhaps most significant, because it may have provided a stimulus to early industrialization in England. The impact is most evident from the dramatic reductions in passenger travel times and freight charges during the 1750s and 1760s, which is the same time that total road expenditure more than doubled.<sup>21</sup>

The new estimates of total road expenditure are also important because they suggest that turnpike trusts did not replace existing parish expenditure. However, this evidence represents a relatively weak test of the replacement hypothesis, because the aggregate series cannot determine whether parishes increased their road spending just before the adoption of turnpike trusts.<sup>22</sup> Therefore, in order to more closely evaluate the impact of turnpike trusts, it is important to analyze the change in road expenditure per-mile before and after turnpike trusts were established.

## Micro-evidence on Road Expenditure

It is straightforward to estimate the level of turnpike expenditure per-mile using the sample of trusts discussed earlier. However, it is more difficult to measure parish expenditure per-mile just before turnpike trusts were established. The most complete information on parishes comes from County Order Books, which describe every parish that levied a highway tax, along with the rate at which property income was taxed. This information can be combined with data on assessed property values in order to estimate the amount of tax

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<sup>21</sup>For evidence on falling travel times see Jackman, *The Development of Modern Transportation*, and Pawson, *Transport and Economy*. For evidence on falling freight charges see Albert, *The Turnpike Road System*, Gerhold, "Productivity Change," and Bogart, "Turnpike Trusts and the Transport Revolution."

<sup>22</sup>The estimates of total road expenditure are measured every ten years and across all turnpike trusts and parishes. As a result, the aggregate series may not capture the expenditures of individual parishes that increased their spending just prior to the adoption of turnpike trusts.

revenues collected for the purposes of highway improvements. Finally, the level of parish highway revenues can be matched with a Parliamentary survey, which describes the mileage for every turnpike trust, the parishes through which the road passed, and the date at which each turnpike trust was established.<sup>23</sup>

As a first step, table 4 illustrates the frequency of parish tax levying along 164 roads in 10 counties where turnpike trusts were established. It lists the total number of parishes managing these roads, along with the proportion that levied a highway tax during each of the five years before the turnpike trust was established. The evidence indicates that very few parishes were levying highway taxes. In fact, less than 5% of parishes levied a highway tax during any of the 5 years preceding the adoption of a turnpike trust in their jurisdiction.

The patterns of parish tax levying are fairly consistent across the 164 roads. However, there were some cases where parishes did levy taxes just before trusts were established. One example comes from the county of Somersetshire, where a turnpike trust was established along a set of roads leading into the market town of Crewkerne in 1765. Between 1760 and 1764, 3 of the 8 parishes maintaining this road levied a highway tax. In particular, Stoke under Hamdon levied a highway tax in 1760, 1761, and 1762, while Misterton and Crewkerne followed suit by levying a highway tax in 1764.

The behavior of the three parishes along the Crewkerne road was fairly exceptional, as the vast majority of parishes did not levy any taxes before turnpike trusts, especially along the major roads. For example, along the Great North Road, connecting London with Newcastle, there was a 29 mile stretch between Ferrybridge and Boroughbridge that was originally managed by 21 separate townships. During the five year period before a turnpike trust was established in 1741, not a single township levied a highway tax and only two townships, Sherburn and Boroughbridge, levied any highway taxes during any year before 1741.

The low proportion of parishes levying highway taxes suggests that financial road ex-

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<sup>23</sup>Parliamentary Papers, *Report of the Commissioners for Inquiry into the State of Roads in England and Wales*. 1840, Vol. XXVII. Additional information on the date of establishment comes from Albert, *Turnpike Road System*, and Pawson, *Transport and Economy*.

penditure was low just before trusts were established. However, it is possible that the few parishes levying highway taxes were able to raise substantial revenues because they had large tax bases. Therefore, to confirm that turnpike trusts increased financial expenditure, it is important to estimate the level of parish expenditure per-mile along the 164 roads where turnpike trusts were established. The estimates are based on assessed property values and the tax rates used for highway levies. For example, a highway tax levied at 6 pence in the pound was equivalent to a 2.5% tax on property income. Therefore, if assessed property income was £2000 in a parish, then a 6 pence tax would yield revenue equal to £50.

The data on property assessments comes from the published figures for the 1815 property tax.<sup>24</sup> This study uses the 1815 assessment because it was not possible to collect data on tax assessments for many parishes during the 18th century. The cost of using the 1815 assessment is that it introduces an upward bias into parish expenditure because tax assessments were much lower during the 18th century. However, the bias is not as problematic because it works against the hypothesis that turnpike trusts increased road expenditure.

To illustrate the estimates, figure 5 plots a 90% confidence interval for average parish expenditure per-mile during the five years preceding the establishment of turnpike trusts. It also plots a 90% confidence interval for average turnpike expenditure per-mile during the first 10 years using the sample of turnpike trusts introduced earlier. It is fairly striking how much more turnpike trusts spent than parishes. During their first two years, trusts spent over 20 times more than parishes and around 10 times more during subsequent years.<sup>25</sup> The initial peak in expenditure suggests that turnpike trusts made substantial investments in the road after they were adopted. Inspection of account books indicates that some of these initial expenditures included Parliamentary fees and the construction of toll houses and gates, but the vast majority went towards flattening and straightening roads as well as building bridges. The expenditures during later years were likely to be equally important as the initial investment, because English roads required substantial maintenance, especially

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<sup>24</sup>Parliamentary Papers, *Annual Value of Real Property*, 1830-31 Vol. XIV, p. 327.

<sup>25</sup>During their first two years trusts spent between £172 and £257 per mile, whereas parishes spent only £7 per-mile the year before. For later years, trusts spent between £60 and £70 per-mile.

after heavy rains.<sup>26</sup>

Figure 6 provides a few examples of the change in road expenditure per-mile along 10 particular roads. Across the 10 cases, turnpike expenditure exceeded parish expenditure in every year except one. The exception was the Hinckley and Lutterworth road in the county of Leicestershire. In 1761, one year before a turnpike trust was established; the city of Hinckley levied a 6 pence in the pound highway tax. This particular tax generated a revenue that was equivalent to the annual expenditure of the Hinckley and Lutterworth turnpike trust in any year between 1763 and 1766. The tax was relatively large because Hinckley was a market town and therefore it had a larger tax base than rural parishes. Another factor was that this turnpike trust spent less than most, perhaps because traffic levels were low or because it had trouble borrowing.

Outside of examples like the Hinckley and Lutterworth road, most turnpike trusts spent substantially more than the parishes they replaced. However, this characterization only applies to financial expenditure and therefore it does not exclude the possibility that reductions in statute labor offset the increases in financial expenditure. Given the sparse information on statute labor, it is difficult to rule out this possibility entirely. Nevertheless, there are a number of reasons why the inclusion of statute labor would not change the basic conclusion that turnpike trusts increased road expenditure. First, statute labor represented a relatively small portion of total expenditure. For example, between 1812 and 1814, the annual value of statute labor performed for parishes and turnpike trusts was less than £552,000, which represents about 30% of the estimated total for financial expenditure.<sup>27</sup> Therefore, even if turnpike trusts reduced statute labor, the change in financial expenditure was so significant that trusts would still have increased total road expenditure.

Second, there is some evidence that turnpike trusts did not substantially reduce statute

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<sup>26</sup>For a discussion of road repair techniques see Albert, *Turnpike Road System*, pp. 132-167 and Pawson, *Transport and Economy*, pp. 236-264.

<sup>27</sup>Information on the value of statute labor comes from the Parliamentary Papers, *Abstract of Returns on the Expense and Maintenance of Highways*, 1818, vol. XVI, p. 255. For the estimates of total financial expenditure see the appendix.

labor. One of the questions in a Parliamentary survey asked whether turnpike trusts were affected by the abolition of statute labor in 1835.<sup>28</sup> Forty-five percent of the trusts said that they were affected by the loss of statute labor, while forty-two percent said that they were not and thirteen percent gave no response. In the survey, some turnpike trusts also estimated the annual value of statute labor relative to their income from the tolls. Based on their calculations, statute labor represented around 21% of the value of tolls. Therefore, it appears that many turnpike trusts used statute labor and regarded it as an important component of road expenditure.

One of the remaining questions is why turnpike trusts spent so much more than parishes. One of the key factors behind the success of turnpike trusts was their ability to levy tolls. The tolls certainly encouraged redistribution by shifting the tax burden from parishes to road-users, yet they also encouraged greater internalization of the costs and benefits of road improvements.<sup>29</sup> For example, a coach traveling along the Great North Road from Newcastle to London would pass through several hundred parishes. If the coach was not required to pay a toll, then it was under no obligation to contribute to the cost of improving or maintaining this road. Instead, the hundreds of parishes along this route would be forced to pay for this service, even though they derived little benefit from the coach passing through.

The complaints of the parish of Bethnal Green just outside of London illustrate the sentiments of the parishes along the major routes. In 1693, this parish appealed for assistance from the magistrates of Middlesex County because it managed two major highways, which required the substantial sum of £200 in maintenance per year. In their appeal, Bethnal Green claimed that other parishes from the area should contribute to the cost of maintenance because they had only 200 inhabitants and were forced to manage one of the great thoroughfares in the country.<sup>30</sup>

The tolls were also important because they allowed trusts to price discriminate against

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<sup>28</sup>See the Parliamentary Papers, *Report of the Commissioners for Inquiry into the State of Roads in England and Wales*. 1840, Vol. XXVII.

<sup>29</sup>For a discussion of the effects of tolls see Pawson, *Transport and Economy*, pp. 65-70.

<sup>30</sup>The arguments made by Bethnal Green are drawn from William Hardy, *Calendar to the Sessions Books*.

different types of road-users. The opportunities for price discrimination depended on the terms of the Act of Parliament, which specified a maximum schedule of tolls. The maximum schedules were usually quite different across trusts. For example, a coach with six horses would often pay different tolls depending on the location of the trust or the time when the Act of Parliament was passed. In many cases, the schedules would also include special provisions for wagons carrying specific commodities. For example, among the 178 Turnpike Acts passed between 1663 and 1740, 10 had special tolls for wagons carrying grain, 10 for hay or straw, 2 for iron, 9 for coal, and 1 even had a special toll for wagons carrying earthenware (The Liverpool to Prescott Turnpike). While we do not know how closely the schedules came to an optimal system of price discrimination, it is clear that they were designed to account for variations in local traffic.<sup>31</sup>

Another important factor behind the greater expenditure of turnpike trusts was their ability to issue bonds secured upon the income from the tolls. As figure 5 illustrates, the bonds allowed turnpike trusts to finance substantial initial investments without relying on accumulated revenues. Debt financing proved to be very effective for turnpike trusts because interest rates were fairly low, especially during the mid-18th century.<sup>32</sup> Debt financing was also successful because local landowners stood to earn indirect returns through higher land values. The indirect returns were most important in cases where traffic volumes were low and local investors had little chance to earn a reasonable return on the turnpike bonds.<sup>33</sup>

Debt financing was also successful because the regulatory environment was favorable for

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<sup>31</sup>For a more general discussion of price discrimination in early transport and its relation to modern telecommunications, see Odlyzko, "Pricing and Architecture of the Internet."

<sup>32</sup>There is a controversy in the literature over the effect of interest rates. T.H. Ashton argued that low interest rates were a key determinant of turnpike investment, while William Albert challenged this view by studying the relationship between turnpike acts and interest rates. Based on the new evidence that road investment increased substantially during the 1750s and 1760s, it seems unlikely that low interest rates had no impact.

<sup>33</sup>This explanation has an interesting parallel in the early U.S., where Daniel Klein and John Majewski have suggested that the opportunity to profit through higher land values was especially important in promoting greater turnpike investment. See Klein, "Voluntary Provision of Public Goods" and Majewski, *A House Dividing*.

investment. For example, investors could foreclose upon the tolls in the event that trustees did not pay interest on the debts. Investors were also encouraged by the passage of legislation that imposed substantial penalties on individuals who destroyed turnpikes and evaded the tolls.<sup>34</sup> Finally, investors benefited from Parliament's willingness to adjust toll schedules as economic conditions changed. For example, in the early 19th century Parliament passed numerous renewal Acts raising the maximum schedule of tolls to account for rapid inflation during these years.

Aside from their ability to levy tolls and issue secure debt, there are other reasons why turnpike trusts were more effective than parishes. For example, turnpike trusts were aided by their powers of eminent domain, which limited the ability of property owners to hold-up improvements by over-charging for the sale of land. Turnpike trusts were also more effective because they resolved coordination problems between parishes. For example, consider the 8 mile road that connected the woolen manufacturing cities of Leeds and Wakefield in the West Riding of Yorkshire. Both Leeds and Wakefield were likely to earn substantial benefits from an improved road, yet neither of these cities may have been willing to invest, if they expected that the other would not. In fact, neither of the cities, or any township between them, levied a single highway tax before a turnpike trust was established in 1758.

Turnpike trusts presented a solution for the coordination problem because they unified decision making authority over roads connecting travel nodes, such as Leeds and Wakefield. Turnpike trusts could also resolve coordination problems by creating inter-locking bodies of trustees. This practice was especially common in the West Riding, where four of the trustees for the Leeds and Wakefield turnpike also served as trustees for the Leeds and Harrowgate turnpike, the Leeds and Holmefield turnpike, the Leeds and Selby turnpike, and the Leeds and Otley turnpike.<sup>35</sup> One of the purposes of this inter-locking body of trustees may have been to encourage greater coordination between the trusts managing the road network surrounding Leeds.

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<sup>34</sup>For a discussion of the various pieces of legislation, see Jackman, *The Development of Transportation*.

<sup>35</sup>Albert, *Turnpike Road System*, p. 63.

Generally speaking, turnpike trusts were more effective than parishes because they addressed a variety of problems with the existing system. However, turnpike trusts were not the only solution for these problems. For example, county magistrates could have forced parishes to increase their road expenditure by levying fines. Decisions regarding fines were made at a meeting of all county magistrates in the Court of Quarter Sessions. At these meetings, magistrates often issued indictments, which represented a warning that parishes should repair their roads. If parishes did not respond to the satisfaction of the magistrates, then they could be issued a fine, which required that they levy a highway tax and use the proceeds to improve their road.

The viability of this alternative solution can be evaluated by studying the behavior of magistrates before turnpike trusts were established. According to County Order Books, it was relatively uncommon for magistrates to fine parishes before trusts. For example, in Somerset County, magistrates levied fines on only 10 of the 224 parishes which had a turnpike trust established in their jurisdiction between 1740 and 1770. In the North Riding of Yorkshire magistrates were even less active, fining only 2 of the 182 such parishes between 1740 and 1770.

In some counties, magistrates began levying greater fines towards the end of the 18th century. For example, in the West Riding of Yorkshire, magistrates levied fines totaling £3850 between 1715 and 1769, in comparison with £8700 in fines between 1770 and 1799 and £52,000 in fines between 1800 and 1830. One explanation for the rise in fines within this county was the substantial growth in the woolen textile industry, particularly after 1800. Another explanation is that magistrates favored turnpike trusts over levying fines, because the tolls shifted a greater portion of the tax burden to road-users outside the county. The switch toward fines during the early 19th century may reflect the need for improvements on local roads, where it was more difficult to shift the costs to external road-users.

As the example from the West Riding of Yorkshire suggests, there is more that we need to learn about the behavior of county magistrates during this period. However, it is clear that magistrates were not willing to levy fines on parishes during the middle of the 18th

century, when most turnpike trusts were established.

## Did Turnpike Trusts Replace Forthcoming Parish Road Expenditure?

Turnpike trusts had numerous advantages over parishes because they could levy tolls on road-users, issue debt at low interest rates, appropriate private property, and centralize decision-making authority over complementary roadways. As a result, there is a legitimate argument that road expenditure would have been much lower in 18th century England, had turnpike trusts not replaced parishes. However, there is an alternative argument which suggests that turnpike trusts may have replaced forthcoming parish expenditure because they were adopted in areas where the demand for road investment was rising. One indication of rising demand comes from Table 4, which shows that parishes were more likely to levy a highway tax during the year immediately preceding the establishment of a turnpike trust. Another indication comes from the rapid adoption of turnpike trusts in the West Midlands and the North during the same period that these regions were beginning to industrialize.<sup>36</sup>

The endogenous process of turnpike trust adoption is important because it raises the possibility that parishes would have increased their road expenditure in response to rising demand. Therefore, to assess whether turnpike trusts were instrumental, it is necessary to observe the behavior of parishes along the same type of roads where turnpike trusts operated. One way of addressing this issue is to examine the expenditure of parishes along roads where petitions to establish turnpike trusts failed in Parliament. A key to this analysis is that turnpike petitions failed for reasons unrelated to the demand for road investment. Therefore, before examining how much parishes were spending, we need to study the reasons why turnpike petitions failed.

The process of creating a turnpike trust began when a group of individuals petitioned

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<sup>36</sup>For a detailed study of the changing patterns of turnpike trust adoption, see Pawson, *Transport and Economy*, pp. 134-169.

the House of Commons. The petitions typically stated that heavy road traffic has made the ordinary laws insufficient for the maintenance and improvement of a particular stretch of highway. After the petition was read before the House, a committee was formed among all the Members who had an interest in the legislation. The committee conducted an inquiry into the merits of the petition and then presented their findings to the House. If there was no immediate objection, the committee fashioned the details of the legislation and presented it before the House for a second time. Next, the House voted on the legislation, and if it was successful, then the Turnpike Act was sent to the House of Lords, where a similar process was undertaken.<sup>37</sup>

The following excerpt comes from a petition to establish a turnpike trust along one of the major roads in Kent. It was written in 1709 by the county magistrates, who supported the establishment of this particular turnpike trust.

That the highways from the parish of Sevenoaks to the parish of Spellhurst...are impassible for travelers by reason of the badness of the roads...notwithstanding there have been great sums of money already laid out towards the repairing the same....All of which sums have proved hitherto insufficient to repair the said roads...Therefore, it is humbly prayed that this honorable house would give leave for a bill to be brought in for a turnpike on some part of the said highway.<sup>38</sup>

According to research by Julian Hoppit, it was not uncommon for turnpike petitions to fail in Parliament during the early 18th century.<sup>39</sup> The failure rate was above 25% between 1690 and 1719, before falling to 13% during the 1720s (see Table 5). It rose again during the 1730s to 24% and then fell to less than 10% during the 1750s and 1760s. The trend in failure rates for turnpike petitions followed the trend in failure rates among all forms of legislation. For example, the failure rate for all legislation was at its height between 1690 and 1719, which is the same period when the largest proportion of turnpike petitions were unsuccessful.

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<sup>37</sup>For a discussion of the procedure for creating Acts of Parliament, see Hoppit, *Failed Legislation*.

<sup>38</sup>This quote is taken from the Quarter Sessions Records for Kent, Q/SB/30, p. 85-86.

<sup>39</sup>Hoppit, *Failed Legislation*.

The similarity in failure rates among general legislation and turnpike legislation suggests that some turnpike petitions may have failed because of spillover effects from disputes over larger political issues, such as war, religion, and government finances. It is also possible that Parliament was learning how to govern in the period after the Glorious Revolution, and therefore more petitions stalled in the legislative process. In either case, the general political environment appears to have been one factor which led turnpike petitions to fail.<sup>40</sup>

Local concerns over redistribution were another important factor in determining whether turnpike petitions failed. For example, there was a petition submitted in opposition to the establishment of a turnpike trust along the road between Sevenoaks and Spellhurst in the county of Kent. The author of the petition claimed that these parishes were wealthy enough to finance adequate road repair and did not need the benefit of the tolls. They also claimed that the farmers who drove their cattle along this road would earn few benefits and would be unjustly burdened by the tolls.<sup>41</sup> Another example of local opposition comes from the inhabitants of the city of Buckingham in 1712, who argued that the proposed turnpike road from Bicester to Aylesbury would injure the trading interests of their city.<sup>42</sup>

While it appears that many factors influenced the success or failure of turnpike petitions, the most important consideration is whether Parliament dismissed petitions because they believed that there was no demand for road improvements. One way of addressing this possibility is to compare the location characteristics of roads where turnpike petitions failed versus those where petitions were immediately successful. Table 6 illustrates this comparison using a sample of all 150 roads where a turnpike petition was introduced before 1750. The roads were classified into one of three categories: (1) roads connecting London with major cities with populations above 2500 in 1700, (2) roads in the hinterland of a major city, and (3) all other roads.

If the location characteristics of failed turnpike petitions were concentrated in the “other” category, then it is more likely that Parliament selected failure based on demand consider-

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<sup>40</sup>See Hoppit and Innes, "Introduction," for a discussion of the reasons why petitions failed.

<sup>41</sup>The counter-petition comes from the Hampshire Record Office, ref. 44m69/G2/342.

<sup>42</sup>This example was drawn from the Journals of the House of Commons.

ations. However, the evidence indicates that the distributions of locations across the two categories of petitions are almost identical. In other words, roads with failed petitions do not appear to have any observable location characteristics that separate them from roads where petitions were immediately successful.

The preceding analysis suggests that it is reasonable to use the expenditure of parishes along roads where turnpike petitions failed as a measure of the road expenditure that would have occurred had turnpike trusts not been established. To explore this counter-factual, this study uses a sample of 199 parishes along 21 roads for which turnpike petitions initially failed, but were ultimately successful.<sup>43</sup> Table 7 describes the average annual expenditure per-mile in five year intervals beginning with the year after the initial turnpike petition was unsuccessful and ending with the year when a new petition was ultimately successful. As discussed earlier, parish road expenditure per-mile is estimated with information on highway taxes and assessed property income in 1815.<sup>44</sup>

The most striking result from this experiment is that many parishes continued to spend nothing on their roads after the turnpike petition failed. Across the sample of 21 roads, average expenditure per-mile equaled between £8.6 and £15.8 (in 1819 prices), which is far below the average expenditure of turnpike trusts. A similar conclusion holds, if the sample is restricted to those roads where the time between successful and unsuccessful petitions was more than five years.

While most parishes continued to spend relatively little, there were some cases where expenditures increased substantially after turnpike petitions failed. In particular, along the Islington to London, Aylesbury to Bicester, and Croyden to London roads, parishes spent between £35 and £110 per-mile, which is in some cases above the expenditure of the average turnpike trust.

The 13 parishes along the Croyden to London road in Surrey provide an illustration of how some parishes would have increased their expenditure had turnpike trusts not been

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<sup>43</sup>Across the sample of 21 roads, the time between unsuccessful and successful petitions ranged between 2 and 58 years, with a median value of 9 years.

<sup>44</sup>The one exception was Islington-London, where there was information on the actual road expenditure.

available. In 1715, one year after the turnpike petition failed, Bermondsey, Southwark, and Putney levied highway taxes on their property income ranging between 1.25% and 2.5%. In 1717, another parish, Lambeth, joined Bermondsey and Southwark in levying a highway tax. Finally, in 1719, a fifth parish, Newington, levied its first highway tax at a rate of 1.25%. The expenditures of all these parishes ceased in 1720, when the Croyden to London turnpike Act was eventually passed.

Despite the exceptional behavior of a few parishes, the basic conclusion from this new evidence is that rising demand was not sufficient to increase parish road expenditure. Instead, it suggests that rising demand had to be combined with an institutional framework that addressed various issues at the local, regional, and national level. The turnpike trust system provided such an institutional framework because it distributed the cost of road improvements across broader segments of the economy. It also provided a framework by which capital could be raised at a low cost. Finally, it provided an organizational structure that helped to coordinate investment throughout the road network. Therefore, it is almost certain that without the transition from parishes to turnpike trusts, road expenditure in 18th century England would have been substantially lower.

## Conclusion

Economic historians have long been interested in the sources of greater transportation investment in 18th century England. This study investigates the impact of institutions by studying the contribution of turnpike trusts to greater road expenditure. It focuses on whether turnpike trusts increased road expenditure or whether they replaced existing or forthcoming parish expenditure. The conventional view among early scholars was that turnpike trusts increased road spending by replacing parishes who under-invested in their roads. This argument was challenged by John Ginarlis and Sidney Pollard's estimates of total parish and turnpike road expenditure between 1750 and 1850. Their estimates suggest that turnpike trusts did not increase total road spending and instead they replaced existing

parish expenditures. If these estimates are accurate, they would suggest that turnpike trusts were not adopted because parishes were spending too little, but because the tolls shifted the tax burden from parishes to road-users. As a result, their conclusion suggests a very different interpretation of the effects of turnpike trusts on transportation investment in 18th century England.

This study reassesses Ginarlis and Pollard's findings and shows that they substantially over-estimated parish road expenditure between 1750 and 1800. It provides new estimates which indicate that turnpike trusts accounted for most of the four-fold increase in total road spending between 1730 and 1800. It also examines the change in expenditure per-mile before and after turnpike trusts were established in order to test whether parishes increased their spending just before trusts were adopted. The results indicate that parishes did not increase their expenditure and that turnpike trusts spent over 20 times more during their first two years and around 10 times more during subsequent years. In addition, this study examines the expenditure of parishes that managed roads where turnpike petitions failed in Parliament. The evidence shows that parishes did not increase their expenditure after petitions failed. This finding is especially important because it provides definitive evidence that rising demand was not sufficient and that turnpike trusts were necessary for greater road investment.

The broader implication of this study is that turnpike trusts made an important contribution to the process of economic development in 18th century England. By resolving a problem of under-investment in road infrastructure, turnpike trusts increased the capacity of the transport sector, resulting in less congestion and lower travel times.<sup>45</sup> Greater road expenditure also affected the efficiency of the land carriage sector by increasing the number of tons hauled per horse.<sup>46</sup> The impact of greater load sizes was so large that it contributed to a 40% reduction in average freight charges between 1750 and 1800, despite the introduc-

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<sup>45</sup>Chartres and Turnbull, "Road Transport," Jackman, *Development of Modern Transportation*, and Pawson, *Transport and Economy*, p. 288.

<sup>46</sup>Gerhold, "Productivity Change."

tion of tolls.<sup>47</sup> By lowering transportation costs, turnpike trusts encouraged a growth in passenger travel and inter-regional trade, which in turn encouraged firms to increase their scale of operations and invest in new capital. Growing travel and trade also encouraged the diffusion of information about new technologies and changes in consumer tastes, which were important factors in the process of industrialization.<sup>48</sup> Turnpike trusts were also instrumental in the process of urban development, as most of the major port and industrial cities were linked through a network of turnpike trusts.<sup>49</sup> Of equal importance, most major cities were also well connected with their hinterlands, thereby increasing the supply of food and raw materials to growing cities. In short, turnpike trusts played an important role in the process of economic development in 18th century England.

This analysis also provides an important example of how institutional changes contributed to the English Industrial Revolution. Ever since the seminal paper by Douglass North and Barry Weingast, economic historians have debated the importance of institutions for economic development in England.<sup>50</sup> The rise of turnpike trusts represents one of the best examples of why institutional change mattered. As this investigation shows, turnpike trusts increased road investment by resolving problems associated with the parish system of road provision. In the process, they also encouraged redistribution by shifting the tax burden from parishes to road-users. Therefore, the turnpike trust system represents an intriguing example of an institution that combined redistribution with greater efficiency.

## Appendix 1: Data Sets

There are a number of new data sets introduced in this paper. The first is a sample of accounts from 43 turnpike trusts. The sample was drawn from a list of surviving records provided by the National Register of Archives ([www.nra.nationalarchives.gov.uk/nra/](http://www.nra.nationalarchives.gov.uk/nra/)). Ac-

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<sup>47</sup>Bogart, "Turnpike Trusts and the Transport Revolution."

<sup>48</sup>Szostak, *The Role of Transport*.

<sup>49</sup>Pawson, *Transport and Economy*, p 323-336.

<sup>50</sup>North and Weingast, "Constitutions and Commitment."

ording to the National Register, records survive from nearly 600 turnpike trusts in England and Wales, with most being located in county record offices. However, there are only around 200 trusts with surviving account books, and less than 100 with a fairly complete set of accounts beginning with the first year the trust was established and extending into the early 19th century. To assemble a sample from the list of surviving records, I collected all complete accounts from over 20 different record offices throughout England. Table 8 provides a list of the various trusts, along with the year when they were established, the record office, and the archival reference.

The sample is not exactly a random draw from all turnpike trusts in England, but it is fairly representative in terms of its geographic coverage. I also checked whether it is representative in terms of road expenditure by comparing the distribution of expenditure per-mile in 1818 across the sample of trusts with the distribution of expenditure per-mile across the population of trusts. The sample and population histograms were nearly identical, which suggests that the sample is fairly representative.

The second new data set is a sample of parish highway accounts between 1750 and 1812. The sample was drawn from a large list of surviving records found in the National Register of Archives. It was also drawn from a list of parish records available on microfilm in the Family History Library of the Church of Latter Day Saints. In this case, it was not possible to collect information on all surviving parish records in any particular county record office or in the Family History Library. Therefore, I chose to collect records that were most complete. Table 9 provides a list of the parishes in the sample, along with the record office and the archival reference.

The last new data set consists of a collection of County Order Books, which describe all parishes that levied highway taxes as well as any indictments or fines levied by magistrates. County Order Books are available on microfilm in the Family History Library or in county record offices. Order Books were used for Bedfordshire (transcription in Bedford R.O.), Cambridgeshire (FHL #580817-18), Hertfordshire (Hardy, *Hertford County Records*), Leicestershire (FHL #1470041-42), Shropshire (transcription in Shropshire R.O.), North Riding of

Yorkshire (FHL #469697–99, #547724-27), the West Riding of Yorkshire (FHL #1657872-4, #1657913-5), Worcestershire (FHL #435298-99), Buckinghamshire (#579507-511), Surrey (FHL #991873-85), Berkshire (FHL #88143), Cheshire (FHL #1502213-28), Middlesex (Hardy, *Calendar to the Sessions Records* and mj/sb/b/067-085, London Metropolitan Archive), Durhamshire (FHL #1519667), Cumberland (FHL #1702779), Westmoreland (FHL #1472563), Hampshire (Hampshire R.O. Q1/11-18), and Northamptonshire (Northampton R.O.).

## Appendix 2: Procedure for Estimating Total Road Expenditure

The estimates of total parish and turnpike trust road expenditure are provided in table 10. The series for total turnpike trust expenditure is based on the sample of turnpike accounts and *The Report from the Select Committee Appointed to Consider the Acts now in Force Regarding Turnpike Roads and Highways in England and Wales* (HC 1821 Vol IV, 343). The report states total expenditure for all turnpike trusts between 1818 and 1820. For later years, the data are available in *The Minutes of Evidence before the Committee on Turnpike Road Trusts* (HL 1834 X) and *The Appendix to the Report of Commissioners appointed to inquire into the State of the Roads*. (HC 1841 XXVII).

The estimates before 1818 are based on the assumption that total road expenditure grew at the same rate as expenditure across the sample of turnpike trusts. In other words, let  $E_t$  represent an index for total expenditure across the sample of turnpike trusts with 1819 as the base year. To arrive at the estimate for total turnpike expenditure, I multiplied the sample expenditure index  $E_t$  with the published figures for total turnpike expenditure in 1819.

The sample is slightly skewed towards the period before 1770. In particular, It consists of 7 trusts (16%) established between 1700 and 1749, 23 trusts (54%) established between 1750 and 1769, and 13 trusts (30%) established between 1770 and 1819. These divisions

are slightly different from the population, where 146 trusts (18%) were established before 1750, 340 trusts (46%) were established between 1750 and 1769, and 313 trusts (36%) were established between 1770 and 1819. To correct for the bias in sampling, three separate expenditure series were calculated for trusts established between 1700 and 1749, 1750 and 1769, and 1770 and 1819. The three series were then aggregated using frequency weights. The weights were (146/7) for the 1700-49 series, (340/23) for the 1750-69 series, and (313/13) for the 1770-1819 series. The weighting procedure yields the following sample expenditure index  $E_t$ , where  $E_{00-49}$ ,  $E_{50-69}$ , and  $E_{70-19}$  are the expenditure series for the three subsets:

$$E_t = (146/7) \times E_{00-49} + (340/23) \times E_{50-69} + (313/13) \times E_{70-19}$$

The estimates for total parish road expenditure are based on a similar technique. They assume that the growth in road expenditure among all parishes between 1770 and 1812 was the same rate as the growth in expenditure across a sample of parish highway accounts described in Table 9. The published figures for 1812 come from *The Abstract of Returns on the Expense and Maintenance of Highways* (HC 1818 XVI). Figures for later years come from the *Report on Local Taxation* (HC 1839 XLIV).

For the period between 1730 and 1770, the estimates assume that total parish expenditure grew at the same rate as the total number of parishes levying highway taxes across 10 counties (see Table 2). This data on parish highway taxes is very comprehensive and ideally, I would have used this information to estimate the growth in parish expenditure until 1812. However, this data source is not reliable after 1773, when an Act of Parliament was passed changing the administrative procedure by which highway taxes were recorded.

## References

- Albert, William. *The Turnpike Road System in England 1663-1840*. Cambridge: Cambridge University Press, 1972.
- Ashton, T. S. *Economic Fluctuations in England 1700-1800*. Oxford: Oxford University Press, 1959.
- Bogart, Dan. "Turnpike Trusts and the Transport Revolution in Eighteenth century England, Working Paper, Department of Economics UC Irvine.
- Chartres, John and Turnbull, Gerard. "Road Transport." In *Transport in the Industrial Revolution*, edited by Aldcroft, Derek and Freeman, Michael (eds). Transport in the Industrial Revolution. Manchester: Manchester University Press, 1983.
- Clark, Greg. "Farm Wages and Living Standards in the Industrial Revolution: England, 1670-1869." *Economic History Review*. 54 no. 3 (2001):477-505..
- Corfield, Penelope. *The Impact of English Towns, 1700-1800*. Oxford: Oxford University Press, 1982.
- Gerhold, D. "Productivity Change in Road Transport before and after Turnpiking, 1690-1840." *Economic History Review* no. 49, (1996): 491-515.
- Ginarlis, John. "Roads and Canals" In *Aspects of Capital Investment in Great Britain: 1750-1850*, edited by Higgins J.P.P. and Sidney Pollard. London: Methuen.
- Ginarlis, John and Pollard, Sidney. "Roads and Waterways: 1750-1850." In *Studies in Capital Formation in the United Kingdom*, edited by Feinstein, Charles and Sidney Pollard. Oxford: Oxford University Press, 1988.
- Hardy, William. *Hertford County Records* Hertford: Hertford, C. E. Longmore, 1905.
- \_\_\_\_\_. *Calender to the Sessions Records*. Fakenham: London, Sir E. Hart, 1935.
- Hoppit, Julian. *Failed Legislation, 1660-1800*. London: Hambledon, 1997.
- Hoppit, Julian and Joanna Innes. "Introduction" In *Failed Legislation*, by Julian Hoppit. London: Hambledon, 1997.
- Jackman, W. T. *The Development of Transportation in Modern England*. Cambridge: Cambridge University Press, Cambridge, 1916.
- Klein, Daniel B. "The Voluntary Provision of Public Goods? The Turnpike Companies of Early America." *Economic Inquiry*. 28:788-812, 1990.
- Levinson, David. *Financing Transport Networks*. Northampton: Edward Elgar.
- Majewski, John. *A House Dividing: Economic Development in Pennsylvania and Virginia Before the Civil War*. Cambridge: Cambridge University Press, 2000.
- North, Douglass. *Institutions, Institutional Change, and Economic Performance*. Cambridge: Cambridge University Press, 1990.
- North, Douglass and Weingast, Barry. "Constitutions and Commitment: the Evolution of Institutions Governing Public Choice in Seventeenth-Century England." *The Journal of Economic History* 49:803-832, 1989.
- Odlyzko, Andrew. "Pricing and Architecture of the Internet: Historical Perspectives from Telecommunications and Transportation," Mimeo, University of Minnesota, Digital Technology Center, 2003.
- Ogilby, John. *Britannia*. London, 1939.
- Parliamentary Papers, House of Commons. *The Abstract of Returns on the Expense and Maintenance of Highways*, Vol XVI, 1818.
- \_\_\_\_\_. *The Report from the Select Committee Appointed to Consider the Acts now in Force Regarding Turnpike Roads and Highways in England and Wales*, Vol IV, 1821.
- \_\_\_\_\_. *Annual Value of Real Property*. Vol XIV, 1830-31.

- \_\_\_\_\_. *Report on Local Taxation*. Vol XLIV, 1839.
- \_\_\_\_\_. *Report of the Commissioners for Inquiry into the State of Roads in England and Wales*. Vol XXVII, 1840.
- \_\_\_\_\_. *Appendix to the Report of Commissioners appointed to inquire into the State of the Roads*. Vol XXVII, 1841.
- Parliamentary Papers, House of Lords. *The Minutes of Evidence before the Committee on Turnpike Road Trusts*. Vol X, 1834.
- Pawson, Eric. *Transport and Economy: The Turnpike Roads of Eighteenth Century Britain*. New York: Academic Press, 1977.
- Szostak, Rick. *The Role of Transportation in the Industrial Revolution*. Montreal: McGill, 1991.
- Webb, Beatrice, and Webb, Sydney. *English Local Government: The Story of the King's Highway*. New Impression, London: Archon, 1963.
- Wilson, R.G. *Gentlemen Merchants: The Merchant Community of Leeds, 1700-1830*. Manchester: Manchester University Press, 1971.

Table 1  
The Breakdown of Turnpike Trust Road Expenditure in 1829

Expenditure Category	% of Total Expenditure
Manual Labor	18%
Team Labor, Materials, and Improvements	34%
Land	3%
Repairs, Toll Houses and Gates	4%
Salaries and Legal	12%
Debt Payments	15%
Interest	14%

Source: Parliamentary Papers, House of Lords, *Minutes of Evidence before the Committee on Turnpike Road Trusts*, 1834 Vol X

Table 2  
The Proportion of Parishes Levying Highway Taxes in Ten Counties between 1730 and 1770

County	Number of Parishes	Number of Parishes Levying Highway Taxes in each year				
		1730	1740	1750	1760	1770
Bedfordshire	150	2	2	4	3	6
Buckinghamshire	275	6	6	3	4	6
Cambridgeshire	175	0	0	0	0	2
Hertfordshire	150	0	0	2	1	4
Leicestershire	250	0	0	1	1	0
Shropshire	300	1	1	1	9	5
Somersetshire	500	6	18	20	26	25
Worcestershire	225	0	0	1	3	1
Yorkshire, North	650	0	0	0	6	15
Yorkshire, West	775	2	0	1	0	11
Total	3450	17	29	33	53	75
Proportion		0.005	0.008	0.010	0.015	0.022

Sources: The data are drawn from County Order Books or County Minute Books. For a complete list of the references see the appendix. The number of parishes represents an approximation based on tax records. For more information see Parliamentary Papers, *Annual Value of Real Property, 1830-31* Vol. XIV, p. 327.

Table 3  
Total Parish Expenditure, Excluding Poor Relief and Estimated Total Parish Financial Road Expenditure

Year	Total Parish Expenditure, Excluding Poor Relief (in current prices)	Ginarlis and Pollard's Estimates of Parish Road Expenditure (in current prices)	New Estimates of Parish Road Expenditure (in current prices)
1750	£40,100	£826,000	£47,000
1760		£835,000	£76,000
1770		£835,000	£107,000
1775	£138,000	£865,000	
1780		£858,000	£197,000
1785	£164,000	£825,000	
1790		£969,000	£282,000
1800		£1,115,000	£402,000
1802	£1,034,000	£847,000	
1810		£967,000	£635,000
1812	£1,860,000		£840,000

Sources: For the information on total parish expenditure, excluding poor relief see, Parliamentary Papers, *An Abstract of the Returns of the Amount Levied and Expended on the Poor*, 1830-31 Vol XI, p. 207. For Ginarlis and Pollard's estimates see, "Roads and Waterways," pp. 197-199, 205-207. For the new estimates of parish road expenditure see appendix.

Notes: All figures apply to England and Wales.

Table 4  
The Proportion of Parishes Levying Highway Taxes Prior to the Establishment of Turnpike Trusts

County	Number of Parishes with Trusts in their jurisdiction	Proportion of Parishes Levying Highway Taxes Before Trust is established				
		Five years prior	Four years prior	Three years prior	Two years prior	One year prior
Bedfordshire	81	0.07	0.04	0.05	0.03	0.05
Buckinghamshire	97	0.03	0.06	0.05	0.04	0.02
Cambridgeshire	82	0.00	0.00	0.00	0.00	0.01
Hertfordshire	51	0.02	0.02	0.00	0.02	0.00
Leicestershire	122	0.01	0.01	0.01	0.02	0.07
Shropshire	191	0.00	0.01	0.02	0.02	0.05
Somersetshire	224	0.08	0.10	0.13	0.08	0.17
Worcestershire	144	0.01	0.02	0.01	0.01	0.03
Yorkshire, North	182	0.01	0.02	0.02	0.01	0.03
Yorkshire, West	410	0.00	0.01	0.01	0.01	0.02
Total	1584	0.02	0.03	0.03	0.02	0.05

Sources: Numbers of Parishes Levying Highway Taxes comes from County Order Books. Information on location of turnpike trusts comes from Parliamentary Papers, *Commissioners for Inquiry into the State of Roads in England and Wales*. 1840, Vol XXVII.

Notes: The number of parishes with trusts applies to the period before 1773 when Order Books are informative.

Table 5  
Failed Turnpike Petitions, 1690-1769

Decade	Failed Turnpike Petitions	Successful Turnpike Petitions	Failure Rate for 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: Information on failed petitions comes from Julian Hoppit, *Failed Legislation*.

Notes: The failure rate for all legislation, excludes turnpike petitions.

Table 6  
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: The 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 comes from Corfield, *Impact of English Towns*, which defines all major cities as having a population above 2500 in 1700. For information on failed turnpike petitions, see the sources for Table 5.

Table 7  
Parish Road Expenditure per-mile after Turnpike Petition Failed

Road	Number of Parishes	Annual Expenditure Per-Mile			
		0-5 Years after Petition Failed	6-10 Years after Petition Failed	11-15 Years after Petition Failed	16-20 Years after Petition Failed
Islington-London	4	94.2	62.5	54.2	0
Aylesbury-Bicester	7	0	35.0	46.7	46.7
Stockton-Darlington	8	0	0	3.3	24.8
Farringdon-Fyfield	7	0	0	0	1.8
Kingston-Petersfield	8	12.4	2.2	4.0	16.2
Church Hulme-Newcastle	8	2.8	3.8	2.8	0
Penrith-Cockermouth	9	0	0	0	0
Aylesbury-Buckingham	15	0	16.3		
Northampton to Hillmorton	11	0	0		
Worcester-Birmingham	9	0	0		
Knotting-Harborough	8	0	0		
Brough-Penrith	8	0	0		
Sevenoaks-Tonbridge	5	0	0		
Croyden-London	13	110.1	0		
Kensington-Colnbrook	6	0			
Boroughbridge-N. Allerton	22	0			
Leeds-Wakefield	7	0			
Worcester-Bewdley	9	0			
Evesham-Broadway	9	0			
York-Thirsk	19	0			
Mean/Total	199	10.4	8.6	15.8	12.8

Sources: see text.

Notes: expenditure per-mile is estimated with information on tax revenues per-mile. Expenditure figures are in constant 1819 prices after deflating using the Clark wage series.

Table 8  
Turnpike Trust Sample with Archival References

Turnpike Trust name	Year Established	Record Office	Reference
Chestnut	1725	Hertford R.O.	TP1/1-4
Essex and Hertfordshire	1744	Hertford R.O.	TP3/1-11
Sparrow Herne	1763	Hertford R.O.	TP4/25-31
Wadesmill	1663	Hertford R.O.	TP7/1-4
Watton	1757	Hertford R.O.	TP8/1-2
Hockliffe and Woburn	1728	Bedford R.O.	X/21/4-5
Brentford	1718	Hounslow Library	
Isleworth	1767	Chiswick Library	
Cambridge and Ely	1763	Cambridge R.O.	T/E/AM1-AM2
Hinckley and Lutterworth	1762	Leicester R.O.	T/MB/2/1-2
Leicester and Hinckley	1754	Leicester R.O.	T/SA/4/1
Huddersfield and Pennistone	1777	West Yorkshire R.O.	
Manchester and Wilmslow	1754	Manchester City	M124
Bawtry and Selby	1793	West Yorkshire R.O.	RT 13/5
Harrowgate and Hewick	1752	West Yorkshire R.O.	RT 44
Knaresborough and Pately	1759	West Yorkshire R.O.	RT 52
Redhouse and Crofton	1741	West Yorkshire R.O.	RT 73
Ripon and Pateley Bridge	1756	West Yorkshire R.O.	RT 44
Donnington	1757	Lincolnshire R.O.	
Grimsby	1765	Lincolnshire R.O.	
Leadenham	1759	Nottingham R.O.	DDT/27/1-2
Mansfield and Southwell	1807	Nottingham R.O.	DDM/111/57
Hartford Green	1769	Cheshire R.O.	DC 170/6
Nottingham and Ilkestone	1764	Derbyshire R.O.	D 5050/2
Islington	1717	Islington Library	
Burford and Preston	1754	Gloucester R.O.	D1070/8/1
Cheadle-Ipstones	1770	William Salt Library	52/31
Blackburn and Burscough	1755	Lancashire R.O.	TTE/3
Northampton and Wellington	1797	Northampton R.O.	
Ludlow, First District	1750	Shropshire R.O.	LB13/1
Ludlow, Second District	1756	Shropshire R.O.	LB18/25
Caynham	1780	Shropshire R.O.	LB18/86-89
Madeley	1773	Shropshire R.O.	1681/196/1-2
Cheadle, Oakmoor	1762	Staffordshire R.O.	D239/M/4/48
Cheadle, Huntley	1763	Staffordshire R.O.	D239/M
Cheadle, Dilhorne	1790	Staffordshire R.O.	D239/M
Cheadle, Alton	1799	Staffordshire R.O.	D239/M
Tonbridge to Maidstone	1765	Centre for Kentish Studies	T2/3-4
Kippings Cross to Willsley	1765	Centre for Kentish Studies	T1/3
Dover to Deal and Sandwich	1797	Centre for Kentish Studies	T11/f1
Odiham to Alton	1793	Hampshire R.O.	50m63/c5
Gosport	1780	Hampshire R.O.	36m72/b/a1-a2
Basingstoke and Alton	1796	Hampshire R.O.	

Table 9  
Parish Sample with Archival References

Parish, 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 R.O.	DE/199/6
Ashby Magma, LE	Leicester R.O.	DE/437/1/9
Belgrave, LE	Leicester R.O.	17 D64/E/2
Blaby, LE	Leicester R.O.	DE 3352/247
Bruntingshorpe, LE	Leicester R.O.	DE 765/9
Borough on the Hill, LE	Leicester R.O.	DE 990/22
Cole Overton, LE	Leicester R.O.	
Cossington, LE	Leicester R.O.	DE 40/36
Seagrave, LE	Leicester R.O.	DE 3897/10
Shenton, LE	Leicester R.O.	6 D 43/6/5
Cheetham, LA	Manchester City	M10/7/4/1
Almondbury, YW	West Yorkshire R.O.	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 R.O.	PR 80/17
Sheffield, YW	Sheffield R.O.	CB 1640/1-15
Sykehouse, YW	Sheffield R.O.	PR Syke 1/411
Thorne, YW	Sheffield R.O.	PR Thor 43
Hartlington, BD	Bedfordshire R.O.	
Houghton Conquest, BD	Bedfordshire R.O.	DDP 11/21
Meppershall, BD	Bedfordshire R.O.	P 29/21/1
Upper Stondon, BD	Bedfordshire R.O.	P 55/21
Hyde Staleybridge, CH	Tameside Archive	
Sutton in Macclesfield, CH	Cheshire R.O.	MF 335/9
Handforth, CH	Cheshire R.O.	P10/21/1
Handley, CH	Cheshire R.O.	P3/5
Farndon, CH	Cheshire R.O.	P45/13
Winwick, CH	Cheshire R.O.	P155/17/1-6
Nether Peover, CH	Cheshire R.O.	
Halton, CH	Cheshire R.O.	
Nether Alderley, CH	Cheshire R.O.	P 143/15/1-2
Tattenhall, CH	Cheshire R.O.	P5/17/1
Warburton, CH	Cheshire R.O.	P68/28/1
Wettenhall, CH	Cheshire R.O.	P40/22
Denby Abbey, DY	Derbyshire R.O.	D1061/A/PS/1
Turksdean, GL	Gloucestershire R.O.	P341/su/2/1
Balderton, SH	Shropshire R.O.	P201/N/1/1
Llanymyne, SH	Shropshire R.O.	P168/N/1
Preston on Weald Moors, SH	Shropshire R.O.	P233/N/1/1
Porkington Selattyn, SH	Shropshire R.O.	P240/N/1
Armitage, ST	Staffordshire R.O.	D805/4/1
Tettenhal, ST	Staffordshire R.O.	D571
Haughton, ST	Staffordshire R.O.	
Britford, WI	Wiltshire R.O.	
Charlton, WI	Wiltshire R.O.	1813/17
Bratton, WI	Wiltshire R.O.	1872/16-17
Blunden St. Andrew, WI	Wiltshire R.O.	1564/24

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

Year	Total Turnpike Expenditure (in current prices)	Total Turnpike Expenditure (in 1819 prices)	Total Parish Expenditure (in current prices)	Total Parish Expenditure (in 1819 prices)
1730	£104,000	£223,000	£24,000	£51,000
1740	£131,000	£271,000	£41,000	£85,000
1750	£171,000	£364,000	£47,000	£100,000
1760	£330,000	£655,000	£76,000	£151,000
1770	£441,000	£852,000	£107,000	£207,000
1780	£494,000	£837,000	£197,000	£334,000
1790	£557,000	£902,000	£282,000	£457,000
1800	£764,000	£927,000	£402,000	£488,000
1810	£923,000	£927,000	£635,000	£638,000
1812			£840,000	£794,000
1818	£1,114,000	£1,124,000		
1821	£1,034,000	£1,124,000		
1827			£1,122,000	£1,215,000
1829	£1,500,000	£1,608,000		
1839	£1,624,000	£1,700,000	£1,268,000	£1,328,000

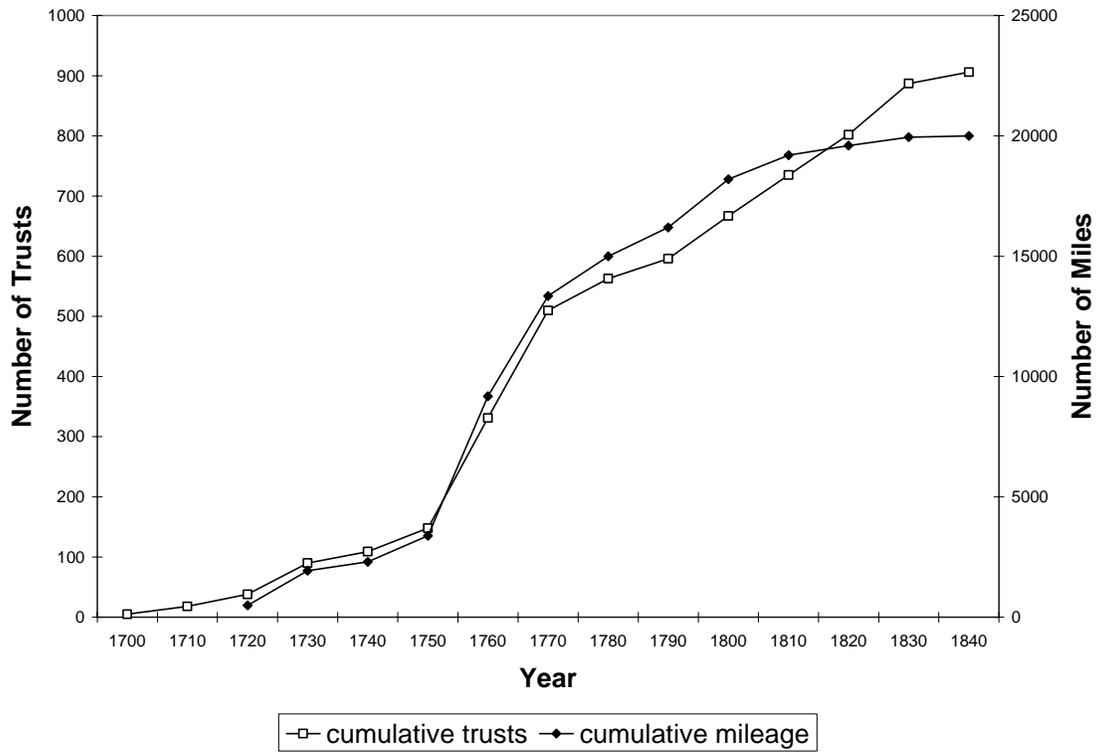
Sources: See Text

Notes: The series are deflated using the farm laborer wage series from Clark, "Farm Wages," pp. 502-503.

Figures

Figure 1

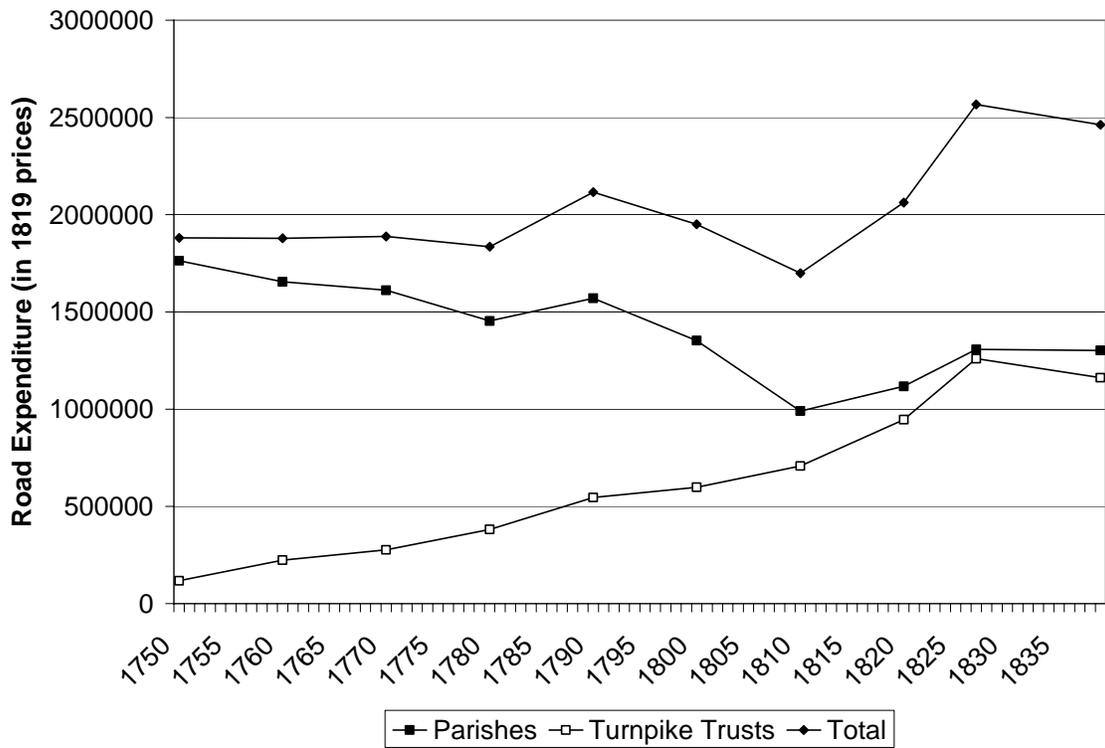
The Adoption of Turnpike Trusts and Turnpike Mileage in England and Wales, 1700-1840



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.



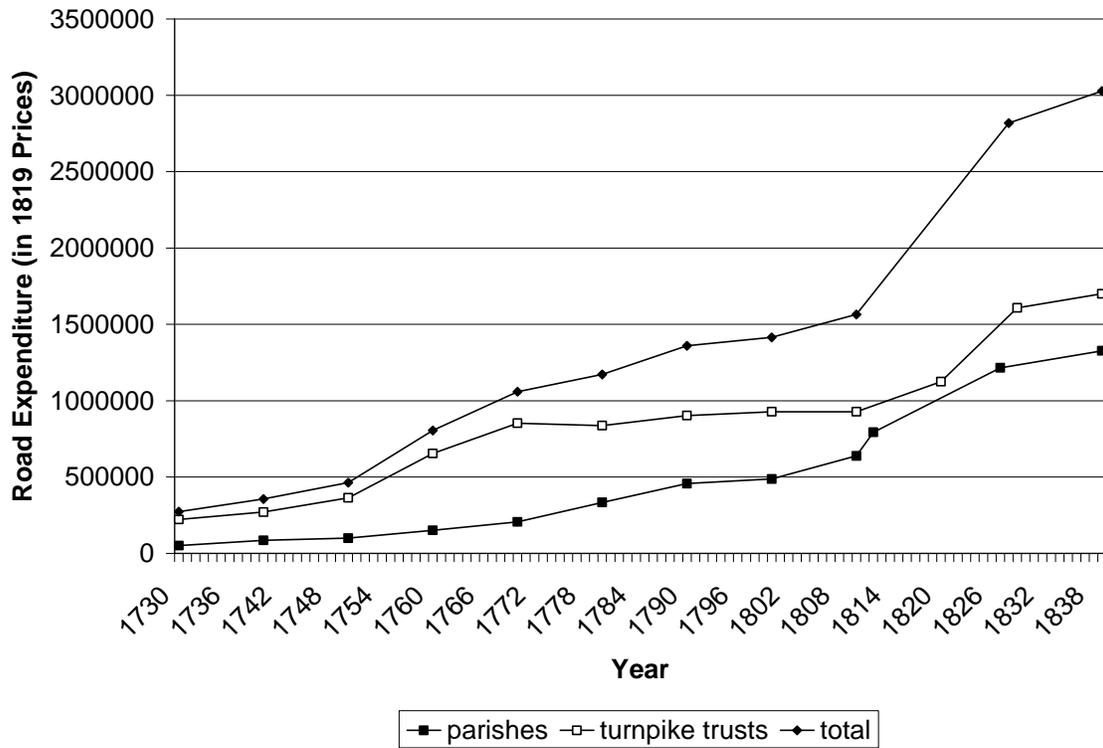
Figure 3  
 John Ginarlis and Sidney Pollard's Estimates of Parish and Turnpike Trust Financial Road Expenditure in England and Wales, 1750-1850



Sources: Ginarlis and Pollard, "Roads and Waterways," pp. 197-199, 205-207.

Notes: The series are deflated using the farm laborer wage series from Clark, "Farm Wages," pp. 502-503.

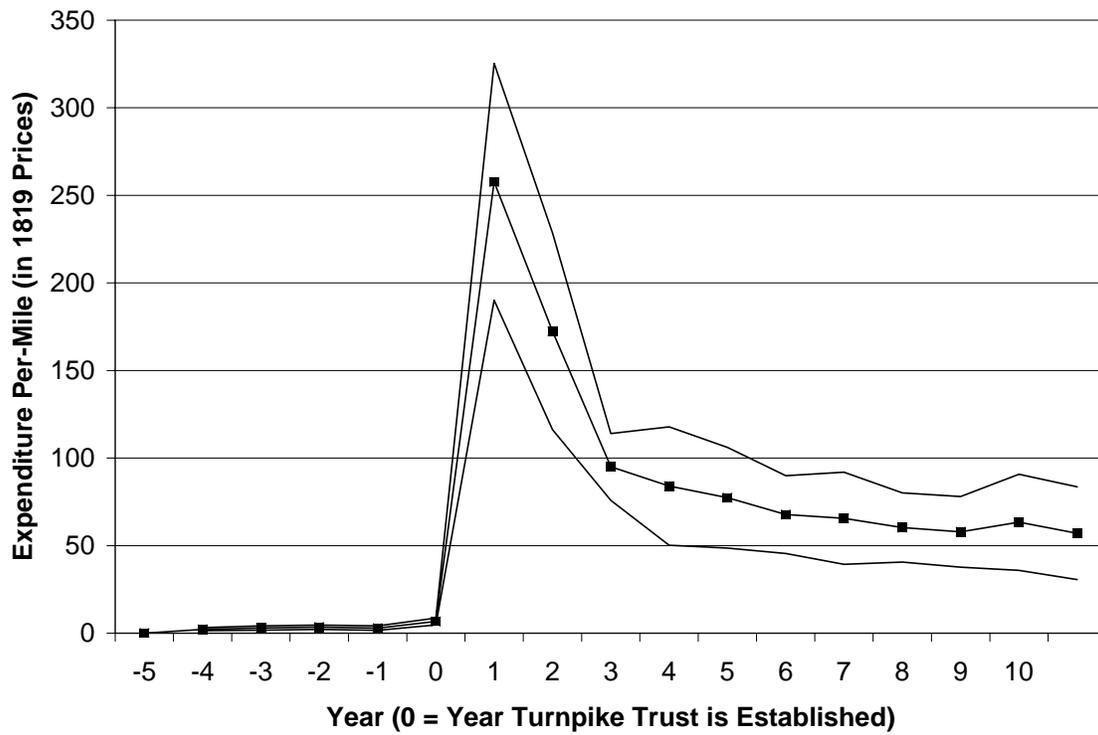
Figure 4  
 New Estimates of Parish and Turnpike Trust Financial Road Expenditure in England and Wales, 1730-1840.



Sources: See Text.

Notes: The series are deflated using the farm laborer wage series from Clark, "Farm Wages," pp. 502-503.

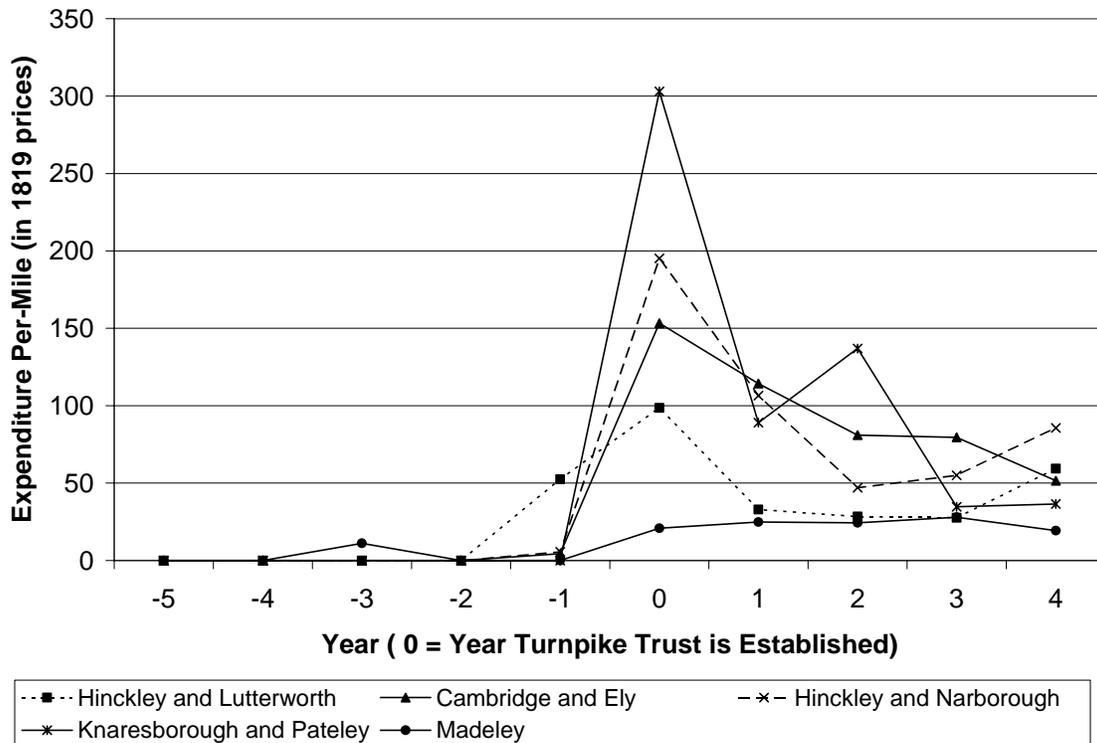
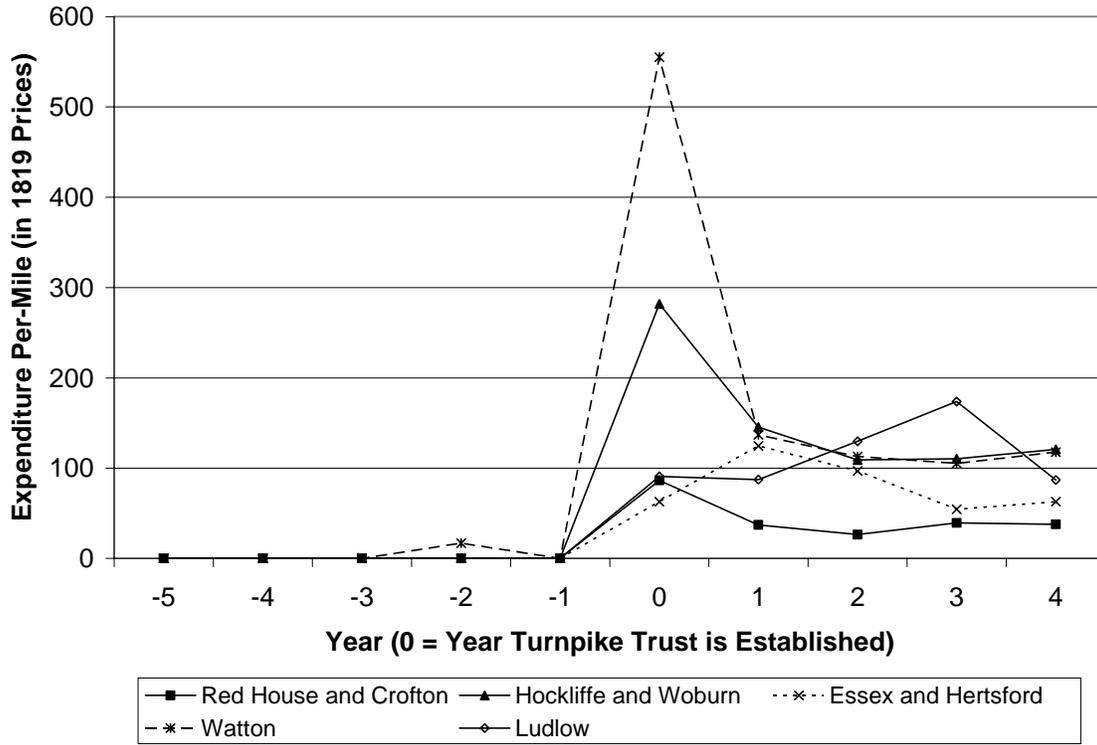
Figure 5  
The Estimated Change in Road Expenditure Per-Mile after Turnpike Trusts are Established



Source: see text.

Notes: The bounds represent a 90% confidence interval around the mean in each year.

Figure 6  
 Ten Examples of the Change in Road Expenditure Per-Mile after Turnpike Trusts



Sources: see text.