

*Analyzing the Determinants of Contract
Renegotiation: A Case Study of Eighteenth-
Century British Turnpike Trusts*

Hannah Markee

Department of Economics
University of California, Berkeley
December 2011

ABSTRACT

This paper adds to the existing literature on turnpike trusts by analyzing the factors that contributed to the frequency of renegotiations in British turnpike acts from 1705 - 1830. Using data on initiation and renewal dates from a 5% random sample of all existing turnpike acts, I find that renewal acts were less likely during periods of high interest rates and during Parliamentary election years. By using a second fully coded sample of 48 acts, I determine that trustees petitioned for renewal acts primarily for two reasons. The first was to increase their tolls after periods of declining real revenue. The second was to expand the set of legal rights established in initial acts. The overall conclusion is that renewal acts expanded the powers of trustees and allowed them to function more independently from government regulation.

ACKNOWLEDGEMENT: I would like to thank Professor Dan Bogart at the University of California, Irvine for all of his advice and guidance throughout this project, both of which made this an invaluable research experience.

Introduction

The turnpike road system revolutionized transportation in England both in its development and its effects. The turnpike trusts responsible for developing this system were a major change from the government-run, parish road repair. Rather than relying on local government taxes and authorities, the trusts allowed members of community to petition for rights to develop and maintain the roads while collecting tolls from road users. This new system rectified many of the inefficiencies of the parish system and contributed to road expansion. In fact, by 1830 the turnpike system had developed over 20,000 miles of road, which comprised 17% of all roads in England.¹

A unique feature of the turnpike act when compared to other Acts of Parliament at the time was that it expired after 21 years of legal activity. The acts could be renewed after expiration, or at any other point. This paper analyzes these renewals to try to determine the factors that significantly contributed to changes in the probability of renegotiation. Primarily, if it can be determined what factors lead to a higher chance of probability then it can be deduced which party was initiating the contracts. Parliament, trustees, landowners, and road users all had separate goals within the turnpike trusts. If Parliament initiated act renegotiations to suit their political agenda, then there should be a positive correlation between renewals and years after elections. If trustees caused renewals to increase maximum tolls, then there should be a negative correlation between real toll and probability of renewal.

Background

Starting in 1555, parishes in Britain were responsible for the creation and repair of roads within their boundaries. Chosen by the crown, magistrates (also known as Justices of Peace) would run these local governments and make sure that they kept up with public good provision

¹ Bogart, 'Did Turnpike Trusts Increase Transportation Investment in Eighteenth-Century England?' p. 440

and infrastructure maintenance. This system of parish road repair is viewed as inefficient for a variety of reasons. First, the structure of parishes in Britain was such that a major road would be broken up into multiple parishes' jurisdictions. This lowered the incentive for a particular parish to create or repair roads, because their road repair would not be as effective if other parishes did not follow suit to create a usable passageway between cities. Secondly, parishes did not have the authority to issue debt, which made it much more difficult to secure the capital necessary for the initial road investment. Expenditure was highest in the first five years of road repair, so an inability to secure funds to overcome the initial costs would be a major factor that hindered large-scale road repair by parishes.² To finance road repairs parishes could collect land taxes from their residents. They also had the authority to mandate up to six days per year statute labor from residents to repair roads, or collect payments in lieu of the required work. But the statute system was also inefficient, as it also drew from members of the parish who had little reason to do good work if they did not regularly use the roads themselves. A surveyor would be appointed to oversee statute work, but he was not compensated for his duties. Surveyors had little incentive to enforce regulations and penalties of labor and road repairs, so this position contributed to the overall inefficiency of the parish system.

Another big issue with this system was that those who were using the road were not the ones required to finance repairs. Wagons carrying goods long distances to ports or trade centers could pass through numerous parishes along the way. Because parish residents were funding repairs through land taxes, those only traveling through the parish would be free-riding at the expense of the residents. What level of benefits these travelers received is questionable because in any given year only 2% of parishes allocated funds to road improvement expenditure.³ The

² Bogart, 'Did the Glorious Revolution Contribute to the Transport Revolution?' p.37

³ Bogart, 'Did Turnpike Trusts Increase Transportation and Investment in Eighteenth-Century England?' p.448

turnpike system not only rectified many of these problems, it contributed to overall highway development in Britain.

In the late 1663, the first precursor to turnpike trusts passed in Parliament. This act gave magistrates the ability to collect tolls to maintain the Great North Road, the longest stretch of road out of London that was difficult to maintain due to its terrain and heavy traffic. This act was quite different from the turnpike acts that followed in the early 1700s. This act gave toll rights to magistrates only and it was set up to be quite temporary, lasting only eleven years. This act was the first of its kind and although it preceded the first turnpike act by over forty years, it showed that a shift away from the parish system could increase productivity of road repair.

The first turnpike trust that gave transportation improvement rights to non-magistrates was passed in 1706. This act revolutionized road improvement in Britain because it gave a group of community members monopoly rights to collect tolls and repair a particular stretch of road. Typically composed of landowners and merchants, a body of trustees would come together and petition parliament for the right to create roads or improve existing road. The petition would state that a road needed to be maintained, what kind of maintenance it needed, and whom it could benefit. The acts had to be passed through both the House of Commons and the House of Lords before put into law. The crown held the right to veto, but otherwise was uninvolved in the parliamentary process. The result of the petition was an Act of Parliament. Turnpike trusts were classified as statutory authority acts, along with all other parliamentary acts that allowed rights to infrastructure and social services.

Turnpike trusts gave trustees an extensive set of rights and restrictions to follow. They were allowed sole authority to set up gates and collect tolls on the road or roads specified in the act. They were given provisions for purchasing land to widen or redirect sections of road. They

could require statute labor from residents near the road, which would be shared with existing statute labor required by parishes. Mortgaging and leasing of the tolls were options available in many trusts. In some cases, trustees could collect subscriptions to help initial financing, but that was relatively less common. To help with trust administration and execution, trustees could elect a body of officers usually consisting of a clerk, treasurer, surveyor, and collector. These positions were given salaries for their work, but they could also be fined for misbehavior. Restrictions were placed on officers and on the trustees themselves. For instance, some acts specified that treasurer had to give a security for the position, or that the clerk and treasurer positions could not be held by the same person. Trustees had to hold a certain value in land, inheritance, or personal wealth in order to act. Also, mortgagees, lessees, and sellers of liquor were usually prohibited from acting. Turnpike trusts were legally active for a period of 21 years, although the acts could be renegotiated at any point during the 21 years or after expiration of the act.

Literature Review

So what effect did these turnpike trusts have? Because many trusts formed to repair existing roads, it is possible to compare the expenditure levels of roads taken over by trusts to the roads that remained under control of parishes. Bogart (2005) uses new expenditure calculations are based on Parliamentary Papers, Country Order Books, and account books, all which would have formed good indicators for the levels of parish and turnpike expenditure. Parishes could not collect toll revenue but they could collect taxes, although data from the Country Order Books shows that parishes rarely required road taxes from residents. Parishes could also mandate statute labor and were exempt from many of the legal expenses of turnpikes. Turnpikes, on the

other hand, were required to pay Parliament fees to pass or renew their acts. In order to compare road expenditure, it is necessary to take into account all the different resources and expenses of parishes and turnpikes.

The paper concludes that after the adoption of a turnpike trust, a particular road would see a substantial increase in road expenditure. However, the question arises of whether the trusts themselves are responsible for the increase in road expenditure or whether they merely replaced intended parish expenditure. Bogart addresses this question by comparing parishes that had successful petitions for turnpikes to parishes where their petition initially failed but was eventually successful. This counter-factual is valid because he finds no major differences between parishes that had successful petitions and parishes with failed positions. Furthermore, the failure rates for turnpikes follow the overall pattern of legislation failure rates in Parliament, indicating that the failed turnpike petitions may have been resulted from greater political inefficiency rather than an issue with individual petitions. Parishes where petitions failed did not see an increase in expenditure, while parishes that adopted turnpike trusts did see a significant increase in expenditure.

The overall lesson from this study is that turnpikes did not simply replace parish road expenditure, but actually were responsible for a large increase in expenditure because they fixed many of the issues with the parish system. In particular, turnpikes solved the road continuity problems, were able to collect tolls, and could issue debt to obtain the financing necessary for road improvement. Turnpikes are responsible for the large increase in road expenditure in eighteenth-century England, and ultimately contributed to economic development by establishing a network of trade routes essential for the transport goods and the spread of industrial technology.

In addition to increasing road expenditure and fostering road development that otherwise would not have occurred, turnpike trusts also lowered freight costs, lowered passenger travel times, and led to a social savings of .5% of national income. Albert and Pawson did analyses of passenger times and found that turnpikes reduced travel time by improving and widening the surfaces of roads. Bogart's (2005) first method of analysis was to look at land carriage rates between major cities. When accounting for the cost of inputs and unobservable fixed effects, the paper shows that 50% of the decrease in land carriage rates can be attributed to the addition of turnpike trusts to some of the 130 city pairs studied.

An alternative way to measure the effects of turnpike trusts on travel costs is to look at the evolution of winter toll rates compared to summer tolls. Winter tolls were higher to account for the higher cost of repair in seasons of bad weather. After their creation, turnpike trusts reduced the difference between winter and summer tolls to a negligible level, giving evidence of their higher efficiency in repairs.

Bogart found that the benefits of turnpikes extended beyond expanding the road system and reducing travel costs. He also found that when examining the cost and benefits of transportation efficiency in the freight sector that trusts accounted for a social savings equivalent to .5% of national income. To put this into perspective, average TFP growth has been estimated at .27% per year, implying that a .5% social savings contributed to one sixteenth of all productivity growth from 1770 to the early 1800s.⁴

The addition of turnpike trusts to the road improvement system of England in the 1700s undoubtedly was beneficial to parish residents, road users, and society as a whole. But why were these organizations so much more productive in allocating resources and improving roads than parishes, which had been responsible for these roads for over 100 years? One main argument put

⁴ Bogart, 'Turnpike Trusts and the Transportation Revolution in 18th Century England,' p. 500.

forth by Richardson and Bogart (2008) was that it was the adaptable nature the turnpike trusts that allowed for their overwhelming success.

The parliament act process, they argue, showed a transition into adaptable property rights because it allowed for members of the community who realized areas of inefficiency to come forward and petition for the right to redistribute resources. Prior to turnpikes there were limited ways that residents could transfer, mortgage, or lease land, and there was no ways for residents could individually contribute to the development of new infrastructure. Based on the data, it seems that Parliament favored passing acts that would be at least Pareto efficient, if not Pareto improving. This result was ensured by the multiple readings of the proposed bill and requiring success in both houses before it became active.

In relation to turnpike trusts, the issue of adaptability is quite important. To begin, these trusts were allowed the right to purchase and sell land. This was instrumental because it allowed for roads to be created in the most efficient way, particularly where routes could be made wider or more accessible, benefitting road users. They were also allowed to sell land that was not needed for the roads, ensuring that trustees would hold only land essential to road development. Furthermore, trustees were given legal rights to toll revenue that they could either keep and use for repairs or that they could use as a security for mortgage debt. Allowing trusts to issue debt ensured a proper distribution of funds when it was needed, particularly that trusts needed large amounts of capital for initial repairs and then would take the remaining time on the trust to repay debt.

The significance of adaptability to the economic and political environment is shown by Richardson and Bogart's analysis of the passage of statutory authority acts. This category included acts passed for transportation improvement, urban improvement, infrastructure

development, poor relief, and small requests courts. Using regression analysis, they found that the passage of acts was quite responsive to economic and political conditions. Particularly, that growing trade increased the demand for acts and that an increase in interest rate would drive down act passage. Also, parliament passed more statutory authority acts when it was not distracted by elections, foreign affairs, or changes in the crown. The adaptability of statutory authority rights is important. Because we see that the demand for infrastructure is affected by outside economic conditions, having contracts that allow for rights to adapt to the changing conditions is important to ensure the efficient allocation of rights and resources.

Although the issue of adaptability has been studied using data statutory authority acts, it has not yet been studied how turnpike trusts adapted, which is important given how much developing a road system benefitted residents and travelers, and how much it contributed to overall economic development. The issue is particularly important with turnpike trusts because they were the only type of act that expired. Therefore, the adaptability of road improvement rights should be studied not only through the passage of the initial act, but also by examining the changes that occurred as acts were subsequently renewed or renegotiated.

This paper contributes to the existing literature on turnpike trusts by analyzing what factors affected the probability of renewal, and how the act expiration changed structure of the trusts over time. Given that acts expired after 21 years, turnpike trusts were forced to adapt faster than other acts that did not expire. By using data on initiation and renewal dates from a 5% random sample of all existing turnpike acts I determine if the probability of renewal was also affected by economic and political factors, as Richardson and Bogart had established for the passage of all statutory acts. Then, by coding all provisions granted by a smaller sample of 48

acts, I determine what trust-specific effects contributed to an increased probability of renegotiation.

Data

The first and larger set of data used in this paper is a random sample of 43 trusts drawn from the Parliamentary Archives. It is a 5% sample of all remaining records, and is representative of the variety of expenditure and geographical location found in turnpike trusts. This dataset provides us with the title, road location, date of passage, and governing trust for 192 acts. The data is pulled from a timeframe spanning from 1705 to 1830. 1705 is the starting year for this dataset because that is the year where Parliament permitted bodies of trustees to have road improvement rights, which is why we see that the first characteristic turnpike trust became active in 1706. 1830 is used as an ending year because it is just before parliament election reform, the Great Reform Act of 1832, and the rise of railway transport in Britain.

Each of the 43 trusts had an initial act passed through Parliament and the overwhelming majority had at least one renewal act, if not more. In the 5% sample of this paper, there was only one act that passed an initial act without renewal. The maximum number of acts for one trust was 10, with the mean number of acts per trust at 4.5. Table 1 shows summary statistics for the sample used. Based on this table, we can see that the study of renewal acts is just as important, if not more important, than studying initial acts in trusts because renewal acts far outnumbered initial acts.

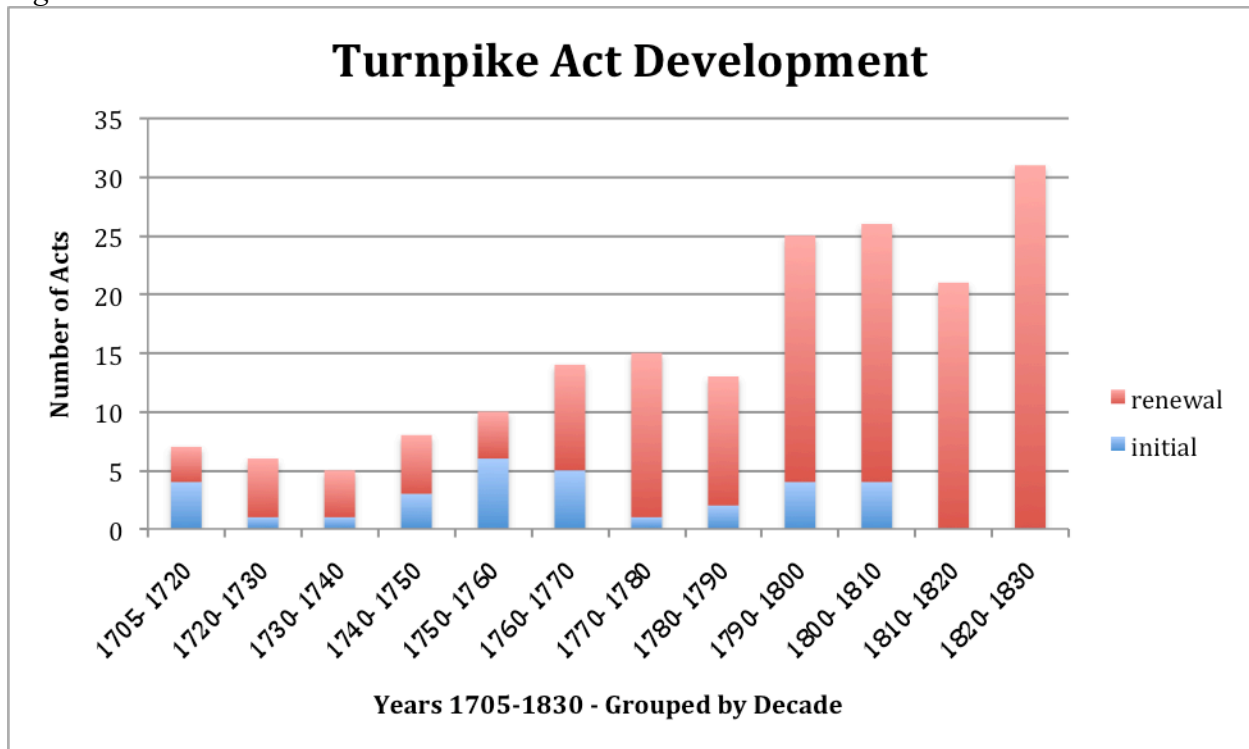
Table 1.

Large Sample:	Number of Acts	Percentage of Total Acts in Sample
Total Number of Acts	192	100%
Number of Initial Acts	41	21.35%
Number of Renewal Acts	151	78.65%
Small Sample:		
Total Number of Acts	48	100%
Number of Initial Acts	11	22.92%
Number of Renewal Acts	37	77.08%

The pattern of trust development suggests that the initial trusts spurred the development of other trusts. In one view, main roads out of England were turnpiked first, followed by other roads leading off these larger roads, creating transit from outskirt towns into main centers of trade.⁵ The roads of out of London were the first to be turnpiked in the early 1700s. By the 1750s, England was part of what is known as the “turnpike boom” which saw an increase in the number of turnpikes formed from 1751-1773. This boom was in response to growing population and industrialization, and the expansion of parliamentary acts was seen in all other sectors of infrastructure development. The turnpike boom affected the 5% sample in the same way as it affected overall trust development, as can be seen in the increase in the passage of initial acts from 1750-1770 in Figure 1. What is even more interesting about this figure is the pattern of renewal acts. The pattern of renewal loosely follows the pattern of initial acts, delayed by 21 years and increases due to previous acts renewing for a second time. The number of renewal acts continually increases, showing that earlier acts would renegotiate multiple times. However, the pattern does not perfectly follow the expiration of prior acts, indicating that there may be other factors contributing to the renewal of turnpike acts. This trend is what was expected given that previous research has showed act passage to respond to economic and political changes.

⁵ Albert, *The Turnpike Road System in England 1663-1840*, p.31-43

Figure 1.



Another explanation for trust expansion and renewal is that as trusts renewed their contracts many of them added new sections of road or provisions to create new entire stretches of road. In fact in the smaller sample of coded acts, 24% of all renewal acts expanded the territory of the trusts and included new sections of road. Thus, trusts' development could both expand their own road system as well as provide incentive for other trusts to follow suit.

The second set of data used in this paper is a smaller sample of 48 acts from 11 trusts, and this data set extensively codes all act provisions and toll schedules of each act. The acts themselves gave trustees a large and specific set of rights and restrictions. The provisions in the acts generally fell into five distinct categories. The first was general information such as location of road and reason for act. Then they listed out all active trustees and gave provisions regulating the powers of trustees. The acts also listed the schedule of maximum tolls and any exemptions and fines. Then they would have the regulations for buying and selling land and road materials,

and then whether or not the act could mandate statute labor. Finally, the acts would specify the terms for issuing mortgage debt.

Trustees

Most of the restrictions in the act were places on the trustees themselves, and would be listed along with the other trustee regulations. In order to act, a trustee had to meet a set of requirements. They had to own a minimum value of property, be “heir apparent” to inherit a minimum value of land, or hold a minimum value of personal wealth. If these requirements were changed in subsequent renewal acts, the trend was always to increase them, especially in trusts that had initial acts in or before the 1750s. As the powers of trustees expanded, they would raise the wealth requirements for who could act as a trustee. Trustees were prohibited from gaining direct profits from the trusts, but there were other ways people could benefit from them. Landowners were big beneficiaries of the turnpikes because having a nearby turnpike increased the value of land, allowing landowners to profit from land sales. The rise of land requirements along with the expansion of powers is the first evidence that landowners may have initiated renewals to preserve their interests.

Although trusts gave extensive lists of who was to serve as a trustee, usually only a few members of a trust would execute the turnpike development. The additional trustees may have been added to increase the chances of the act passing in the two houses of Parliament.⁶ Because of this phenomenon, the acts included a clause for the minimum number of trustees to execute the trust. The minimum number to form a quorum hovered around an average of 5 across the 43 acts studied. If it was changed in renewal acts, it was always lowered to reduce inconvenience

⁶ Albert, *The Turnpike Road System in England 1663-1840*, p. 57

for trustees. For example in both the 1822 Leatherhead Act and the 1768 Crickley Hill Oxford Act it explicitly states that the quorum of trustees was reduced to facilitate easier execution of the acts. However, the reduction in number required to execute may have led to smaller groups working together to increase their indirect profits. Some earlier trusts had provisions allowing the justices to hire someone to monitor road improvement and inspect all trust records, but this provision is not found in any acts past the 1750s.⁷ The trend seems to be to reduce trustee restrictions and allow them to function more independently from the British Government.

The trusts gave additional directions to trustees for meetings, elections of officers and additional trustees, resolving disputes, recovering penalties, and whether or not they could lease the tolls. They were set to have their first meeting on a certain date after the act passed, at which meeting they would elect officers. They usually elected a treasurer, clerk, surveyor(s) and collector(s), all of who were allotted salaries for their positions. Officers were given salaries and could be fined for misbehaving, an incentive scheme to try and solve the bureaucratic apathy found in parishes. In renewal acts, additional restrictions would be placed on officer positions, particularly for the clerk and treasurer. The most common change was mandating that separate people had to act as clerk and treasurer, or they would be subject to a large fine. This provision reduced corruption by ensuring that the treasurer could not falsify clerk records and steal turnpike revenue. There were minimum present trustee requirements for meeting, election additional trustees, and electing these officers.

The ability to lease the tolls was important for trustees. It was difficult for trustees to ensure the collector was doing their job honestly. Although there were many specific penalties for collectors misbehaving there were many more ways he could misuse the position, such as allowing toll evasion, not collecting overweight fines, and falsifying toll payment receipts. The

⁷ Albert, *The Turnpike Road System in England 1663 – 1840*, p. 23.

difficultly in maintaining collectors can be seen through the multiple provisions for fining collectors, discharging them from the position, electing temporary replacement collectors, and specific directions for removing collectors who refused to vacate the tollhouses. Leasing the tolls resolved trustees of this problem while still allowing them a steady stream of revenue.⁸ Although there was still the potential for lessees to act fraudulently, the penalties on lessees were exponentially higher to try to counteract it.

Tolls

After administrative provisions, trusts would dictate a maximum toll schedule for the roads that trustees could not exceed. Tolls were individually specified for horses pulling carriages, horses pulling wagons, individual horses, droves of cattle, and droves or calves or other small livestock. They were either noted for a particular number of horses or cattle, or the toll would be per animal. For example:

“For every Horse, Mule, Ass, Ox, or other Beast, drawing any ... Coach ... or Carriage for the conveyance of Passengers or light Goods or Articles, the Sum of Five-Pence:

For every Horse, Mule, Ass, Ox, or other Beast, drawing any Waggon ... or other such Carriage, the Sum of Four-pence:

For every Horse, Mule, Ass, or other Beast, laden or unladen, and not drawing, the Sum of Two-pence:

For every Drove of Oxen, Cows, or Neat Cattle, the Sum of Two-pence per Score, and so in proportion for any greater or less Number:

And for every Drove of Calves, Swine, Sheep, or Lambs, the Sum of Five-pence per Score, and so in proportion for any greater or less Number.”⁹

Many of the acts split tolls for carriages and wagons by wheel size. Wagons and carriages with wider wheels paid a lower toll because wide wheels did less damage to the roads and actually helped to maintain a more even surface. In some cases there were additional tolls for drays, tolls for dogs pulling carts, and tolls for two-wheeled wagons. Other less common

⁸ Albert, *The Turnpike Road System in England 1663-1840*, p. 84-85

⁹ Thirsk Yarm Turnpike Act, HL/PO/PB/1/1802/43G3n8

provisions in this sections restricted how many tolls could be collected at each gate, or along the entire stretch of road. One act in the smaller sample split tolls into winter and summer tolls, with higher tolls in the winter to keep up with increased road repair costs from poor conditions. The toll section also listed penalties for dishonestly claiming toll exemptions, evading tolls, refusing to pay tolls, and giving out toll receipts.

Having access to these turnpike acts allows for the creation of toll variables to include in this paper’s analysis. Due to the wide variety of tolls, it is best to use tolls that were consistent throughout all acts. In every act there would at least be tolls specified for coaches, wagons, and horses. Toll levels would either be listed “per horse” or for fixed numbers of horses drawing, so it is necessary to average over all per-horse toll levels included in a particular act. Using this method, we obtain average tolls per horse for coaches, wagons, and horses. Cattle and calf tolls are omitted from the analysis because some of the acts in the sample included toll exemptions for cattle. To account for acts having control over varying lengths of road, toll levels are then divided by total mileage to yield toll per mile for each type of traffic. This data is important to the analysis of renewals, because many renewal acts changed maximum toll levels. Table 2 shows the proportion of acts that changed tolls for the three main types of traffic used in this analysis.

Table 2.

	Toll per horse – Coach	Toll per horse – Wagon	Toll per horse – Single Horse
Renewals that increased toll	45.95%	35.14%	27.03%
Renewals that kept toll constant	37.88%	48.65%	59.46%
Renewals that decreased toll	16.17%	16.21%	13.51%

After listing the maximum tolls allowable, the act would then list all exemptions and toll provisions specific for this act. There was a typical set of exemptions that can be found in each act. This set includes: wagons transporting road materials, those transporting implements of husbandry (e.g. plows), cattle being taken to pasture or to a water source, people going to church or a funeral, postmen, clergymen, soldiers, carriages belonging to the crown, and anyone traveling on the day of an election. It is commonly believed that exemptions were included in turnpike acts to reduce any opposition to the act. Some renewal acts added exemptions while some repealed past exemptions, so the pattern here is not clear.

Land and Materials

Having complete regulations for buying and selling land was essential to creating roads that were wide enough to handle a large amount of traffic. The process in trusts started with the trustees offering landowners an amount for their land. If after a certain number of days the owner did not respond, or if they refused, then the decision would go to a jury. The sheriff of the county in question was responsible for impaneling twelve men to act as a jury. The jury would then determine if the compensation level was too low, accurate, or too high. If the verdict called the same amount or less compensation, then the landowner who brought the dispute would be responsible for jury fees. If the verdict called for more compensation to the landowner, then the trustees had to pay the jury fees in addition to the difference in compensation.

Along with jury provisions came regulations for how to handle money owed for land purchased or taken from “incapacitated persons.” This category of persons included corporations, women, children, mentally ill, or people incapacitated in any other way. If the value of the land were over £20, then the money would be placed in the Bank of England in the

name of the Account General of the High Court of Chancery. It would then be invested in land or bank annuities. If the value were between £20 and £200, then it would be put in the court under the same name and used as previously directed, or it could be paid to two trustees nominated by the previous owner and five trustees. If the value were less than £20, then it could be paid to their guardians or applied in the use of the incapacitated person. These provisions were similar to modern day eminent domain provisions. The parallel inclusion of jury provisions and eminent domain provisions into renewals suggests that acts needed well-defined regulations for land redistribution to promote efficient land routes and widths.

Within a working trust, the surveyor was responsible for overseeing the on-site road development. In sum, this meant he collected road materials, ensuring the roads were in good condition, and monitoring statute work. The surveyor could collect materials from any public land for free, but had to fence or fill pits to avoid danger. He could also take materials from privately held land, but needed trustee approval and payment to the owner before removal. He was also responsible to oversee road repair, road widening, and in many cases was also permitted to build bridges, arches and drains. Another responsibility of the surveyor was to keep the roads clean. It was his job to “remove annoyances,” which meant removing all trash and items left by travelers, and trimming trees.

Statute Labor

Statute labor was labor that both trusts and parishes could require of parish residents. Under the parish system, the magistrates (Justices of Peace) could ask up to six days of labor per person on repairing the roads. When trusts were established, they could also require a maximum number of days of statute work towards their roads, but the statute labor was shared with the

parishes. The acts would first say whether or not the parish statute labor continued. Then, the acts would list who would apportion the statute labor. In earlier acts they allowed groups of trustees or the surveyor to apportion, but later renewals would always change it to a set number of justices of the peace. The trusts could not take all the days of labor from the parish; they were typically allotted two to three days maximum per year.

Both individual laborers and teams of horses did statute work. Landowners who were required to keep a team for each 50 pounds value of land they held. Individuals and teams would be fined for not doing labor, and would also be fined for being idle on the job. If anyone wanted to get out of their labor, they could pay the surveyor a composition fee in lieu of labor. The surveyors had to keep track of all statute labor and compensation payments for the turnpike. If they did not maintain accurate records of statute work then they would be also be subject to large fines. Although statute work is an important consideration when discussing trusts, there is little data on performed statute labor.

Debt

The last thing addressed by turnpike trusts was the issuance of debt. If initial acts did not allow trustees to mortgage tolls, then it would always be added in a later renewal acts. This provision was extremely important to the trust because it was their main way to raise funds for road repairs and passing renewal acts through Parliament. Mortgages were made on the credit of the tolls and had no official expiration dates, essentially lasting as long as the turnpike trust was active. The number of trustees required to mortgage the tolls hovered between 5 and 9 for all acts. In renewal acts, the number would usually be lowered to 5. In only one act was an upper limit set for borrowing, and it was repealed in the following renewal act.

In initial acts passed from 1720s- 1750s trustees would have to stay below maximum interest rates on mortgage debt. But, as acts renewed these provisions would be omitted and trustees control over the debt expanded. Renewal acts had to keep repaying the debt of earlier acts, although all creditors to the trusts were viewed as equal to receive funds. Mortgage debt was also transferrable between people, and one of the clerk's jobs was to enter these mortgages and transfers into the official trust records. Overall, given the trends on trustee requirements, interest rate maximums, and total debt limits, it is clear that act renewals moved to allow trustees full control over issuing debt.

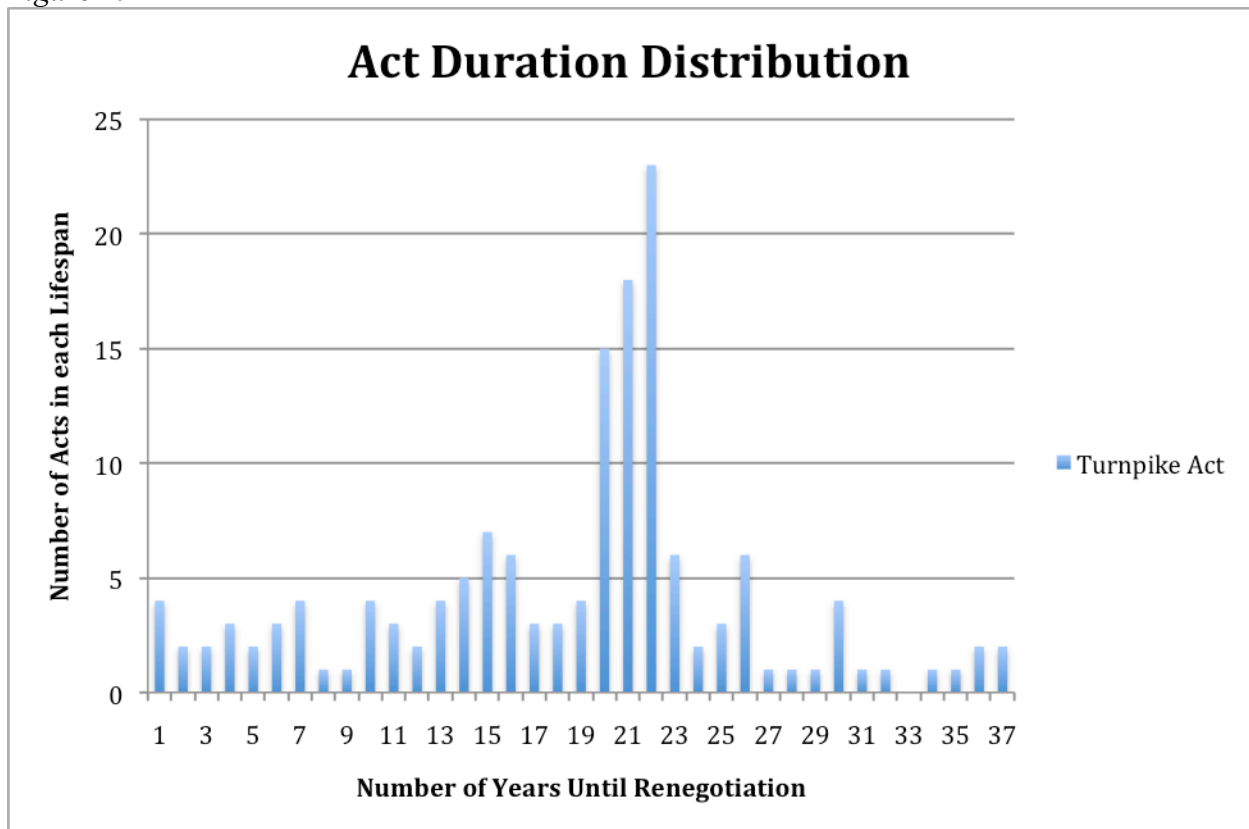
Methods

This paper uses discrete time survival analysis to model the probability of turnpike act renewal. Duration of act is measured in years, and the beginning of time is marked by the passage year on the cover page of each act. Once established, each act starts year one of the act's lifespan, a term used in this paper to refer to the act's active legal duration. A discrete time hazard model is appropriate for this analysis because an individual contract can only renegotiate once. The dependent variable is coded to equal 0 in all active years that did not see a renewal, and to equal 1 in the year of renewal. Renewals, if present, will always mark the end of a contract lifespan, because each renewal begins a new act. Figure 2 shows the distribution of act lifespans in the larger sample of 192 acts. The most obvious trend from this graph is the cluster of renewals among contracts that were active for 20, 21, and 22 years. Given that turnpike acts expired after 21 years, this trend shows us that the systematic expiration was one of the biggest reasons that contracts renewed. The trend follows in the smaller dataset and gives us our base

specification – that the expiration was a main factor that increased the probability of contract renewal.

The clustering in the distribution of Figure 2 gives the intuition to form three variables modeling contract expiration. The first is a binary variable for active contract terms lasting between 17 and 19 years to account for acts that renewed early to avoid expiration. The second is for active terms that lasted 20 to 23 years, modeling the peak in the distribution centered on the expiration year (exp20-23). The third is for years 24 to 26, showing us contracts that waited until after expiration to reorganize and renew (exp24-26). The binary variables are 0 for all contracts active years before or after the span of the variable, and 1 active years within the ranges covered by the three variables.

Figure 2.



Empirical Logit Analysis - First Dataset

The first analysis uses the larger sample to test how the expiration variables contribute to the probability of renewal in the logit model. Regression [1] of Table 3 shows these results. It should be noted that all regressions using the full sample also used trust-specific binary variables to account for unobservable effects. All of the coefficients on the expiration variables are positive, which is what is expected because approaching expiration, expiration, and passing expiration dates will increase the probability that a trust will renew if it wishes to remain active. The coefficients and significance variables are also as predicted. Although approximately the same number of acts were renewed in the 17-19 year range as renewed in the 24-26 year range (10 and 11, respectively), there many more trusts made it through the 17-19 range and postponed renewal. Therefore, simply making it to the 17-19 year range in act duration was not a sole factor in determining the probability of renegotiation for these years. However, we see that the coefficient for 24-26 years is highly significant with a much larger coefficient because most of the acts that “survived” until this period would also renew in this period, showing that having a contract expire does significantly increase the probability of renegotiation. As predicted, the coefficient for 20-23 is the largest because contracts expired after 21 years. We can conclude by Table 4 that being in the range of expiration increased the probability of renewal by 7%. The effects of being within the expiration date are larger than having passed it, so many trusts must have organized ahead of time to make sure their renewal act passed near the expiration date, presumably to maintain uninterrupted authority. Being within three to five years after expiration still increased the probability of renewal by almost 6%, indicating that the expiration of an act was a big incentive to regain control over the turnpike.

Regression [2] adds macroeconomic factors to the regression model. Due to the historical nature of the data, we do not know how long it would take trusts to respond to changes in the economic environment. To account for delayed responses, we include each variable along with one- and two-year lags. Regression [3] adds election variables for years when there was an election in Parliament. Elections for members of parliament was known in advance, so both lead and lagged election variables are included. Table 4 converts the logit regression coefficients to marginal effects for better understanding.

Of the population variables, growth in year $t-2$ contributed to 2% increase in chance of renewal, suggesting that there may have been a delayed response. Population growth could affect trusts in a few ways. First, a higher population could increase traffic and prompt trustees to renegotiate for changes in tolls or road maintenance clauses. In another view, population growth could mean more road users who could petition to renew acts in their favor. Trusts also may have renewed to add roads to accommodate more travelers and add to their revenue, although in the smaller sample the correlation between population growth and road addition is weak.

Yield on consols refers to the return on consolidated annuities issued by the British government. In year t , a one-unit rise in the interest rate leads to a 1% decrease in probability of renewals. Because of the importance of creditors to the continuation of trusts, the immediate effects of interest rate make sense because a higher rate indicates a higher cost of lending to the creditors. In years $t-1$ and $t-2$ the coefficient is positive and although it is not statistically significant it indicates a shift to stop renewing acts when interest rates rose.

Trade growth and inflation rate were included to see the effects of commerce and price level on act renewal. Although merchants transporting goods would have been hit hardest by the

implementation of the tolls, they may have realized that the benefits of turnpike trusts exceeded the toll costs. As Bogart (2005) showed, trusts did increase travel times and reduce freight charges. Merchant realization of the benefits may have stopped them from petitioning for lower tolls or more exemptions, leading to the negligible impact of trade growth on act renewal. This notes a marked change from analyses using data from initial and renewal acts of all types of statutory authority contracts, as those studies found a positive correlation between trade and number of acts.

The results for inflation are quite interesting. A main hypothesis tested in this paper is if over time inflation would drive down toll revenue and the trustees would petition parliament for a renewal to increase tolls. This hypothesis is consistent with the fact that toll revenue was the major source of turnpike revenue and essential for the trust. The results of regressions [2] and [3] indicate that virtually no effect on the probability of renewal, although the hypothesis will need to be tested again using information on real toll level.

The coefficients on the election variables indicate that renegotiations were less common during years when there were elections for members of Parliament. More specifically, a renewal in year t of an election would be 2% less likely to occur. However, elections would be for Parliament sessions that occurred in late November or December and turnpike acts were usually passed in March or April. Because of this timing, the significant effect of renewal in year t actually means that parliamentary sessions immediately after elections were less likely to see a renewal act. This means that Parliament would be less productive in the session immediately following an election. This is verified by the positive correlation between election years and the failure rate for all other bills, excluding turnpikes. Since the decline in renewal acts was not a

trend unique to turnpike bills, we can assume that some aspect about new members of Parliament caused the following year to be relatively less productive than years without elections.

Table 3.
Logit Regressions – Large Sample

	[1] ^a	[2] ^b	[3] ^c
Expiration 17-19 yrs	.33 (.35)	.23 (.37)	.23 (.37)
Expiration 20-23 yrs	2.63*** (.20)	2.58*** (.21)	2.58*** (.21)
Expiration 24-26 yrs	2.02*** (.36)	2.14*** (.37)	2.12*** (.37)
Population Growth _t		-.05 (.35)	-.06 (.36)
Population Growth _{t-1}		-.33 (.41)	-.22 (.43)
Population Growth _{t-2}		.69* (.40)	.72* (.40)
Yield on Consols _t		-.50** (.23)	-.47** (.24)
Yield on Consols _{t-1}		.42 (.30)	.31 (.31)
Yield on Consols _{t-2}		.12 (.24)	.21 (.25)
Trade Growth _t		-.001 (.01)	-.003 (.01)
Trade Growth _{t-1}		.02 (.01)	.008 (.01)
Trade Growth _{t-2}		-.01 (.01)	-.008 (.01)
Inflation _t		.003 (.01)	-.001 (.01)
Inflation _{t-1}		-.01 (.01)	-.01 (.01)
Inflation _{t-2}		.008 (.01)	.02 (.01)
Election _{t+1}			-.15 (.28)
Election _t			-.81*** (.33)
Election _{t-1}			-.04 (.26)

a. Log likelihood= -516.93, Pseudo R2 = 0.1434

b. Log likelihood= -492.37, Pseudo R2 = 0.1558

c. Log likelihood= -488.43, Pseudo R2 = 0.1622

1. All regressions used trust-level fixed effects binaries

2. Standard errors in parentheses. Coefficients significant at 1%(***), 5%(**), and 10% (*) level

Table 4.
Marginal Effects

<i>Logit Regression [3]</i>	$(dy/dx)^a$	<i>[3] continued</i>	$(dy/dx)^a$
Expiration 17-19 yrs	.006	Trade Growth t	-.0001
Expiration 20-23 yrs	.071***	Trade Growth $t-1$	.0002
Expiration 24-26 yrs	.058***	Trade Growth $t-2$	.0002
Population Growth t	-.002	Inflation t	0
Population Growth $t-1$	-.006	Inflation $t-1$	-.0003
Population Growth $t-2$	.019*	Inflation $t-2$	.0004
Yield on Consols t	-.013**	Election $t+1$	-.0004
Yield on Consols $t-1$	.009	Election t	-.023***
Yield on Consols $t-2$	.006	Election $t-1$	-.002

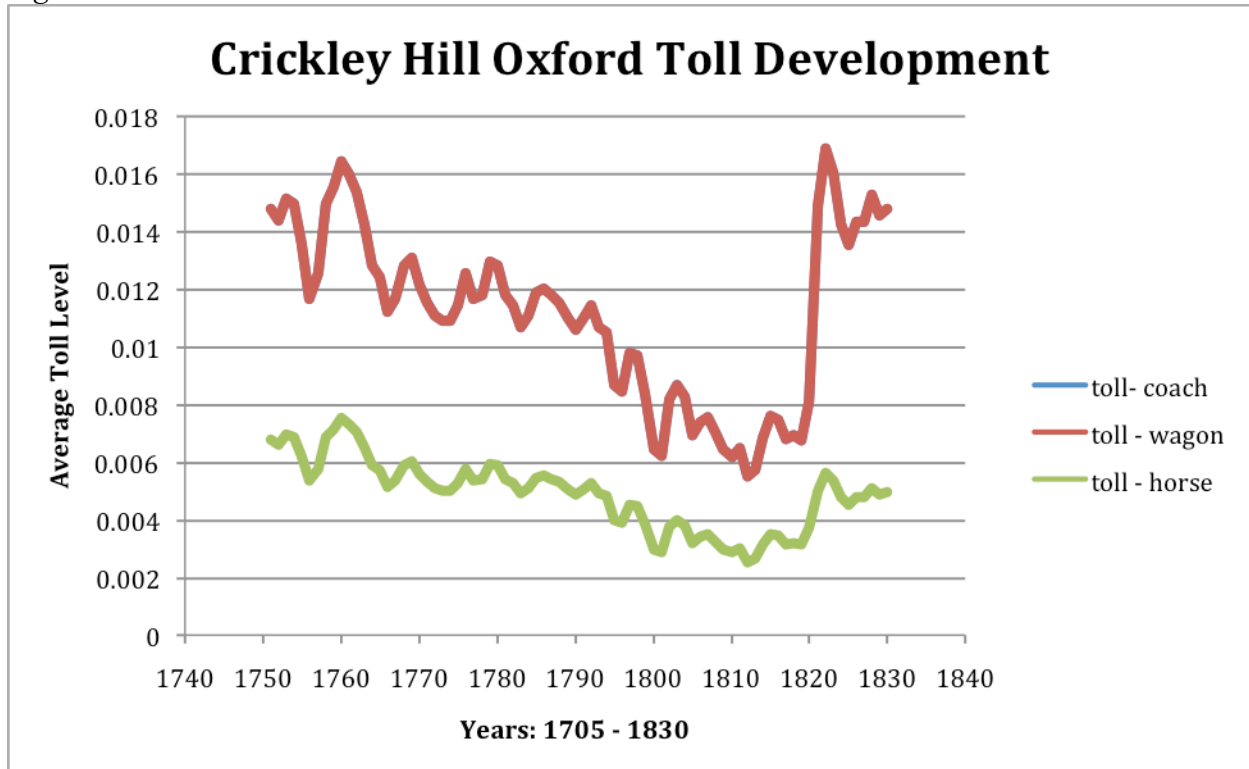
a. marginal effects on probability of renewal holding all else constant: for dummy variables it corresponds with a change from 0 to 1, for continuous variables it corresponds to a one unit increase

Empirical Logit Analysis - Second Dataset

Since it has been verified that the analysis using expiration, macroeconomic, and political factors is valid for the 5% random sample of all acts, now we can apply this specification to the smaller sample of fully coded acts. Regression [1] of Table 5 shows these results. The use of the smaller sample yields the same results proven with the larger sample, but with smaller significance levels due to the limited nature of the second sample. The most interesting part of the smaller sample is that it uses fully coded data from 48 turnpike trusts and allows us to include toll variables in our specification. Regression [2] of Table 5 shows the effects of using a variable for average toll level. Because per-horse toll levels for coach, wagon, and horse are highly correlated, including all variables would cause bias. Thus, regression [2] uses an average of the three tolls to pick up the general trend in real toll level. The magnitude of the coefficient indicates that when the toll increased, the probability of renegotiation decreased. Or alternatively, when the real toll level dropped it prompted the trustees to renegotiate their

contracts to increase their maximum toll schedule. This result clarifies the large-sample analysis and shows that in fact, maintaining a steady level of toll revenue was essential to road development. This trend can best be seen in the toll development of the Crickley Hill Oxford trust in Figure 3. After a long decline in toll levels, they renegotiated their maximum schedule to return their tolls to initial levels. Note that this trust had identical tolls for coaches and wagons.

Figure 3.



The overall magnitude and significance (p-value of .15) indicates that while a decrease in tolls did increase the probability renegotiation, there were other factors. Given that the small sample of coded data includes other provisions, this paper tests the hypothesis that act renewed in order to expand the powers of trustees. We add two variables to the regression: one for an act that is missing a provision for leasing the tolls, and one for an act that is missing the eminent domain clause. Eminent domain is typically added along with the jury provision, so the eminent

domain variable marks the inclusion of land purchase rights into turnpike acts. The variables used are binary; they are 1 when a given contract is missing the clause and are 0 once the clause is added in a subsequent renewal act.

Based on the results of regression [3] from Table 4, we can see that lacking essential provisions increased the probability that a turnpike act would renew. The coefficient on the missing eminent domain is positive, which is what was expected. The variable is 1 when the provision is missing, so a positive coefficient means that when the variable went from 1 to 0 (when the provision was added), then it would decrease the probability of a future renewal by 2%. This result is consistent with the initial discussion on turnpikes, and shows that contracts did indeed expand the powers given to trustees as a given trust's act developed over time. The marginal effect of the leasing provision is negligible and not statistically significant, so we can conclude that this provision was not as essential to the functioning of the act as the land purchase clauses. This is logical, given that many turnpikes needed to purchase land to create, widen, or alter a road.

Table 4.
Logit Regressions – Small Sample

	[1]	[2]	[3]
Expiration 17-19 yrs	.90 (.69)	.85 (.69)	.70 (.73)
Expiration 20-23 yrs	2.99*** (.50)	3.04*** (.51)	2.81*** (.54)
Expiration 24-26 yrs	1.94*** (.89)	2.04** (.90)	1.83** (.90)
Population Growth t	-.14 (.88)	-.26 (.89)	.12 (.96)
Population Growth t_{-1}	-.21 (.96)	-.19 (.97)	-.03 (1.01)
Population Growth t_{-2}	.86 (.92)	.66 (.92)	.98 (.96)
Yield on Consols t	-.84 (.57)	-.93* (.57)	-1.02* (.60)
Yield on Consols t_{-1}	.37 (.66)	.41 (.66)	.26 (.68)
Yield on Consols t_{-2}	.74 (.53)	.62 (.53)	.69 (.55)
Trade Growth t	-.01 (.03)	-.01 (.03)	-.003 (.03)
Trade Growth t_{-1}	-.03 (.03)	-.03 (.03)	-.02 (.03)
Trade Growth t_{-2}	-.02 (.02)	-.02 (.02)	-.01 (.02)
Inflation t	.04* (.03)	.04 (.02)	.03 (.03)
Inflation t_{-1}	-.04 (.03)	-.05* (-.03)	-.05* (.03)
Inflation t_{-2}	.08*** (.03)	.07** (.03)	.07 (.03)
Election t_{+1}	-.49 (.62)	-.47 (.62)	-.30 (.64)
Election t	-1.48** (.77)	-1.46* (.79)	-1.48* (.80)
Election t_{-1}	-.55 (.59)	-.52 (.59)	-.43 (.60)
Real Toll Level		-79.84 (55.69)	-113.73** (59.03)
No Lease Provision			.41 (.89)
No Eminent Domain			1.18* (.68)

1. All regressions used trust-level fixed effects binaries

2. Standard errors in parentheses. Coefficients significant at 1%(***), 5%(**), and 10% (*) level

Conclusion

The parish system of road repair was insufficient to adequately develop the road system in England. The old system was full of inefficiencies and did not properly allocate capital, land, or labor. One main way the turnpike system helped was it allowed for people in high-inefficiency areas to petition Parliament for rights to redirect poorly made routes, redistribute the cost of road repair to the road users, and ensure that an entire route would be created and maintained. A clause unique to turnpike trusts was the act expiration after 21 years of legal activity. Because of this clause, contract expiration was the major factor contributing to contract renewal. However, many acts renewed well before and well after the expiration period so other factors did play a role in renegotiation.

The first analysis using a full sample of dated acts shows that acts did renew in response to the economic and political environment. Because trusts needed creditors to support their initial expenditure, the renewals correlated with periods of low interest rates when the cost to lenders is lower. Act renewal was also much less common during sessions immediately following elections for members of parliament. Given that there is a positive correlation between election years and total bill failure rate, then these new members of Parliament may have made Parliament as a whole relatively less productive in passing acts.

The second analysis includes variables for toll level and tests the hypothesis that leasing and land purchase provisions were important to turnpike acts. Turnpike acts are more likely to be renewed when there has been a decline in the real level of the maximum toll schedule, but this effectively lowered the income from the act's main revenue source. Lease provisions turned out to not be nearly as essential as land purchase provisions. Once a land purchase provision was

included, the probability of renewal dropped 2%, indicating how important it was to trust productivity.

Ultimately, this paper concludes that the renewal process increasingly adapted to changes in the economic and political climate, and most importantly it adapted to changes in the needs of the trustees. When trustees' revenue declined, they would seek and obtain a renewal act with tolls that brought their real toll revenue up to its original level. They would also renew in order to obtain more provisions to increase their power and freedom from Parliament. Overall, Parliament seemed to favor this trend and allow the renewals. The rapidly changing atmosphere in eighteenth century Britain allowed for the institutional environment facing turnpike trusts to adapt alongside the roads themselves. As the turnpike system expanded, trustees were granted more powers, had their restrictions decreased, and were allowed to maintain their levels of revenue. Overall, the renewal process benefitted the trustees and allowed them to more effectually expand and maintain the turnpike road system.

References:

- Albert, Willing. *The Turnpike Road System in England 1663-1840*. Cambridge: Cambridge University Press, 1972.
- Bogart, Dan. "Did the Glorious Revolution Contribute to the Transport Revolution?" *Economic History Review*, 64, (November 2011), 1073-1112
- "Did Turnpike Trusts Increase Transportation and Investment in Eighteenth-Century England?". *Journal of Economic History*, 65, (June 2005) 439-468.
- "Turnpike Trusts and the Transportation Revolution in 18th Century England," *Explorations in Economic History*, 42, (October 2005) 479-508.
- Bogart, Dan and Gary Richardson. "Institutional Adaptability and Economic Development: The Property Rights Revolution in Britain, 1700 to 1830." National Bureau of Economic Research Working Paper No. 13757, 2008. <http://papers.nber.org/paper/w13757>, (accessed October 2011).
- "Parliament and Property Rights: A Database." Working paper, 2006. <http://www.socsci.uci.edu/~dbogart/actsdataaug112009.pdf>, (accessed September 2011).
- "Institutional Adaptability and Economic Development: The Property Rights Revolution in Britain, 1700 to 1830." National Bureau of Economic Research Working Paper No. 13757, 2008. <http://papers.nber.org/paper/w13757>, (accessed October 2011).
- Guasch, J., Laffont, J., & Straub, S. "Concessions of Infrastructure in Latin America," *Journal of Applied Econometrics*, 22 (2007), 1267-1294
- Guasch, J., Laffont, J., & Straub, S. "Renegotiation of Concession Contracts in Latin America: Evidence from the Water and Transport Sectors," *International Journal of Industrial Organization*, 26 (2008), 421-442.
- House of Commons Parliamentary Papers, 1800 – 1830. Accessed May – December 2011. <http://parlipapers.chadwyck.co.uk/marketing/guide.jsp>
- Pawson, Eric. *Transport and Economy: The Turnpike Roads of Eighteenth Century Britain*. London: The Academic Press, 1977.
- Turnpike Road Acts, 1705- 1830. United Kingdom Publications and Records, Parliamentary Archives. Accessed December 2011. <http://www.parliament.uk/business/publications/parliamentary-archives/>