

Financing the rebuilding of the City of London after the Great Fire of 1666

D'Maris Coffman*, Judy Stephenson†, and Nathan Sussman‡

Abstract

The Great Fire of 1666 consumed most of the City of London. Although it is generally accepted that most of the reconstruction was a private-order affair the responsibility for replacing infrastructure and public buildings, including numerous parish churches and St. Paul's Cathedral fell to the London Corporation, the City's governing body. This paper presents archival data and analyzes how, in the absence of banks, a stock market, and without central government funding, the City was able to fund the rebuilding, and large improvement works its carried out in the three decades after the disaster. The City borrowed at historically low rates from its citizens and outside investors, partly secured on its' reputation and partly secured by future coal tax receipts. The rebuilding project was mostly completed in fewer than ten years. However, having invested in public goods without additional sources of revenue, the Corporation defaulted in 1683.

* UCL, Bartlett School of Construction and Project Management

† UCL, Bartlett School of Construction and Project Management

‡ The Hebrew University, The Graduate Institute, and CEPR.

We thank participants at the 7th CEPR annual economic history workshop, Tarragona, for their helpful comments.

Introduction

On Sunday, September 2, 1666, a fire broke out in the City of London. The fire burned for four days and consumed a large part of the City including the main public buildings, wharves, 87 parish churches, and St. Paul's cathedral. According to contemporaneous accounts, including those of Samuel Pepys, more than 13,000 houses were burnt and some 70,000 people displaced (Pepys, 1666). The Crown and City jointly appointed Commissioners to oversee the rebuilding process, each nominating three of the six men who oversaw the legal and administrative process. Parliament passed two acts, an Act establishing the Fire Court in 1666 and one setting new building regulations in February 1667 to aid the City.

Most historians see the aftermath of the Fire as exceptionally well-governed. Although many lament that officials squandered an opportunity to design a new architectural legacy, envisioning a nineteenth-century city with wide boulevards, this was largely because existing property rights were respected and effectively enforced. The Fire Courts were effective, and private property owners had mostly completed the task of rebuilding according to new stricter regulations within agreed boundaries by the mid-1670s. However, the City did take up the opportunity to improve many aspects of public buildings and infrastructure. Most notably they widened streets, secured and wharfed the notorious Fleet ditch, and the legal quays. In the immediate aftermath, they rebuilt Guildhall, Bridewell, Newgate and the Sessions House. In the longer run, after 1675 particularly, however, the Fire proved the stimulus to improve public areas and churches in the City that had long needed investment. The Churches and St Paul's had been underinvested in throughout the Tudor and early Stuart period. The City and the Commissioners decided to heavily invest in new Churches and a new Cathedral to a much higher specification and ambition than what they replaced. This required investment on a new scale.

In this paper, we demonstrate how the London Corporation managed to finance this extraordinary building project. Using a variety of archival sources of the London Corporation were able to reconstruct the building expenditures. We show how the Corporation financed them by taxes and borrowing. We document, for the first time, the deficit in the main source of finance (coal cash) that the City relied upon— the initial inadequacy of the taxes collected and the initial overrun in expenditure that necessitated borrowing on a large scale. We detail the cost of borrowing, debt service, debt repayments, and the subsequent mounting debt.

The nature of investment in infrastructure projects is that they require large amounts of capital upfront. The returns from such project accrue over long periods of time and therefore they require access to financial markets, or deep-pocketed investors, to finance them. This problem of finance was deemed overcome by Parliament when they granted the City further income from the tax levied on sea-coal landed at the Customs House.

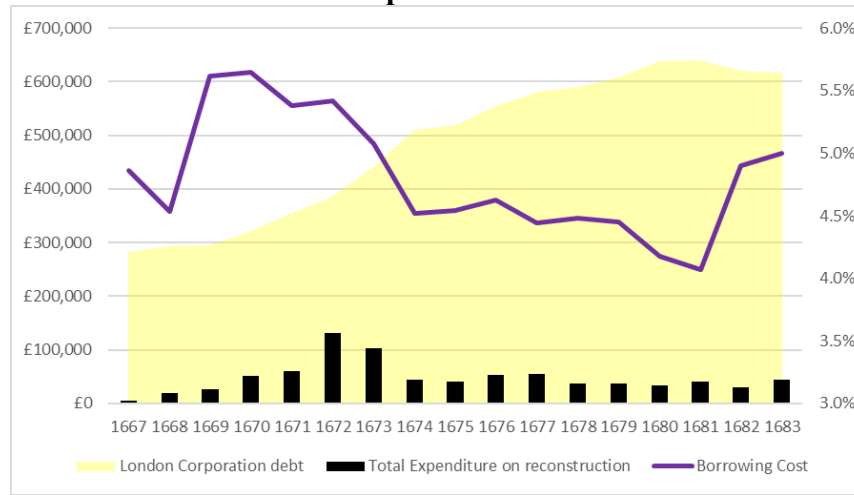
The proceeds from the Coal tax were to accrue over time and involved some uncertainty regarding their intake. However, initial costs, to survey the City and make good physical infrastructure such as London bridge and the Wharves were high, so capital had to be raised in advance of the tax receipts. Unlike in the 19th century, with the advent of the stock exchange and banks, the City government could not turn to the stock market or banks in order to borrow. The amounts needed were probably also beyond the ‘goldsmith bankers’ as well, and most probably they found it more lucrative to lend to the crown at much higher rates. The latter had to rebuild their establishments that were consumed by the fire and lent to individuals who had to rebuild their houses. Moreover, the Goldsmith Bankers lent to the Crown to finance the failed Anglo-Dutch Wars and faced the crown’s default in the 1672’s Stop of the Exchequer (Horsefield, 1982). The London Corporation could not turn to the livery companies (guilds) for cash either, as all of them had to rebuild their own burnt down guild halls and businesses.¹

The London Corporation instead turned to borrow directly. Fortunately, it had established itself as *a* major financial institution in England during the 17th century (Harding, 2003). It borrowed and lent to the Crown and the East India company. It operated an ‘orphans’ fund’ in which individuals invested money with the Corporation for the benefit of their future orphans. Unlike the Stuart monarchs who defaulted on their debts, the London Corporation earned a solid reputation as a borrower over the century preceding the fire. It, therefore, managed to borrow, over a short period, at a relatively low cost, the capital necessary for the rebuilding and subsequent improvement project².

¹ For example, the Brewer’s livery accounts detail these expenditures.

² The early Stuarts’ defaults were not an outright debt repudiation, but delayed interest payments and delayed payments of interest. In the defaults of 1616 and 1625, the debt was settled by transferring land to the lenders (Ashton, 1960).

Figure 1
Borrowing cost, total debt outstanding and rebuilding costs
London Corporation: 1667-1683



Note: Years are fiscal years (Michaelmas to Michaelmas).

Sources: for coal cash COL/CHD/DM/001-3. For London Corporation: COL/CHD/CT/013-019 and COL/CHD/CM/10-004 for 1667.

The expenditure on rebuilding works started slowly in 1667 and peaked at more than £100,000 in 1672 and 1673. The rising expenditures were correlated with a steep rise in the indebtedness of the London Corporation (**Figure 1**). Borrowing costs on the unsecured debt of the London Corporation initially increased by 100 basis points from 5 percent to 6 percent and then started to decline to their lowest level ever. Surprisingly, the peak of the reconstruction spending and borrowing occurred during the Third Anglo-Dutch War and during the default of crown (the Stop of the Exchequer, 1672). Thus, unlike the conventional wisdom that sovereign debt is the benchmark for borrowing costs, during this episode the London Corporation borrowed at a discount of between 200 and 400 basis points below the king (Nichols, 1971). This fact alone demonstrates that a liquid financial market existed before the Glorious Revolution. This market was able to finance a major reconstruction during wartime and the government’s default without a significant increase in the cost of capital (elastic supply of credit). As will be shown below, we find no evidence of credit rationing.³

The London Corporation successfully financed the initial rebuilding works necessitated by the Fire. The rebuilt city had a new infrastructure that made it modern and healthier (Reddaway, 1951). However, as the 1680s wore on the London Corporation became insolvent as its revenues were

³³ For detail see Sussman (2019)

insufficient to service its debts. With tax revenues running short of the costs and having no other new sources of revenue, mounting financial costs eventually drove the London Corporation into default. We document the financial maneuvering of the Corporation that allowed it to defer default for a few years, but these maneuvers lead it to insolvency on a grand scale. The default included the debt issued by the Corporation but mostly the Orphans' Fund which was not secured either. The debt at default in 1683 reached almost 600,000 Pounds, of which 500,000 belonged to the Orphan's fund. The resolution of the default did not occur until the early 18th century and investors had to take a haircut on the accrued interest.

The City's experience and financial trajectory imply some new lessons for those interested in British institutional and financial history. First, private and semi-public debt financial markets were deep enough and liquid enough to fund and carry out this huge reconstruction project, well before the Glorious Revolution. The London Corporation's ability to borrow was based on the market-based reputation that it earned over time. However, despite the existence of deep and liquid markets, the markets lacked long-term debt instruments that are better suited for funding large infrastructure projects (Coffman 2013). Therefore, the London Corporation based most of its borrowing on short-term obligations (Harding, 2003). Though, as we show below, in practice, the maturity of these loans was quite long, the London Corporation nevertheless faced the common problem of maturity mismatch. This constraint could be partly responsible for its default in 1683.⁴

The second lesson we draw from this episode is that the inability to levy taxes independently of Crown and Parliament placed a limit on its financial credibility. It is interesting to note that investors did not apprehend the coming default. Their behavior right up to the default looked, in hindsight, just as in a financial bubble. Was it due to the lack of transparency of the Corporation's accounts, or was it the belief that the government would bail out the Corporation (Doolittle, 1983 and Harding, 2003)? Owing to mounting political tensions between the Whiggish London Corporation leadership and the Crown (Unwin, 1908), the willingness of the State, in 1683 to bailout the Corporation was limited. The King could have assigned additional taxed to be farmed by the city. Instead, the king's response to the City's role in the Exclusion Crisis made the situation

⁴ One of the problems with short term debt highlighted by Coffman (2013) is that interest rates were compounded into the principal of the loan. Causing, therefore, the debt to explode. This, however was not the case for the financial instruments used by the London Corporation to fund the rebuilding projects.

worse, perhaps precipitating default, by revoking the Corporation's privileges in 1683 with the Quo Warranto Act⁵.

The rest of the paper is structured as follows: We begin with a short review of the relevant literature. In Section 2, we provide a brief overview of the Corporation of London and its finance. In Section 3, we describe the rebuilding project, and in Section 4, we provide estimates on its cost. In section 5, we analyze the financing of the rebuilding projects. In section 6, we detail the mounting debt related to the financing of the rebuilding project. Section 7 concludes.

1. Related literature

The London Fire and subsequent reconstruction are not extensively studied by economic historians. The highly cited paper by Reddaway (1951), as many other accounts focus on the non-economic issues and mention the financing issues in passing. The account by Harding (2003) explores the financial situation of the London Corporation with the crown and the resulting default on the orphan's fund but does not produce any quantitative evidence, nor discuss the role that financing the rebuilding of London had on the default. The most recent publication on the topic by Field (2017) examines the private order problem of rehousing. The history of the Orphan's fund, which was the main casualty of the default, was described in detail by Carlton (1974), but without relating it to the financial insolvency of the Corporation. Doolittle (1983) studied the resolution of the Orphan's default but did not relate it to the financial difficulties created by the fire. There are some studies of the finances of the London corporation for earlier episodes. In 1929 Richards (2012) already noted the special role of the London Corporation as a government banker. Wareham (2011) discusses the period before the fire and the levying of the hearth tax on the city. Coates (2017) recently studied the period of financial difficulties of the Corporation in the turbulent years of the Civil War.

Our paper relates to the literature on credible commitment (North & Weingast, 1989) and the debate around the role of institutions in affecting financial development (Sussman & Yafeh, 2006), (Sussman & Yafeh, 2000) and the edited volume on questioning credible commitment (Coffman, et al., 2013). It also relates to the role of fiscal centralization, or its lack (Dincecco (2009),

⁵ See Allen (1972); Knights (1997); and Levin (1969).

(Dincecco, 2011)). Finally, it relates to the literature on the political economy and consequences to economic growth in states versus city oligarchies (Stasavage, 2011).

2. The London Corporation and its financial resources

The Corporation of London was a chartered corporation that originated in the 12th century. Its governance structure included the Lord Mayor, the Court of Aldermen (executive branch), and the Court of Common Council (a deliberative institution).⁶ In the 17th century, it enjoyed autonomy and was essentially an oligarchy of wealthy merchants with mainly Whiggish inclinations.⁷ The accounts, we studied, reveal that the Corporation of London's financial activities intensified during the 17th century. Ashton (1960) studied its financial importance before the Civil War. Their similar role after the Restoration was recognized by Richards (1929) who characterized its role as a financial intermediary to the crown (similar to the goldsmith-bankers, but on a larger scale). According to these accounts, the Corporation of London was providing the exchequer with short term funds.⁸ It also administered an orphans' fund that acted as a savings (insurance) for (potential) orphans.⁹ Therefore, the Corporation was borrowing on a longer-term basis and lending on a short term basis to the government. It profited from the wide spread between its borrowing rates 4-5% and its lending rates 8-10%.

The Corporation of London's financial activities were similar to those of their counterparts on the continent, especially in the Low-Countries. However, historians and economic historians hardly researched its financial activities.¹⁰ Munro (2003) and Carlos and Neal (2011), therefore, arrived at their conclusion on the unique history of financial development in London based on incomplete data. London is, therefore, also missing from the comprehensive analysis by Stasavage (2011) who studied in detail the debt of autonomous cities in Europe.¹¹

⁶ See City of London fact sheet:

<https://web.archive.org/web/20130815012629/http://www.cityoflondon.gov.uk/about-the-city/history-and-heritage/mansion-house/Pages/History-of-the-Government-of-the-City-of-London.aspx>

⁷ See Unwin (1908) and Roseveare (1991).

⁸ See also (Harding, 2003).

⁹ In particular, see Richards (1929) pp. 107-109. On the Orphans fund, see Carlton (1974). See also

¹⁰ Notable exceptions are (Harding, 2003); (Kellett, 1958), (Wren, 1948); (Wren, 1949);

¹¹ See Table 2.1 p. 31. One can argue that London was 'autonomous' but not a 'city-state' and therefore, does not qualify to be included in the analysis.

3. A city to rebuild

Strype's Survey of London (<https://www.dhi.ac.uk/strype/>) is the usual source for the extent of damage done in the Fire and for subsequent rebuilding up to 1720. With up to 13,000 houses to rebuild, if, before the Fire, much London housing had been timber alone, afterward most was internally constructed of timber with external walls of brick.¹² In the wider built environment, the improvements were the widening and regulating of streets and thoroughfares, the wharfing of the north bank of the Thames, the reconstruction of the Fleet ditch towards Farringdon, the construction of the new Churches and the new Cathedral. Brett-James (1935) reckoned that approximately 35,000 new houses were erected in London in the 40 years to 1708, bringing the total to between 67,000 and 78,000, and the total buildings to over 100,000.¹³ Field (2017) shows that the rebuilding was often financed by a reduction in rents for leaseholders who could afford to build, and although it was swift, it displaced many members of the community. Wealthier residents were more likely to return to the City, while poorer households were more likely to stay away.¹⁴

In terms of architecture and investment, the wider context was set with the re-establishment of the Office of the King's Works at the Restoration. The new organization was set up in a manner echoing Inigo Jones's organization of the same before 1642 - a strong signal of continued interest in building investment, and between 1670 and 1686 expenditure at the His Majesty's Office of King's Works - beyond the City - increased from £20,000 per annum to £45,000 per annum.¹⁵ The scope of Crown enterprise extended beyond new palaces to institutional spaces and public facilities, such as the Hospitals of Greenwich and Chelsea. Likewise, although with perhaps more limited financial resource, the City of London acknowledged the need for the improvement of public buildings. Many of the guilds had spent heavily on new buildings and halls in the first half of the century. Parliament's assignation of a portion of the coal tax to cover some of the costs of

¹² Summerson (1978), pp. 65–6.

¹³ Brett-James (1935), p. 509.

¹⁴ Field (2017), Chap. 3.

¹⁵ *Ibid.*, pp. 40–42.

rebuilding the City Churches is a manifestation of the importance attached to investment in public buildings.

Nevertheless, the actual projects and project costs that the city undertook in the years immediately after the fire were more limited than the initial survey or list of damage might imply. The City spent resources appointing surveyors – including Robert Hooke - to restate or enforce property boundaries. The Fire Court was immediately busy adjudicating plans for rebuilding, but the predominant volume of building was undertaken by the property owners themselves.

4. The cost of reconstruction

Proportionally then, what part of the rebuilding did the City have to pay for? Since the City's accounts of the rebuilding are not entirely complete, this is hard to estimate. The implications of the figures that Reddaway gives, that the fire caused £10m of damage, replaced within a decade, involving an expenditure of at least £1,040,000 per annum from 1667 to 1677. This estimate – based on Strype - of rebuilding costs - with the 13,200 houses representing £3.9 m, the public edifices £939,000, and St Paul's £2m, imply that the public works, (the Cathedral, and Churches, etc.) represent three-sevenths or somewhere in the region of 40% of the costs.

In fact, the public edifices seem to have cost far less, as certainly did St Paul's. The rebuilding of the Livery Companies' halls was undertaken by the Companies. Repairs at London Bridge were undertaken and paid for by the Bridge House Estates. Given this, it might seem that the City had to pay for or administrate less than a third of rebuilding costs. What the Strype estimate does not consider, however, is the *improvement* work, rather than replacement, that the city carried out especially along the quays and waterline. The bulk of that was expended in the period 1667 – 1774.

In the first years after the Fire, the City rebuilt Guildhall and Chapel, Bridewell prison and two compters, Newgate, Billingsgate Dock (quays) and Fleet Bridge by 1673 at a total cost of £71,600.¹⁶ There were substantial further investments, such as Wren's fine new Customs House which cost more than £10,000 in 1668-9.¹⁷ However, much of the administrative, surveying, land purchase and planning work and costs were related to the large improvement project along the

¹⁶ COL/SJ/03/21

¹⁷ 'Custom House Quay and the Old Custom House', in Survey of London: Volume 15, pp.35-40.

Waterline, planned as a “Key or Public and Open Wharfe” to run from Temple to London Bridge incorporating the Fleet Ditch, and quays at Queenhithe and St Benet’s.¹⁸ The 1667 ‘Act for the rebuilding’ states that no building was to take place within 40 feet of the River from Temple to the Tower, nor within 40 feet of the Fleet. These lands were to be purchased by the city and subsequently the wharfing of the Fleet ditch alone, where the work was led by Thomas Fitch in 1671–1674, cost £51,360, exclusive of work on newly purchased Quays on the north side of the river.¹⁹

Additional work was carried out by John Fitch and Thomas Cartwright on the Holborn Bridge and rest of the Fleet River. The City purchased lands to enable the widening of streets from Holborn to Newgate, around the Old Bailey and Smithfield, and at Pudding Lane and the area that was given over to the new Monument. Knoop and Jones (1935) estimated the value of mason’s contracts alone on ‘municipal’ projects to have been £24,482.²⁰

The part of public investment in reconstruction after the Fire that we have the most evidence of is the replacement of destroyed churches. Of the fifty-one new City Churches needed, forty-two were completed well before 1690. Each City Church was contracted separately. The Wren Society put the total costs at £263,786, 10s 4.5d. spent between 1670 and 1694, but accounts for five churches were missing. If we assume they were built at the average cost of £5,367, this implies the total price of the rebuilding program was £290,622; however, most of this was expended after 1682.²¹ The final total may even have been higher. Peter Jeffrey (1996), who examined individual parish records, puts the total costs at £362,793 paid out by the coal tax. The difference may be accounted for by interior decoration costs.²² The expenditure before finance costs on St Paul’s Cathedral alone was £804,758, again most of the expenditure was undertaken after 1680.

Any rebuilding expenditure deflated by GDP for the whole country will hugely underestimate the city’s economic burden. The most recent estimates of output for England in this period come from Broadberry et al. They estimate that total annual GDP in England in the 1660s was £42.59 million,

¹⁸ Perks (1927), pp.50-55.

¹⁹ Skempton (2002), pp. 228–9.

²⁰ Knoop and Jones (1935), p. 6.

²¹ The Wren Society, Volume X, pp. 45-53.

²² Jeffrey (1996), p. 356.

rising to more than £52 m in the 1670s. These figures suggest that the total expenditure on private buildings - £3.9 million - were equivalent to about 7.5% of GDP in the 1670s. If we take the figure £1,040,000 per annum (Reddaway, 1951), the expenditures amounted to an annual rate of 2-2.5% of England's GDP. Working out what proportion of those costs were borne by the City is much harder, moreover, as the coal tax accrued to the City over the long run, through the eighteenth century. Using the London Corporation accounts (*Table 1*), the rebuilding costs paid by the Corporation from 1667 to 1687 amounted to about 1.5% of England's GDP.

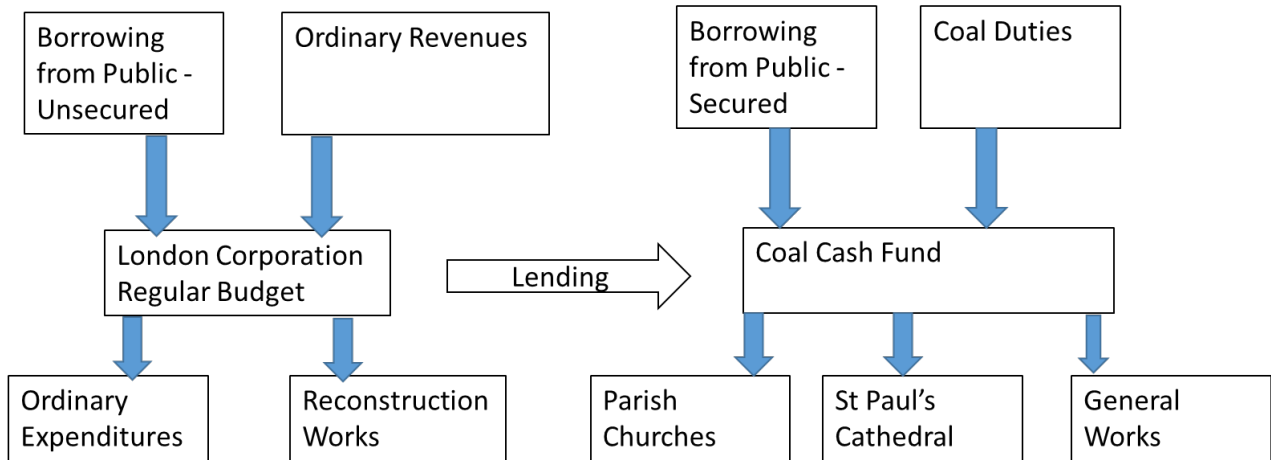
Scaling these estimates to the City's GDP involves making some assumptions. The population of the City numbered about 100,000 inhabitants – 2% of England's population. Crafts (2005) estimated that London's GDP per capita in 1871 was 40% higher than the rest of Britain. Assuming that in 1670 it was even double that of the rest of the country, then we should multiply our burden estimates by a 25 to arrive at the burden of the City. The private expenditure of about £4 million probably represented at least 190% of the City's GDP, and the public costs about 40% of the City's GDP.

The cost of public rebuilding relative to the London Corporation's annual revenues was massive. The annual average revenue was about £16,500, and the reconstruction costs (excluding finance charges) were about £780,000 (*Table 1*). The total revenue of the London Corporation over these twenty years was £330,000. Public rebuilding expenditure by the London Corporation amounted to about 230% of its revenues. These figures suggest that rebuilding London required exceptional funding. As we show in the following section, it was provided by a mix of taxation and borrowing.

5. The financing of reconstruction after the fire

The archival data detail the actual expenditures rather than the initial budget. As explained earlier, most of the reconstruction was to be paid for by the coal tax revenues allocated by Parliament to the London Corporation. The Coal Cash Fund operated as a separate legal and accounting identity under the London Corporation and was managed by the chamberlain of the London Corporation. Figure 2 shows a schematic overview of the relationship between the regular finances of the London Corporation and that of the Coal Cash Fund.

Figure 2
A schematic view of financing the rebuilding of London after the fire of 1666



The detailed accounts show that the rebuilding started in 1667 and the work gathered momentum and reached its peak during 1671 and 1672. Some rebuilding projects, most notably and most costly - St Paul’s cathedral, continued into the first decade of the 18th century and are beyond the scope of this paper. The cost of reconstruction work, including finance charges, from 1667 to 1687 totaled close to a Million Pounds (Table 1). The share paid by the Coal duties was about 77%, and debt was raised to finance the remainder. Table 1 details the breakdown of the reconstruction budget between the various projects. We note that the London Corporation financed directly about 14% of the reconstruction project and also lent to the Coal Cash Fund. We can also see that finance charges were substantial and amounted to almost 20% of the cost of the project. In the next section, we focus on the financial accounts of the reconstruction.

5.1. The Coal Tax

The magnitude of the loss due to the fire of 1666 necessitated the immediate launching of reconstruction at a large scale. The English Parliament realized the need to finance this reconstruction effort and passed a Rebuilding Act in 1667 that allocated a duty of 1 shilling per ton of coal brought into the city to finance the reconstruction of the City of London. In 1670 another act was passed that allocated an additional duty of 2 shillings to the reconstruction. The additional tax was allocated as follows: 25% (6 pennies) to City reconstruction, 56% (13.5 pennies)

to rebuild parochial churches and 19% (4.5 pennies) for the rebuilding of St. Paul’s cathedral. In 1677 when the first and second Acts lapsed a tax of 3 shillings was voted and continued until 1687, the eve of the Glorious Revolution. The tax allocation between the project remained the same with the City getting 50% of the proceeds.

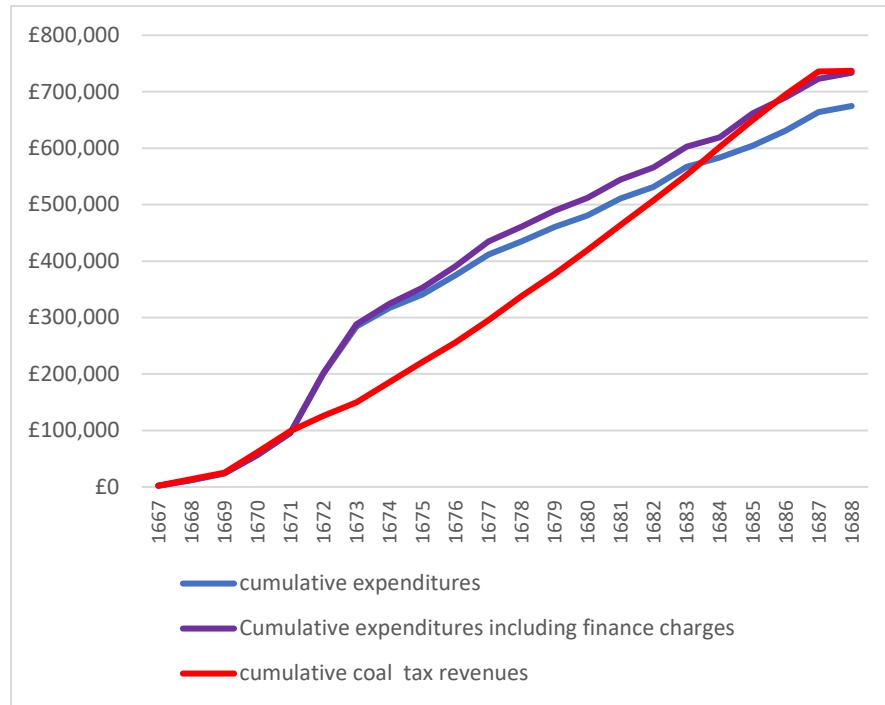
The granting of taxes and the increase in their rate and duration suggest that they lagged behind actual expenditures, as those, probably were initially underestimated. Focusing on the Coal Cash Fund, we can see, in **Figure 3**, that initially expenditures were in line with tax revenues, however by 1672 expenditures outpaced tax revenues. The Corporation borrowed to fill the gap. However, it now had to fund the finance charges out of the coal tax revenues.

Table 1
Summary of reconstruction expenditures form Coal Cash Fund and the London Corporation budget: 1667-1687

Operating Budget Coal Cash Account									London Corp. Account	Total
Project Expense	General		Parochial Churches		St Paul’s Cathedral		Total			
	tax	cost	tax	Cost	tax	Cost	tax income	cost	Cost	Cost
construction	382848	320163	265467	265467	88489	88302	736804	673932	105345	779278
Interest payments to Corporation								26485		26485
Interest payments to public								33102	119642	152744
Cash		3098				187		3285		3285
Total							736804	736804	224987	961792
Financial account										
							Borrowed	Repaid	Borrowed	Borrowed
Borrow from public							102465	102465	224987	327453
Borrow from Corporation							99780	99780		
Debt to public									224987	224987

Sources: for coal cash COL/CHD/DM/001-3. For London Corporation: COL/CHD/CT/013-019 and COL/CHD/CM/10-004 for 1667.

Figure 3
The cumulative expenditure on reconstruction and coal duties income
Coal Cash Fund: 1667-1688



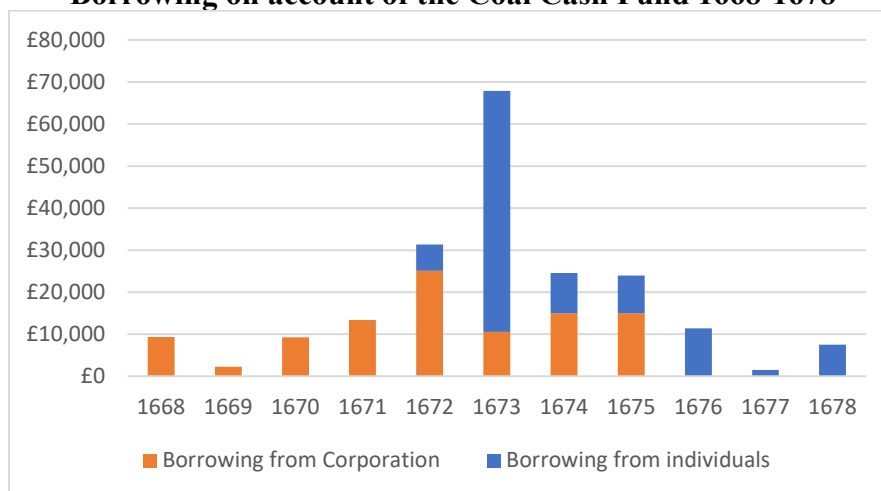
Note: Years are fiscal years (Michaelmas to Michaelmas).
Sources: COL/CHD/DM/001-3.

5.2. Borrowing

5.2.1. Borrowing secured on coal duties receipts

The extension of the coal tax acts and the increase in the tax rate in 1670 suggest that the magnitude of expenditures exceeded expectations. However, the cash flow from the taxes was slower than expenditures (Figure 3). The manager of the Coal Cash, the Chamberlain of the Corporation, had to resort to borrowing. Another indication that the cash flow problem was not foreseen was the initial borrowing from the London Corporation that could readily supply the Fund with cash. Subsequently, the Coal Cash Fund turned to borrow also from individual lenders (Figure 4).

Figure 4
Borrowing on account of the Coal Cash Fund 1668-1678



Note: Years are fiscal years (Michaelmas to Michaelmas).
 Sources: COL/CHD/DM/001-3.

The interest rate that the Coal Tax Fund paid the Corporation was 6%. It secured the debt on future Coal duties receipts.²³ At the time (**Figure 2**) the city was borrowing from individuals at rates below 6% on unsecured debt. The Corporation stood to gain a small profit at the expense of the Coal Duty taxpayers. However, as we can see in Figure 4, the Coal Cash Fund needed to turn to individual lenders,⁽²⁰¹³⁾ and as we shall see below, it defaulted on its interest payments to the Corporation.

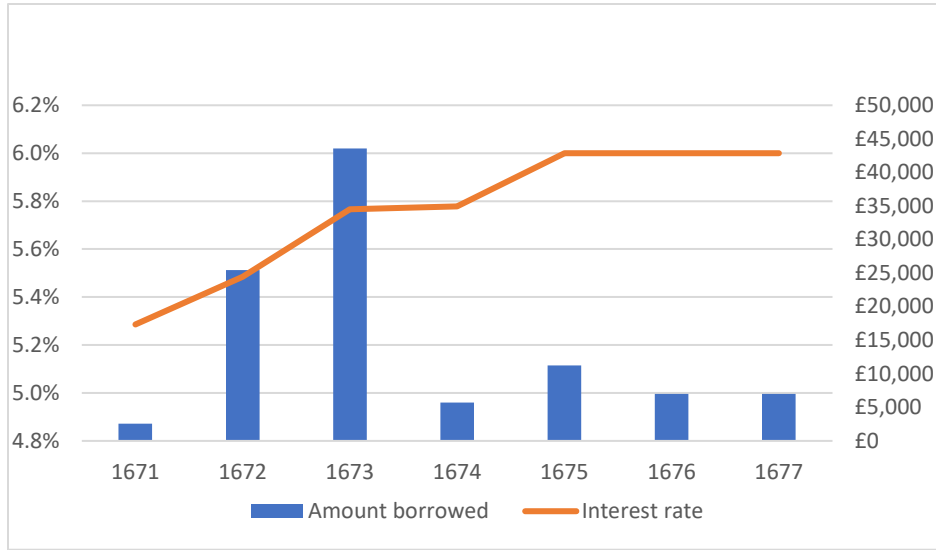
As expenditures mounted in 1672 and 1673, the Coal Cash Fund started to borrow from individuals. The interest rate paid to individuals on most of the loans (75%) was lower than 6% - the rate paid to the Corporation (Figure 5). The Coal Cash Fund was able to raise most of this debt from individuals during the Crown's financial crisis known as the Stop of the Exchequer (1672).²⁴ The default of the crown affected the goldsmith bankers who lent to it, and it is quite plausible that individuals found lending to the Coal Cash Fund a less risky substitute. The increasing supply of savings directed to a safer financial asset probably accounts for the relatively low rates of borrowing by the Coal Cash Fund during a financial crisis.²⁵

²³ Murphy (2013) claim that borrowing secured on earmarked tax revenue by the eschquer began with Downing after the redstoration. See Coffman (2013) for a diseenting view that claim the practice was already prevalent during the Long Parliament.

²⁴ See Li (2019) for a recent account of this financial crisis.

²⁵ The hypothesis that private lending was a substitute to lending to the government was made by (Quinn, 2001)) in the context of the effect of the Glorious Revolution on private lending.

Figure 5
Coal Cash Fund borrowing from individuals: 1671-1677



Notes: Years are calendar years.
 Interest rate is weighted by loan size.
 Sources: COL/CHD/DM/001.

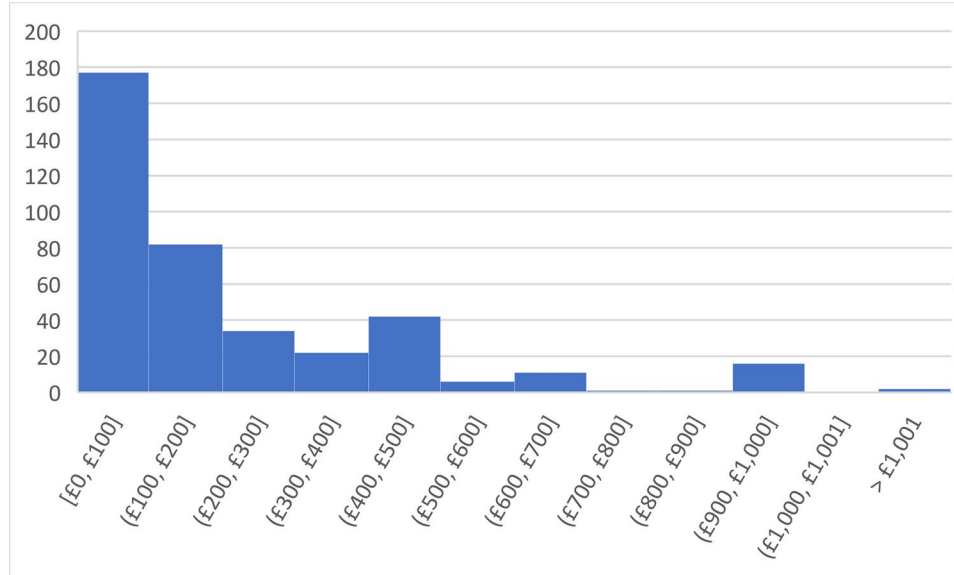
The number of loans contracted by the Coal Cash Fund was almost 400 from about 300 lenders (Table 2). The average loan size was £261, and the median loan was £150. To put these numbers in perspective, according to the Gregory King’s social tables from 1688 (Arkeil, 2006) the average annual income of a gentleman was £280, that of a family of ‘eminent merchants’ was £400 and that of a shopkeeper and tradesman was £45. These estimates suggest that the lenders belonged to the top decile of the English income distribution. We show the distribution of loans by size in Figure 6.

Table 2
Summary statistics of money lent by individuals to the Coal Cash Fund (1671-1677)

Loans	N	Average	Median	Min	Max
Duration (Years)	393	5.0	5.1	0.01	12.15
Loan size (£)	393	261	150	20	3,000
Interest rate	393	5.7%	6%	5%	6%
Lenders	303				

Sources: COL/CHD/DM/001-3.

Figure 6
The distribution of loans to the Cash Coal Fund: 1671-1677



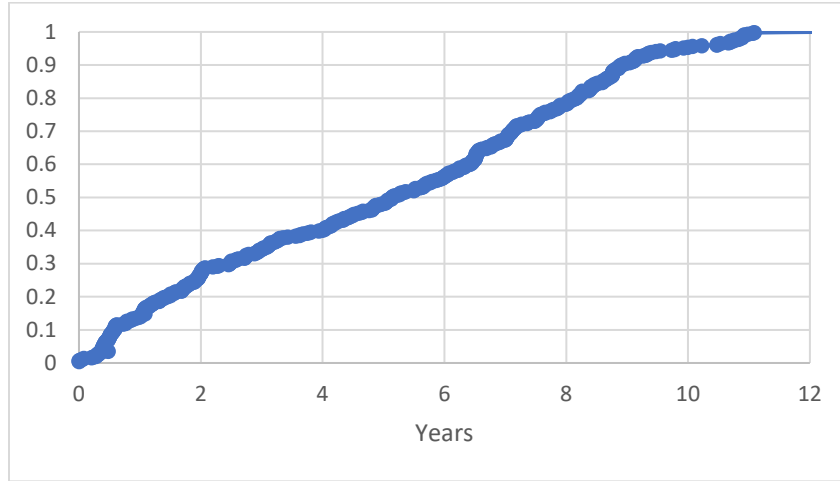
Sources: COL/CHD/DM/001-3.

The loans recorded in the Coal Cash Fund did not have any covenants other than the interest rate they offered and the fact that they were guaranteed by the Coal Imposts. In particular, the accounts do not record the duration of the loans. From the records of their repayment, we can see that the average duration of lending was five years. Interest to individual lenders was paid annually. The cumulative distribution function (Figure 7) of the holding periods of the loans is uniform over the range from 3 months to 12 Years.²⁶ The distribution of withdrawals suggests that they occurred randomly throughout the period. We can conclude that there was no specific event that triggered withdrawals. In particular, the default of the London Corporation on its unsecured debt in 1683 did not create a run on the Coal Cash Fund.

²⁶ The Kolmogorov-Smirnov test cannot reject a uniform distribution (p value of 0.997).

Figure 7

The cumulative distribution function of the duration of loans to the Coal Fund: 1671-1687



Sources: COL/CHD/DM/001-3

Most of the borrowing was from people living in the City, only 15% of lenders lived outside the City, and they provided about 18% of the funds. The lenders to the Coal Cash were drawn mainly from the upper classes – the gentry as well as widows and spinsters who for the most part, belonged to these classes too (Figure 8a Figure 8b). Men belonging to the livery companies represented a large share of the number of loans; however, corresponding to their economic standing, the average loan made by them was below the median. The loans made by the aldermen who ran the city government were of the highest value. Most notably, the London Corporation chamberlain, Sir Thomas Player lent 1600£.

Table 3
Coal Cash Fund borrowing from the City and non-City: 1671-1677

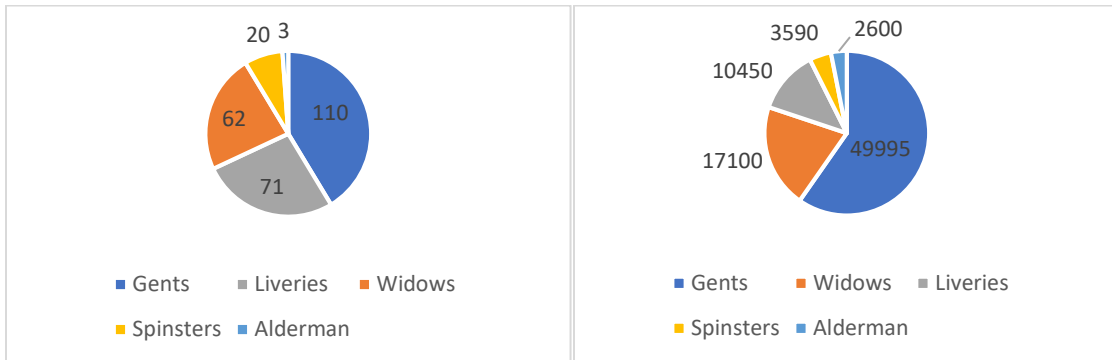
	Number of Loans	Amount loaned
outside City	15%	18%
City	85%	82%

Sources: COL/CHD/DM/001-3

Figure 8a

Figure 8b

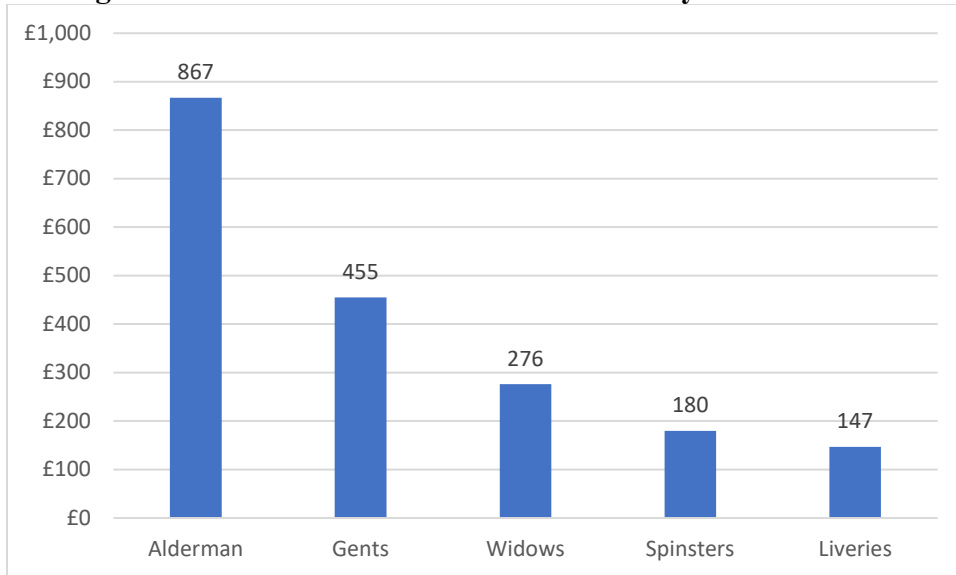
Distribution of the number of loans by status Distribution of amounts lent by status



Sources: COL/CHD/DM/001-3

Figure 9

The average amount of loan to the Coal Cash Fund by the status of the lender



Sources: COL/CHD/DM/001-3

5.2.2. Unsecured borrowing by the London Corporation

The Coal Cash Fund that was managed by the London Corporation as a separate accounting and legal identity (Figure 2). However, the London Corporation took overall responsibility for the public reconstruction projects and financed directly part of the reconstruction projects that were not financed by the Coal Cash Fund and perhaps more importantly lent to the Coal Cash Fund to cover the shortfall between expenditures and tax revenue we saw in Figures 3 and 4. The Coal Cash Fund was created by an act of Parliament that endowed it with an earmarked tax receipts to cover its activities and guarantee its borrowing. However, the London Corporation financed the

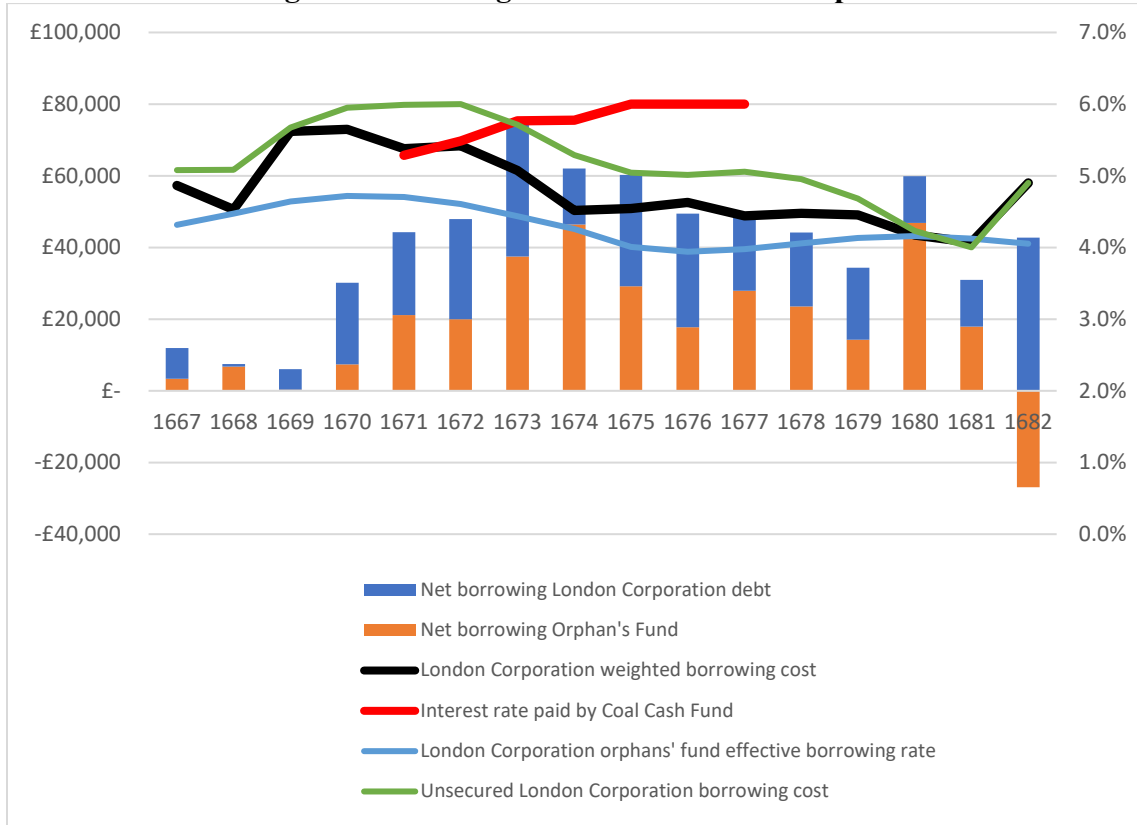
additional costs related to the reconstruction and the lending to the Coal Cash Fund from its traditional resources – unsecured borrowing from individuals and deposits made by individuals to the Orphan Fund.

The debate about the costs of borrowing of sovereigns sparked by North and Weingast (1989) and the literature on sovereign borrowing by emerging markets discusses the role of commitment, reputation and fiscal capacity on the cost of borrowing by governments.²⁷ The financing of the reconstruction after the London fire of 1666 can shed additional light on this debate because we can compare the cost of two types of borrowing: one is secured by a tax approved by Parliament and the other based on the reputation of the London Corporation. The data show (Figure 10) that the London Corporation's reputation allowed it to borrow at a lower cost than the Coal Cash Fund, which relied on an Act of Parliament to secure its debt.

Upon closer inspection, we can see that until 1673 this was mainly driven by the lower borrowing cost of the longer maturity deposits in the Orphan's fund that were different from the standard borrowing by the corporation. In fact, until 1673, the secured debt commanded a small premium over the comparable unsecured debt. From 1673 onwards the unsecured debt commanded a premium over the secured one. As the reconstruction project advanced, it became clear that expenditures overran the tax receipts that were guaranteed only until 1677. Growing tensions between the London Corporation leaders and the King (e.g., Unwin, (1908),(Harding, 2003)) possibly created some uncertainty over the willingness of Parliament to renew the Coal duties. This uncertainty made this commitment less credible than the reputation of the London Corporation.

²⁷ Some of the more influential studies on this topic are: (Flandreau & Flores, 2009), (Grossman & Van Huyck, 1985), (Mitchener & Weidenmier, 2010), (O'brien, 1988), (Panizza, Sturzenegger, & Zettelmeyer, 2009), (Stasavage, 2011).

Figure 10
Borrowing and borrowing cost of the London Corporation: 1667-1682



Notes: Interest rates and borrowing are based on calendar years.

Interest rates on loans are weighted by loan amounts.

The Orphans Fund borrowing rate is based on a 3 year centered moving average of service charges paid out by the Fund divided by the debt outstanding.

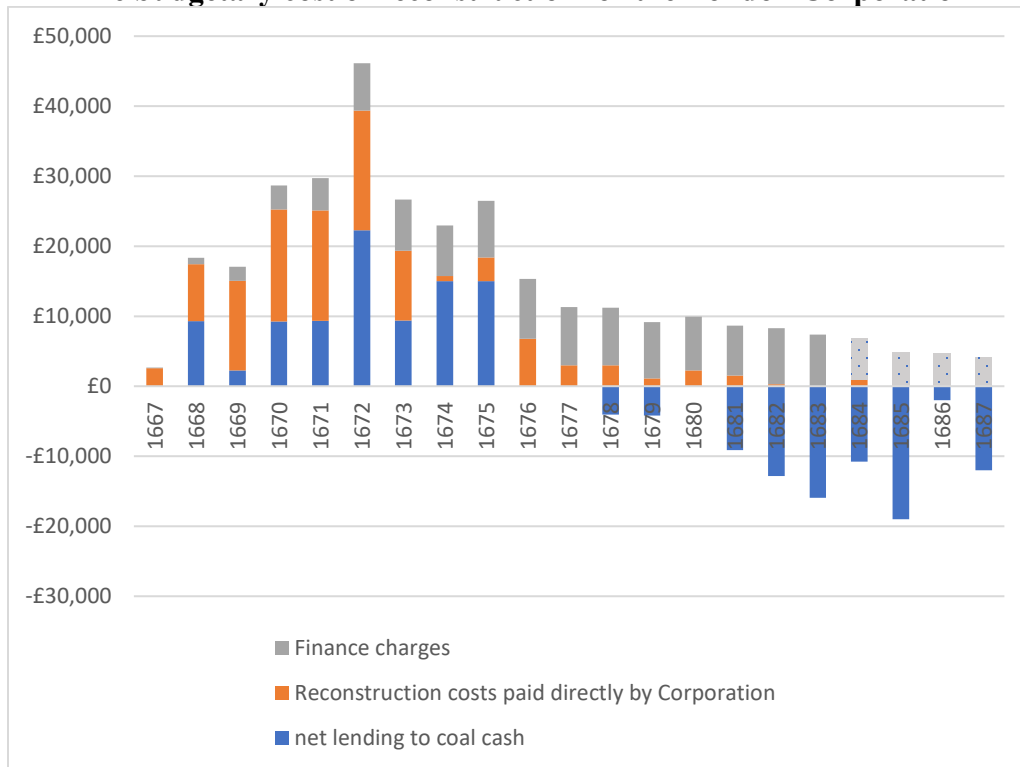
Sources: for coal cash COL/CHD/DM/001, For London Corporation: COL/CHD/CT/013-019 and COL/CHD/CM/10-004 for 1667.

6. The burden of financing reconstruction and the default of the London Corporation

The reconstruction of London after the fire of 1666 placed a heavy burden on the London Corporation's budget. We argue below that this led to the default of London Corporation in 1683. The corporation funded on its own a number of the immediate rebuilding projects before 1672 that were not financed by the Coal Cash Fund. Moreover, as we saw above (Figure 4), the initial gap between coal tax receipts and spending by the Coal Cash Fund was met by borrowing from the Corporation. Thus, the budgetary burden of the London Corporation consisted of its direct expenditures, lending to the Coal Cash Fund and finance charges on the borrowing from the public needed to cover these expenditures. The pressure on the budget peaked in 1672 and lasted until

1681 when Coal Tax revenues were used to start repaying the debt of the Coal Cash Fund to the London Corporation (Figure 11). Owing to its cash flow problems, discussed above, the Coal Cash Fund withheld interest payment to the London Corporation from 1679 to 1684.

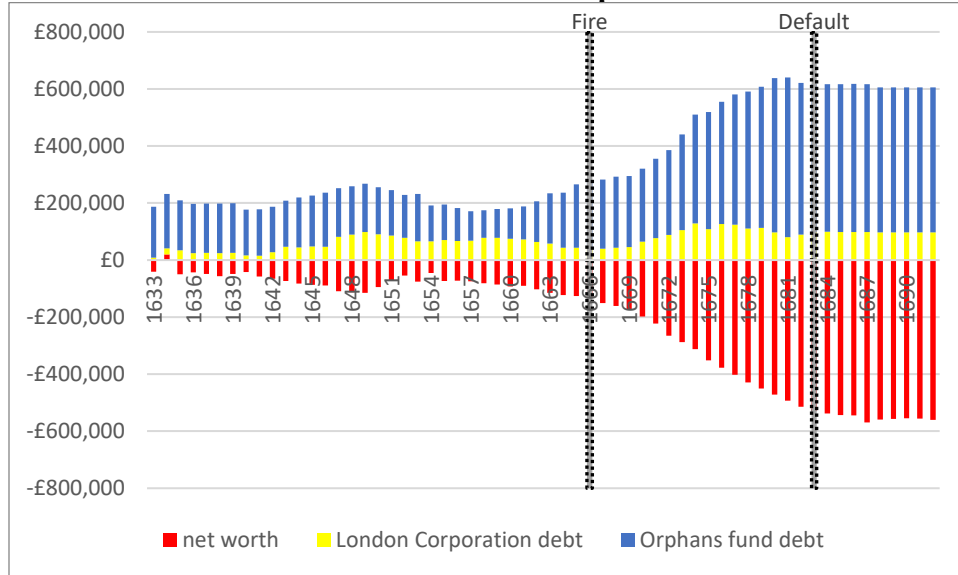
Figure 11
The budgetary cost of reconstruction for the London Corporation



Notes: Finance charges attributed to reconstruction are calculated as the interest cost weighted by source of borrowing (see Figure 10) times the debt accumulated as a result of net lending to Coal Cash Fund and spending on reconstruction. Finance charges after 1683 are shaded because the London Corporation suspended interest payments on its debt. Sources: COL/CHD/CT/013-019 and COL/CHD/CM/10-004 for 1667.

The outcome of the persistent deficits of the London Corporation caused by the expenditures related to the reconstruction of the City was a swelling debt, largely owed to the depositors in the Orphan’s fund (Figure 12). Because the debt service charge of the Orphan’s Fund was lower (Figure 10), the London Corporation preferred borrowing on that account. Arguably these debts levels could have been sustainable, an inspection of two financial distress measures clearly shows that default was imminent.

Figure 12
The debt burden of the London Corporation: 1633-1692



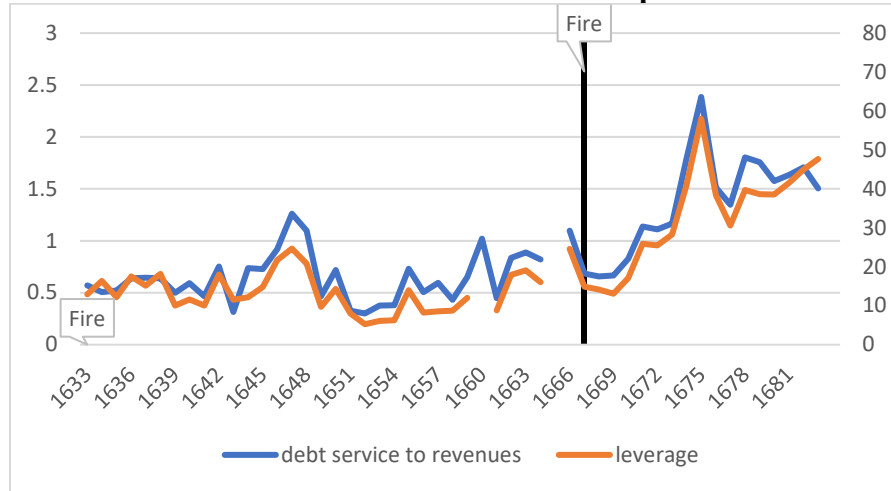
Notes: Years are fiscal years (Michaelmas to Michaelmas).

Net worth is financial net worth (financial assets minus financial liabilities) reported in the London Corporations accounts.

Sources: COL/CHD/CT/01-019 and COL/CHD/CM/10-004 for 1667.

Compared to its historical experience, the London Corporation found itself in a precarious financial situation by 1672 (Figure 13). From 1672 onward the debt service to revenues ratio exceeded 1 and exhibited an increasing trend. Once this ratio established itself above 1, the London Corporation found itself in an unsustainable position where, even if it had cut its expenditures to zero, it would need to borrow to pay off interest charges. Without an increase in revenues, there was no solution to this situation other than default. As we saw above, not only revenues did not increase; the Coal Cash Fund made things worse by withholding interest payments on its debt to the London Corporation. The result was a rise in the leverage ratio to 500% in 1683. At that point, the London Corporation suspended interest payments on its debts.

Figure 13
Financial distress measures of the London Corporation: 1633-1683



Notes: Years are fiscal years (Michaelmas to Michaelmas).

Debt service to revenues is calculated as the annual interest payments on the debt of the London Corporation divided by its annual revenues. Leverage is calculated as the ratio of debt to income.

Sources: COL/CHD/CT/01-019 and COL/CHD/CM/10-004 for 1667.

Conclusions

The Great Fire of 1666 that destroyed substantial parts of the City of London caused the need for private and public spending on a large scale relative to annual income flows. Most of the reconstruction work was completed within ten years. The refurbishing of infrastructure may have come short of 19th-century urban renovation works (e.g., Paris), but it certainly provided the City of London with modern civic infrastructure.

In this paper, we focused on public spending, carried out by the London Corporation. We showed that the London Corporation was able to finance the rebuilding with a mix of taxation and borrowing. A liquid and relatively deep capital market facilitated borrowing by the Corporation, and it paid, historically low, interest rates. While financing the reconstruction proved successful, the financial burden placed on the London Corporation contributed to its default. We leave for

future work the deeper analysis of the dynamics that led to this default. However, it likely that the financial development that followed the Glorious Revolution, especially the widespread adoption of longer-term debt instruments, including annuities, could have facilitated the carrying of this financial burden. Unfortunately, the Corporation found it simpler to finance the rebuilding using its own balance sheet than to rely entirely upon 'project finance,' which is what borrowing explicitly for rebuilding on the back of the coal tax could have represented. Arguably, there were adequate mechanisms available in English law to ring-fence these activities, but there was not, at the time, an appetite to do so.

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