



THE LONDON SCHOOL
OF ECONOMICS AND
POLITICAL SCIENCE ■

Economic History Working Papers

No: 231/2016

Real contracts and mistaken wages: The organisation of work and pay in London building trades, 1650 -1800

Judy Stephenson
London School of Economics

LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE
DEPARTMENT OF ECONOMIC HISTORY
WORKING PAPERS
NO. 231- JANUARY 2016

Real contracts and mistaken wages: The organisation
of work and pay in London building trades, 1650 -1800

Judy Stephenson
London School of Economics
j.z.stephenson@lse.ac.uk

Abstract

Existing series suggest wages in London were substantially higher than in other European cities from 1650 to 1800. This paper presents new evidence from the construction sites that supplied the underlying wage data, and uncovers the contractual and organisational context in which it was recorded. Institutional records of wages were profoundly affected by structural changes in the seventeenth century, particularly the emergence of building contractors. The actual wages paid to London building workers were twenty to thirty per cent below current estimates. Wages in London were lower than Amsterdam, and little higher than elsewhere in North West Europe until 1780.

Keywords: Building wages, Industrial Revolution, High wage economy, Standard of living, Great Britain, 18th Century, London wages, Construction history.

JEL Codes: N00 N33 N63 N83 N93

Acknowledgements: I especially thank Prof. Patrick Wallis for providing the particular brand of academic and moral support required by a new author developing and testing a controversial thesis, and Dr Gerben Bakker for his support and enthusiasm. Professors Jane Humphries and Jeremy Boulton's comments on the thesis and surrounding work have been enormously helpful. I thank members of the department, and particularly Dr Michael Aldous, Tobias Vogelsang, and John Gent for their comments and encouragement. This research was enabled by an EHS PhD bursary in 2013-14, and LSE Studentships in 2013-14 and 2014-12. Any errors, omissions and misjudgements are solely my responsibility.

I

The level and form of early modern wages has long been a controversial topic in Economic History. Most European wage data was collected when historians wanted to know if the industrial revolution improved or damaged the living standards of the working class.¹ But in the last few years wages have been given a critical role in *causing* industrialisation. Allen argues that Britain was a “high wage economy” in the late seventeenth and early eighteenth centuries, which together with cheap energy, created an incentive for labour-saving mechanisation.² Other accounts suggest that high wages created higher human capital and innovation through nutrition, education, and accumulation.³ The high wage argument and evidence has provoked some challenges, but, as Humphries recently noted, no one has challenged the veracity of the sources.⁴

This paper re-examines the core wage series used to establish the ‘high wage’ argument for England: builders’ wages in London. It examines the organisational arrangements under

¹ Original wage data for building craftsmen and others in England 1650 to 1800 was collected by James Edwin Thorold Rogers, *A History of Agriculture and Prices in England: 1259-1793* (Oxford: 1866). ; Elizabeth Gilboy, *Wages in Eighteenth Century England* (Cambridge: Harvard University Press, 1934). A. L. Bowley, *Wages in the United Kingdom in the Nineteenth Century : Notes for the Use of Students of Social and Economic Questions* (Cambridge: University press, 1900), William Henry Beveridge Beveridge, *Prices and Wages in England : From the Twelfth to the Nineteenth Century / Vol.1, Price Tables:Mercantile Era*, 1st ed. (Cass., 1965).For wages and the living standards debate more generally prior to 2001 see C. H. Feinstein, 'Pessimism Perpetuated: Real Wages and the Standard of Living in Britain During and after the Industrial Revolution', *The Journal of Economic History* 58, no. 3 (1998), pp. 625-658.

² For Britain as a high wage economy see Jan L. van Zanden, "Wages and the Standard of Living in Europe, 1500–1800," *European Review of Economic History* 3, no. 02 (1999). S. Broadberry and B. Gupta, "The Early Modern Great Divergence: Wages, Prices and Economic Development in Europe and Asia, 1500-1800," *Economic History Review* 59, no. 1 (2006).,Robert Allen, *The British Industrial Revolution in Global Perspective, New Approaches to Economic and Social History* (Cambridge ; New York: Cambridge University Press, 2009). R. C. Allen, "Why the Industrial Revolution Was British: Commerce, Induced Invention, and the Scientific Revolution," *Economic History Review* 64, no. 2 (2011).

³ Advanced by many authors including Elizabeth Gilboy, "Demand as a Factor in the Industrial Revolution," in *Facts and Factors in Economic History. Articles by Former Students of Edwin Frances Gray* (Cambridge, Mass: Harvard University Press, 1932), Joel Mokyr, *The Enlightened Economy : An Economic History of Britain, 1700-1850, The New Economic History of Britain* (New Haven: Yale University Press, 2009), Morgan Kelly and Cormac Ó Gráda, "Ready for Revolution? The English Economy before 1800," *UCD Centre for Economic Research Working Paper Series; WP14/18* (2014)..

⁴ Jane Humphries, "The Lure of Aggregates and the Pitfalls of the Patriarchal Perspective: A Critique of the High Wage Economy Interpretation of the British Industrial Revolution," *The Economic History Review* 66, no. 3 (2013).p.697

which the work was done, and shows that the bills that have been interpreted in the past as reports of wages received by labourers and craftsmen did not, in fact, state the pay of workers, but the rates charged by major building contractors to clients for types of service. Using records from London's largest building sites, it shows that the 'day wages' that historians have used extensively were no such thing. Once contractors' margins are taken into account, the actual wage in London construction was significantly below the level reported in the series established from Gilboay onwards that have been used by Allen and others.⁵

II

Eighteenth-century wage series for London rely on a very small data set, as can be seen in Figure 1. The evidence for England's 'high wages' can be traced largely to the work of Elizabeth Gilboay, who spent two years in the early 1930s transcribing wage rates found in estates and institutions in England. Her London sources were drawn from the archives of Westminster Abbey, Greenwich Hospital, and the Middlesex and Surrey (Southwark) sessions papers.⁶ The resulting series indicated that English building craftsmen were well paid, but the uniformity of the data was a marked feature.⁷

Subsequent substantive work on London wages was contributed by Schwarz (1985), who expanded and qualified Gilboay's wage series through to the early nineteenth century, using the Middlesex Sessions Papers, and Boulton (1996) whose seventeenth century wage series

⁵ Gregory Clark, "The Condition of the Working Class in England, 1209–2004," *Journal of Political Economy* 113, no. 6 (2005).p. 1321acknowledges that wages prior to 1815 should have some overhead removed. But he only discounts 10 per cent. His main agriculturalsource, "Beveridge, Prices and Wages in England, LSE Archive, Beveridge Price History D:3/4/5, E:7b/8/9/10/24a/25 F:1/8/9. records a mixture of direct and contracted prices for labour throughout this period

⁶ Gilboay, *Wages in Eighteenth Century England*.

⁷ Ibid. note p.13 and appendices. This uniformity has been interpreted as customary wage practices. Leonard Schwarz, "Custom, Wages and Workload in England During Industrialization," *Past and Present* 197 (2007).p.151

ends in 1721.⁸ Boulton's sources were drawn from institutions in the city of London, and indicated slightly lower wages than Gilboy's original study. In fact, Boulton noted in associated seventeenth century sources many complaints from craftsmen about low wages and the difficulty of making ends meet, nevertheless his conclusions largely supported London's wage premium. Boulton's work was preceded chronologically by that of Rappaport whose wage series to 1609 suggested a good standard of living among London craftsmen, and which also included data on the wages of semi-skilled men alongside those of craftsmen.⁹

Figure 1. Summary of eighteenth century London compiled wage data sources.¹⁰



⁸ Jeremy Boulton, "Wage Labour in Seventeenth-Century London," *The Economic History Review* 49, no. 2 (1996), L. D. Schwarz, "The Standard of Living in the Long Run: London, 1700-1860," *The Economic History Review* 38, no. 1 (1985).

⁹ Steve Lee Rappaport, *Worlds within Worlds: The Structures of Life in Sixteenth-Century London*, Cambridge Studies in Population, Economy, and Society in Past Time (Cambridge: Cambridge University Press, 1988).

¹⁰ Gilboy, *Wages in Eighteenth Century England*, Schwarz, "The Standard of Living in the Long Run: London, 1700-1860.", Boulton, "Wage Labour in Seventeenth-Century London.". All subsequent authors draw on these. The sources used by authors since are as follows: Robert C Allen, "The Great Divergence in European Wages and Prices from the Middle Ages to the First World War," *Explorations in Economic History* 38 (2001)., uses Schwarz 1985, Boulton 1996, Gilboy, 1934, for London and Phelps Brown Hopkins for SE England. Phelps Brown Hopkins, 1955 use Gilboy, 1934, and Rogers, 1866. Van Zanden 1999 uses Chartres 1986, which is a

It is these series, and these only, that provide the data on London for Allen's international wage comparisons.¹¹ London's wages, based on Boulton, Gilboy and Schwarz, appear to have been higher than those paid in other cities, especially relative to those in the Low Countries. The accuracy of Gilboy, Boulton and Schwarz's archival work is not in question here. However, to interpret their data correctly, it needs to be located in its organisational, institutional and technological context, rather than taken as a straightforward statement of wages.

From Bowley's early studies onwards, wage data has been collected on the assumption the institution was paying for labour directly, and that a recorded 'day rate' was the wage received by a craftsman or labourer for a day's work.¹² Neither assumption holds for these London series. The accounts and records used were predominantly *lead contractors'* bills submitted to large institutions. The 'day rates' they contain were *not* the wages that workers actually received – those were lower by a margin that was wide enough to wipe out the 'London premium'.

III

The bills of large contractors in archival sources reflect developments in the London construction sector over the seventeenth century. Architectural historians agree that direct labour hiring was no longer commonplace by the early seventeenth century, and finally died

MAV of Gilboy 1934, Broadberry & Gupta 2006 use Gilboy 1934, and Allen 2001. Botham & Hunt 1987 use Gilboy 1934, and refer to Schwarz 1985. Lindert & Williamson 1983 use Gilboy 1934, Feinstein 1998, use Schwarz & Gilboy, and Deane & Cole 1959 used Gilboy.

¹¹ A series published by B. Hutchins in 1900 using data from the Office of the King's Works clerk at the Tower of London has never been widely used. It showed more variation in day rates than Gilboy. A series created by Chartres in 1996 to study consumption London was constructed as a moving average of Gilboy's figures after 1700 and used Rogers data for years prior.

¹² Bowley, *Wages in the United Kingdom in the Nineteenth Century* p.58-9

out in the building boom that followed the Great Fire of London in 1666.¹³ There were approximately 13,000 houses destroyed by the Great Fire.¹⁴ Although the rate of population growth of the city as a whole was slowing after 1650, reconstruction and the development of the West End required high levels of new building. Brett James reckoned that approximately 35,000 new houses may have been erected in London in the forty years to 1708, bringing the total to between 67,000 and 78,000, and total buildings to over 100,000.¹⁵ This implies about a thousand new houses per annum. Deeds registered from 1709 show a steady increase from below 1,000 to approximately 2,000 per annum, peaking at 3,200 per annum in 1725.¹⁶ Thus, the largest portion of building work on housing in London in the later part of the seventeenth century and early eighteenth was new construction rather than repair, and, as Elizabeth McKellar has shown, it was carried out by large scale developers who contracted and subcontracted with multiple trades and crafts, used prefabricated elements within buildings, and constructed complex credit arrangements to fund their enterprises.¹⁷

The huge demand for construction in the aftermath of the Fire finally broke any remaining governance that the Carpenter's and Mason's Livery Companies' (guilds) had over labour supply and firm size in building in London.¹⁸ Regulations passed to avoid hold ups in rebuilding lifted the ban on non-guild members working in London. Many of the large scale contractors who worked on big projects such the city churches or St Paul's still became freemen of the city and members of a relevant guild. For example, Edward Strong and Christopher Kempster, two of Christopher Wren's most trusted large scale mason contractors,

¹³ Knoop & Jones, *The London Mason in the Seventeenth Century*, p.19

¹⁴ *Ibid.*, p.5, and see note 14.

¹⁵ N.G. Brett James. *The growth of Stuart London*, London & Middlesex Archaeological Society, 1935 p.509, (estimates 14,000 houses destroyed in fire p.501)

¹⁶ F. Sheppard, V. Belcher, P. Cottrell. "The Middlesex and Yorkshire deeds registries and the study of building fluctuations." *The London Journal* 1979; 5(2), 176-217.

¹⁷ ¹⁷ E McKellar, *The Birth of Modern London* (Manchester University Press: 1999). pp.81- 110. J.N Summerson, *Georgian London* pp. 62 – 65.

¹⁸ T. F. Reddaway, *The Rebuilding of London after the Great Fire* (London: E. Arnold, 1951). pp.112-115

took their freedom in London by redemption in the 1670s.¹⁹ However, the more ordinary jobbing mason was unlikely to have been a member of the guild.²⁰ Few of the individual workers sometimes named in project accounts can be identified as having been members of any of the relevant guilds.²¹ The building trades were unusually open to migrant labour and free of institutional barriers, even as the labour market in the city in general became more competitive.²²

While the building of private housing was the largest element in the construction sector, it is *not* the part for which wage data survives.²³ Instead, the sources for London builder's wages tended to be drawn from the records of institutions that constructed public or state buildings (as shown Figure 1). This work too was big business, by the 1670's institutions' reliance on large building contractors was probably even more advanced than in residential building.²⁴

It is impossible to be precise about exactly when large scale contractors became wholly responsible for major works commissioned by institutions. At Middle Temple, where there are excellent accounts from the late sixteenth century, the last evidence of direct labour hiring

¹⁹ Douglas Knoop and G. Jones, "The London Mason in the 17th Century," *Ars Quatuor Coronatorum* LVIII part i 1935 (1935).p.45 Both from Oxfordshire, Strong built Greenwich Hospital, Kempster Tom Tower at Oxford, they partnered on St Stephen's Walbrook, and both were major contractors at St Paul's.

²⁰ Douglas Knoop, G Jones, *The London Mason's Company*, Worshipful Company of Masons 1939.

²¹ Also see J. Campbell, "The Finances of the Carpenter in England" p.322.n.54, and Knoop & Jones, "London Mason" appendices A,B,C.

²² M. Dorothy George, *London Life in the Xviiiith Century* (London: Kegan Paul, Trench & Trubner, 1925).Ch.4.George F. E. Rudé, *Hanoverian London 1714-1808, History of London* (London: Secker & Warburg, 1971), C. R. Dobson, *Masters and Journeymen : A Prehistory of Industrial Relations, 1717-1800, Croom Helm Social History Series* (London: Croom Helm, 1980), Leonard Schwarz, *London in the Age of Industrialisation : Entrepreneurs, Labour Force, and Living Conditions, 1700-1850, Cambridge Studies in Population, Economy, and Society in Past Time* (Cambridge England ; New York: Cambridge University Press, 1992). for later in the century.

²³ A very rough estimate suggests that housing was around 87% of the construction sector before 1710. Private houses cost approximately £300 each on average. Institutional expenditure on churches and large projects was much smaller: the total expenditure on the fifty churches and St Paul's to 1710 (£1.2m), to which we add an allowance of £0.2m for other large projects with conflicting or no recorded cost (eg: the Custom House, Bethlem, The Fleet ditch, Montague House etc).

²⁴ Knoop & Jones (1935) were of the opinion that the building of the Banqueting House at Whitehall was the last significant incident.

is from April 1614. The days rates are as recorded in Boulton's series; 20d. per day for craftsmen, and 14d. per day for labourers.²⁵ From this date on, all building 'wage' records at the Temple seem to be total sums paid to contractors in abstracts of accounts or builder's bills preserved in the paymasters' accounts. Other staff and workers are listed and paid wages directly on a quarterly basis. At the Office of Kings Works, the Tower and Whitehall accounts for 1660 still listed named masons and carpenters. Their day rates ranged from 24d. to 30d. as Hutchins' found, and the labourers rate was 16d. Thereafter, however, even these records increasingly report billing from contractors.²⁶ The middle of the century would thus seem to be the latest date for a transition to relying on contractors.

Institutions' use of large contractors reflected the organisational effects of the metropolitan building boom which had started even before the Great Fire, with developments in architecture, and technical and stylistic shifts in construction.²⁷ Most of the projects that institutions commissioned were designed in a classical style, popularized by Inigo Jones and his disciples from 1615 onwards. Building styles to the Tudor period had allowed design modifications to be easily incorporated during construction. It was common for buildings to be copied from old, bricklayers and carpenters would quote for work based on observed measurements and quantities and renegotiate if these changed.²⁸ In contrast, the classical style could only be designed and executed by a skilled architect, with a working knowledge of

²⁵ It records the attendance of a team of bricklayers building a 'garden wall'. The day rates are exactly as recorded in the Boulton series. MT2/TOT/3/2

²⁶ TNA WORK 5/1. Contracts start in 1668: TNAWORK5/11.

²⁷ John Newenham Summerson, *Georgian London* (London: Pleiades Books, 1945). Summerson, *Georgian London*, Chapter 1, N. G. Brett-James, *The Growth of Stuart London* (1935). John Schofield, *The Building of London*, Brett James *growth of th*

²⁸ Howard Montagu Colvin, *A Biographical Dictionary of English Architects, 1660-1840* (London: Murray, 1954). Introduction.

mathematical and engineering concepts, some of which were new and experimental.²⁹ Once building commenced the design could not be changed if it was to keep to its correct proportions, so costs were sunk.³⁰ Whilst the technical challenges they faced on institutional projects were greater, most of the contractors who undertook large city and crown projects were also active in private building, which suggests that their working practices were not confined to one sector.

Most economic historians examining wage series have assumed that the main craftsmen employed on the building projects for which records survive were small or artisan masters operating in a largely unchanging industry, with a small number of journeymen and apprentices working for them. Indeed, Donald Woodward showed that this remained true of the organisation of construction in Northern Towns to 1750.³¹ But the London records surviving belie the idea of artisan organisation.

Account books show that the persons hired to carry out large building schemes were contracting for work that would in reality be supplied by other craftsmen in their employ, frequently forming partnerships and subcontracts.³² They did not perform work on sites themselves. Indeed, sometimes they were paid extra just to supervise and actually be in attendance.³³ Prominent contractors often held a web of concurrent roles. For example, in the 1670s, Thomas Knight was the City mason, the agent for St Paul's Cathedral on the Isle of Portland, and a contractor for work with the Office of King's Works. It seems safe to say he

²⁹ The experimentation of Wren and Robert Hooke's work is widely documented. Summerson, *The Classical Language of Architecture*. See Bill Addis, *Building: 3,000 Years of Design, Engineering and Construction* (London, : Phaidon 2007). Ch.4.

³⁰ Colvin, *A Biographical Dictionary of English Architects, 1660-1840*. Introduction. Colvin, *A Biographical Dictionary of English Architects, 1660-1840*. Introduction.

³¹ Donald Woodward, *Men at Work : Labourers and Building Craftsmen in the Towns of Northern England, 1450-1750* (Cambridge University Press, 1995).

³² JWP Campbell, *Building St Paul's* (London: Thames & Hudson, 2007). pp. 75 – 79.

³³ For example, Edward Tufnell's (masons) bills to Westminster Abbey 1712 include "for my own attendance at 16d a day", for a small or fixed number of days: Westminster Muniments, no 34153.

was not laying stones himself. The Office of the Kings Works owed money to approximately 85 such contractors through the period 1709 – 1725. The total sums outstanding ranged from £6,000 to £11,000. Single contractors were owed as much as £1200.³⁴ To put this in context, the average annual value of timber imported into London between 1699 -1701 was £96,000.³⁵ Perhaps unsurprisingly, the master masons' contracting to work on St Paul's Cathedral met Grassby's 1970 scale for extreme wealth in London.³⁶ Campbell's estimate of the lifetime 'earnings' of individual mason contractors suggest that Edward Strong earned in excess of £77,000 just for his work on St Paul's and the City Churches.³⁷

Some sense of the scale of contractors' businesses can be gained from the sums major contractors billed their clients. Table 1 gives annual figures for specific projects that relate to the sources in Figure 1 only.³⁸ It is the bills and accounts of these projects that Gilboy and others mined for 'artisan' or journeymen's wages. As we will see, the contracting system meant that actual labour costs were buried in piece rates and hidden behind different types of pricing and accounting systems in contractors' bills.

³⁴ TNA WORKS 5 /56, Abstracts of accounts 1709 – 26.

³⁵ Davis, 'English Foreign Trade 1660 – 1700' Appendix tables.

³⁶ Campbell, *Building St Paul's* Ch. 9, pp.72-78, also see Colvin, *A Biographical Dictionary of English Architects, 1660-1840*, p.4

³⁷ J.W.P. Campbell, "Building a Fortune: The Finances of the Stonemasons Working on the Rebuilding of St Paul's Cathedral 1675-1720.," *Proceedings of the Third International Congress on Construction History*. (2009). Campbell's figures are lifetimes earnings estimates, not turnover, nor profit earned. If Strong had earned £77,000 profit in his lifetime his margin would have been greater than discussed here.

³⁸ A fuller list of contractors and turnover for this period is being compiled.

Table 1: Some major Contractors in existing and present London Wage Sources.

Contractor	Sites, dates	Approximate total contract value	Contract values estimated per annum
Edward Tuffnell, Mason	Westminster Abbey 1712 - 1719	£19,000	£1,800
William Kempster, Mason	St Paul's Cathedral 1700 – 1708. Note 1.	£9,000	£1,800
Andrews Jelfe, Mason	Westminster Bridge 1738 - 48	£155,000	£15,000
Thomas, and Edward Strong, Mason	Greenwich Hospital 1696 – 1708	£55,000	£5,000
	St Paul's Cathedral 1675 –c. 1705	£54,000	£4,500
Edward Stanton, Mason	Middle Temple, ? - 1734,		£500
	Westminster Abbey 1720 – 1734.		£1,500
William Gray, Carpenter	City Churches, St Clement East Cheap,		
	Bridge House 1685 - 1706		£500
Thomas Wise Snr.	St Paul's Cathedral , Bridge House	£5,500 (£24,500 with Thomas Hill)	£3,000
Thomas Wise Jnr	St Paul's Cathedral Portland Stone ,	£37,000	
	Bridge House 1685 – 1710's		£500

Sources: see text and appendix. No information indicates unknown amounts. Note: 1. Total paid to master masons for masons work at St Paul's cathedral to 1710 approximately was £185,196. See Wren Society Volume XVI p.xiii –xiv for details. Those listed here relate directly to sources or persons referred to in the text of this paper.

IV

How did the contracting system for major projects work? In brief, for ‘extraordinary’ work or new building, the client and the surveyor or Clerk of Works agreed the requirements for the job. In the case of the City or other major institutions this requirement was then posted at gates or submitted for publication to the *London Gazette*.³⁹ Contractors would submit their tenders or estimates and the Surveyor would meet with those that could meet the requirements. Meetings and presentations with commissioners or boards also sometimes took place depending on the scope of the work.⁴⁰

Contracts for several parts of a project might be written, specifying the contractor’s duties to supply work at specific prices, under one or a number of three ways of working: by the day, by the great and by the measure.⁴¹ Contracts gave clients the right to monitor work, to appoint an external inspector of work, and to discount or not pay agreed amounts if the quality they had stipulated was not met.⁴² It was not unusual for a contractor to enter a bond to secure a contract, particularly if it were his first contract with a client.⁴³ Once an estimate was agreed and work had started the contractor submitted bills quarterly or biannually as agreed. The paymaster or Treasurer would receive the bill and pass it to the Surveyor or the Clerk of the Works for approval. To approve or “pass” it, the Clerk had to ensure the work met the specification by appointing a surveyor to measure and evaluate the work done.⁴⁴ Once

³⁹ Descriptions of the process survive in: TNA ADM 67/4 (1696 description of the Greenwich Hospital Commission’s instructions to Nicholas Hawksmoor for the procurement of mason’s services); Portland papers, Vol. X (the appointment of contractors in 1710 at St Paul’s). This is not to say that contracts were not handed directly on occasion to specific contractors.

⁴⁰ Records of deliberations include: ADM 67/4 Westminster Abbey Muniments no 34516+.

⁴¹ See also Wren Society, Volume XVI, Contract Book p.1-51 for combinations of day, measure and task, Jane Lang, *Rebuilding St.Paul's after the Great Fire of London* (London ; New York ; Toronto OUP, 1956)., p.81

⁴² For another surviving contract, see: LMA CLC, MS00233

⁴³ Edward Stanton, one of the most well-known city masons secured the contract at Westminster Abbey in 1719 after the death of Tufnell. He refers to his bond of £2,000 in meeting minutes of December 1722: Westminster Abbey Muniments 34517.

⁴⁴ Or measure it himself if he were so qualified such as Hawksmoor at Greenwich. . The final account usually states a number of dates: the rough dates the work was completed; the date the work was measured by the Clerk;

assessed, the bill was passed or discounted and went to the Treasurer to be signed and eventually to the paymaster to be paid. In this system, the responsibility for hiring and managing labour rested solely with contractors.⁴⁵ The contractors' bills and the institution's accounts of works that were generated by this process are the sources for all London wage data.⁴⁶ But these are not records of payments to workers. They are the prices that the contractors charged the client.

In 'ordinary' work the process was similar, but payment more regular. Bridge House, the institution that maintained and administered London Bridge throughout the centuries, appointed individuals as head mason, carpenter and so on. These official craftsmen were also contractors at other sites. For example, the Bridge's mason, Thomas Wise, was also stone and masonry contractor at St Paul's, while William Gray, the Bridge's carpenter, also contracted for work on the City Churches.⁴⁷ They paid substantial sums for their places at the Bridge, and the small stipends, or salaries they were paid would not have covered their interest or costs.⁴⁸ They submitted weekly bills for labour but awaited longer payment for materials, and submitted to a bi annual audit. Mark Latham has shown the extent to which materials may have been marked up at the Bridge. Certain firms at the Bridge persist in the accounts for over a century.

To further complicate matters, labour costs were priced and presented differently in each of the contracting methods. The 'wages' that Gilboy and other historians report in their series

the dates the work was approved and the bill passed by Committee; the date the sum was paid. See Westminster Abbey Muniments 34513 for dates of Dickinson's measurement and latter dates for passing of bills.

⁴⁵ Campbell, 'Seventeenth-Century Bricklayers' Contracts'

⁴⁶ Even smaller contractors and craftsmen billing individual churchwarden's or parishes, or bricklayers repairing Middle Temple walls leave the same type of bills, and such smaller contractors would also have had overhead.

⁴⁷ Wren Society, Vol. XIII, p.46-48, and Vol XVI, p,xvi.

⁴⁸ See Mark Latham, "'The City Has Been Wronged and Abused!': Institutional Corruption in the Eighteenth Century," *The Economic History Review* (2015).for figures. The salary for mason and carpenter place holders was £4 per annum, The places were bought for hundreds of pounds.

are transcribed ‘day rates’ for masons, bricklayers, labourers etcetera. In practice, however, most bills did *not contain* day rates: Contracted ‘by the day’ were only one kind used, and not the most common. The other two types of contract that were generally used were measured (or task) work, where prices were agreed per length or unit of work, and work by the great, (where a contractor quoted one price for an entire job at the outset). In both these types of contracts labour costs were built into the unit price of worked stone, timber or brick quoted. Unfortunately for historians interested in wages, most construction work seems to have been priced ‘by the measure’. A typical ‘measured’ bill included no information on the cost of the labour employed on the job.

Christopher Wren, responsible for so much of London’s institutional construction in this period, regarded work ‘by the measure’ as best value, only using day bills for exceptionally skilled work or where safety was at stake.⁴⁹ Prices for labour appear in bills for work ‘by the day’, when time was needed for workers to take greater care, or perform more intricate or difficult operations that required extra skill or strength. A day bill from Edward Strong at Greenwich Hospital offers a typical example of a bill for ‘day work’.

December 1700

Days work by Edward Strong pulling down the scaffolding made to raise the pedestals and trophies upon the pediment of the B[...], in cutting way into the brickwork for the corridor frames chimney pieces corner stows, windows, soyles and window stones and taking out the iron barrs of the cellar windows in the KC his

⁴⁹ James W.P. Campbell, "The Finances of the Carpenter in England 1660-1710: A Case Study on the Implications of the Change from Craft to Designer-Based Construction", in *L'edilizia Prima Della Rivoluzione Industriale. Secc.Xiii-Xviii*, ed. Simonetta Cavaciocchi (Prato: Istituto Internazionale di Storia Economica, 2005).

building aforesaid and cutting way for the top of four staircases descending from the first floor of the B[...]the cellars or vaults of the same.

Wm. Loggans 20 days at 2s 6d.	02:10:00
Jb. Adams 25 days at 2s 6d.	03:02:06
Richard Nailor 8 days --	01:00:00
Edward James 20 days at 20d.	01:13:04
Wm. Derry 10 ----	00:16:08
Wm. Hosslet 1 day	00:01:08
J How—1 day	00:01:08
Matt Allen 2 and half days	00:04:02
Wm. Macon 1 [day]	00:01:08

09:11:04⁵⁰

Day bills of this kind have three characteristics that need to be understood if the wages they report are to be interpreted correctly. First, they only indicate *some* of the labour employed on a project, and possibly the most skilled or expensive part. For example, Edward Tufnell's bills to Westminster Abbey in 1712 amounted to £1,917. Yet they only listed 600 "days" worked, enough for three masons for a year, and equating to less than 5 percent of the total.⁵¹

Day bills make up a small amount of the work at Westminster Abbey and the Office of King's Works. At Greenwich Hospital they represent approximately 15 per cent of the bills.⁵²

⁵⁰ LMA CLC/B/227/MS00233. The calculations seem to be incorrect by 4d, in the books there are a number of corrections.

⁵¹ Westminster Abbey Muniments, Christopher Wren Fabric book, 34513.

⁵² Based on a analysis of all bills in Edward Strong's account book, LMA CLC Ms00233.

Second, day bills show the price the contractor charged the client for a person's work for a day. They are not a record of what the worker actually received. The day rates they list were not in fact received by the named mason or carpenter. Day rates were frequently set by institutions across multiple contracts. For instance, St Paul's allowable day rates were set at 2s.6d. for carpenters, bricklayers, masons in 1675. The rates were not increased until after 1711, or later, despite the fact that we know that other institutions and contracts were paying more. If the underlying labour market for the skills that the contractor hired tightened during the period of a contracts their margin would be squeezed. Likewise if they could procure labour and materials at rates below what they quoted at they would profit.⁵³ Thirdly, day bills contain no separate line for the contractor's own overheads and profit, so those are built into the prices billed.

Appreciating the specific role of day bills helps explain the puzzling uniformity of wage rates found in account books and bills.⁵⁴ The contracting and pricing context suggests that the persistence of the rate is more likely to have been a product of contractors in competition with each other utilising a "going rate" or acknowledged trade price. Institutions may have given guidance after comparing rates.⁵⁵ In fact, surviving records of direct payments show little sign of a customary wage for craftsmen, rather there is much variation, presumably for skill and productivity.

⁵³ Data on charge out rates in Boulton, "Wage Labour in Seventeenth-Century London." p. 277, shows that the range of rates charged out increased from 24d to 36d per day in 1670 to 30d to 42 d per day in 1710. For labourers the range moved from 14d to 24d in 1670 to 21d to 26d. in 1720. As Boulton noted only modal rates in his series a median cannot be calculated, but the range and trend of both series increase.

⁵⁴ For instance, see Gilboy *Wages in Eighteenth century* pp.254-257, and note 1.p13.

⁵⁵ For evidence of institutions bargaining with suppliers, see: ADM 67/ 2.

V

If our existing ‘wage’ series report the prices at which highly skilled work was charged out at, what were the actual wages that building craftsmen and labourers received? To establish this, we need either to find contractors’ actual pay records, or in their absence, estimate their operating margin. Luckily, in a rare case the contractor’s own books have survived. In order to put the figures in context I first discuss margins, before presenting the direct evidence on wages.

The size of the contractor’s margin should be approached by looking at three sets of costs: the cost of giving credit to customers; the risk of retrospective discounting to bills; and the contractor’s own management or operational costs. Together these amount to the overhead or operating margin that the contractor added to the costs of goods and services (including labour) that he billed, to which he would also have had added some allowance for profit. Grassby estimated that an acceptable profit margin to seventeenth century merchants was 13 – 20per cent.⁵⁶ James Campbell ascribed the whole of contractors margin of 20 to 40 percent to profit in his analysis.⁵⁷ But, as I argue here, contractors had considerable operating costs, even before the question of profit is considered.

Credit for customers was one of the major costs faced by eighteenth-century building contractors.⁵⁸ At Westminster and Greenwich, for example, payments were typically made 15 to 30 months after the work was carried out. At St. Paul’s, payment became so late that

⁵⁶ Richard Grassby, "The Rate of Profit in Seventeenth-Century England," *The English Historical Review* 84, no. 333 (1969).

⁵⁷ Campbell, "The Finances of the Carpenter in England 1660-1710: A Case Study on the Implications of the Change from Craft to Designer-Based Construction". pp.332-339

⁵⁸ Melody Mobus, "Surviving Late Payments: Strategies of Christopher Wren's Masons from Burford," *Proceedings of the first Conference of the Construction History Society* 1, no. 1 (2014).. It is recognised as a cost for all commercial operators in the early modern period. Pat Hudson, *The Industrial Revolution, Reading History* (London: Arnold, 1992)., p.104.

Wren was forced to convert the money owed to contractors into a bond.⁵⁹ Colvin wrote of a similar system for other major supplying creditors to the King's Works. Apparently, no works account was ever audited, (and final sums paid) within less than two years of finalization of work, and delays of ten years were not uncommon. "It was the artificers who bore the problem".⁶⁰ Contractor's records show that masons working at St Paul's borrowed family capital or drew on financial support from other sponsors to pay their weekly wage bills and keep their team working.⁶¹ The price they paid for this line of working capital is unknown. Annual interest rates or discounts on trade bills of exchange were commonly between 6 percent and 15 percent in the period, suggesting that a moderate 18-month delay in payments cost a contractor at least 10 percent of his bill.⁶² Suppliers further down the supply chain may have shared some of the pressure, but building contractors could not hire workers on credit. Experienced contractors would have known the risk and priced work accordingly.

Contractors received only token relief for the costs of credit they faced. Small advances or imprests were commonly given to key contractors. The maximum imprest at Westminster Abbey in any quarter seems to have been £50 whereas contracts in progress in the same period could be worth thousands.⁶³ It is also worth noting that credit was not offset by perquisites. Institutions offset the value of everything taken off site against contractors'

⁵⁹ Campbell, *Building St Paul's*, page 67. See remittance records at CLC/313/I/B/014/MS25483/001. St Paul's pays interest on late payment after a delay of more than 24 months. .

⁶⁰ Howard Montagu Colvin et al., *The History of the King's Works Volume 5 1660 - 1782*, 6 vols. (London: Her Majesty's Stationery Office, 1976). 'Financial Stress', p.44 In 1670, to deal with the problem and maintain credit, officers of works were allowed six per cent interest on works outstanding which were traded as a loan but only if they loaned a further sum. In 1692 the same deal was offered to contractors who would advance double the amount outstanding to him by way of a loan to the works In other words late payment was so bad the Office of Works was forced into paying interest to maintain credit – but the interest rate was only available to those who would put more capital in.

⁶¹ TNA PRO 106/145

⁶² The estimate of 10per cent is based on a 6per cent interest rate. Usury limits were 6 falling to 5per cent, in this period, but a rate of return nearer 8per cent annually has been established for two contemporaneous private lenders, see Quinn, 'The Glorious Revolution's effect', Temin & Voth *Prometheus Shackled* .

⁶³ Westminster Abbey Muniments Cat. 34513, 34514, 34518

bills. Plumbers are charged for old lead discounted, and bricklayers for old tiles, at 25 - 35 per cent discount to the cost of new.⁶⁴

Contractors' second major risk that would have been priced into their margin was the likelihood that their bills would be discounted before payment. The account book of the mason Edward Strong for work at Greenwich 1698 to 1708 shows that his bills were regularly discounted. Day bills were discounted by an average of 15 percent, his measured bills by 3 percent.⁶⁵ At Middle Temple, Christopher Wren discounted the plasterer's bill by 30 percent in 1682.⁶⁶ Clients wrote this right to discount unsatisfactory work into construction agreements, as can be seen in a surviving mason's contract for Greenwich Hospital.⁶⁷ The contract did not give reciprocal rights to the contractor.⁶⁸

The third and most important type of cost that affected contractors' margins was their own operating costs. As is attested by the size of these projects, the contractors were not small masters. They were employing tens or hundreds of staff, some working on site, some off site prefabricating and preparing. In the years 1698–1710, for example, the Strongs had operations and teams of persons on at least three large sites continuously. Contractors paid for the carriage of supplies, negotiated with suppliers, and used their own surveyors and estimators to verify lengths and work done.⁶⁹ Management was not cheap. At Westminster Abbey, William Dickinson's pay was £50 for measuring approximately £3,500 of work.⁷⁰ Measurers were paid 10s. to a guinea a day.⁷¹ Overseers are not included independently in

⁶⁴ Westminster Abbey Muniments Cat. 34513. Office of Kings Works at TNA WORK 5/146-166. Similarly, at Bridge House the off cuts of wood for certain jobs are accounted and entered in the books. CLA/007/FN/03/25

⁶⁵ LMA ref. CLC/B/227-175, formerly MS00233.

⁶⁶ Middle Temple Archive MT.6/RBW

⁶⁷ LMA ref. CLC/B/227-175, formerly MS00233

⁶⁸ A copy of the contract is in Strong's account book LMA ref. CLC/B/227-175

⁶⁹ James Nisbet, *A Proper Price* (London: Stoke Publications, 1997).p.26

⁷⁰ Westminster Abbey Muniments. 34517

⁷¹ LMA CLA/007/FN/04/001

day or measured bills, yet they were paid at the higher end of journeymen's charge out rates. Kempster's foreman Fletcher appears in his daybooks in 1706-8 paid 20s. a week.⁷² The detailed sawing records kept by Kempster and Strong from St Paul's imply that there was a full time monitor present to records the amounts sawn and the distribution of the load and account for any wastage.⁷³ On top of the costs of operating on site, large contractors maintained separate premises for off site work and administration.⁷⁴

The letter book of Andrews Jelfe, one of the mason contractors at Westminster Bridge in the 1740s shed some small light onto the issue of margin.⁷⁵ His book details biweekly accounts for a project, possibly sited outside London, throughout 1734-5. As well as day rates for men it shows that approximately 2-3 percent of the costs on this small project were made up of messenger, stationary, and transport costs. It also shows that he was paying one man, John Ogle, probably foremen of his yard, 50d. per day. Copies of bills do not include Ogle's wage, nor the administrative costs. Later letters show that he retained an agent, one Mr Roper, to procure the stone for Westminster Bridge. Again, Roper's costs are not in his bills, which are largely measured.⁷⁶ Jelfe's book shows that he gave his men a drink one night when they had worked all day and then had to travel to Cambridge.⁷⁷ His lack of *regular* food or drink bills is typical of records for those who worked at Greenwich, Westminster Bridge, or Bridge House. Drink, or even breakfast is found sporadically in some bills during winter months or in relation to unusual work – those sinking caissons at Westminster Bridge in February 1744 were offered gin - but men working on London sites were not offered food or drink in order

⁷² TNA PRO 145/106, also see Wren Society, Vol XVI, Fletcher is only present from 1706/7.

⁷³ TNA PRO 145/106; , and the marble sawing records at LMA CLC/313/I/B/003/MS25473

⁷⁴ Edward Stanton maintained premises at Holborn through the late 1690s (possibly before) to 1720s. We do not know the exact locations of other masons yards. But the yard would have stored of goods prior to delivery at sites, carving and other work performed off site for task or measured orders, administrative and other. Kempster's is believed to have had premises on Garlick Hill, but these may have been temporary due to work on the Church there.

⁷⁵ BL Ms27587.pp.4 – 5,13, and after p.20.

⁷⁶ TNA WORK 6/46 by example.

⁷⁷ BL Ms 27587 p.5

to sustain them in normal work.⁷⁸ The Jelfe evidence is too fragmented to put together a complete operating budget or profit and loss for his projects, but they do show that he, as others, had substantial operating costs that did not appear in bills to clients. He also took a substantial income for himself: Jelfe left £30,000 on his death.⁷⁹ Using the varied accounts that survive we can estimate at least some of the associated costs involved in running a building project in early modern London. The calculation is set out in Table 2. Although these figures are based on evidence from large projects (which are those from which day bills are derived), smaller contractors such as those found in individual parish records would also have faced overhead costs for carriage, accounting, management, tools and rent, even if they did not work by the measure.

Table 2. Calculation of contractor's operating margin for day work.

Type of cost	% share of bills
Credit	6- 9
Discounting	3.5 - 7
Measurement, estimation, agency, overseeing	5
Accountancy	2
Rent **	2
Tools*	1
Total before profit	19.5 - 26
With Profit of 10%	29.5 - 36

**The figure of 2% is an estimate based on Barbon, 'Apology' who quotes houses in Bishopsgate at £30 p.a, Charing Cross at £60 p.a in 1685. Based on a conservative estimate of turnover at £2,500 for a mason such as Stanton with rent at £25 p.a. and another percentage for tools and supplies. For some contracting and speculative masons and carpenters rent would have been a higher figure, for those with more permanent types of work contracts at Bridge House they may have been less.

*Based on calculations of iron mongers bills, rope and the portion of joiners' bills for moulds on extraordinary projects only at Office of Kings Works, St Paul's. These costs are not presented separately on all work at these sites, and not at Greenwich or Westminster, thus the contractors would seem to be absorbing them. The Kempster notebooks show also payments for tools and for tool maintenance, but as they are notes not accounts they cannot be used to calculate the percentage of turnover this represented. See appendix for sources.

⁷⁸ See as above, TNA WORK 6/46, LMA CLA 22-175. (Ms00233)

⁷⁹ Colvin, *A Biographical Dictionary of English Architects, 1660-1840*.p11.

The above calculation agrees with the higher end of Campbell's estimate of between 20 and 40 percent.⁸⁰ Contractors would only have been able to recoup the administrative, finance and operating cost of their business, and anticipate discounting, if there was a margin between day rates charged to institutions and pay to workers. But depending on the project, the length of contract, and the rates set the difference, or margin on individual inputs, would have varied.

VI

Although rare, there is evidence of what contractors actually paid craftsmen and labourers. One instance, long known about by historians, has been disputed. In 1711 Richard Jennings, Wren's carpenter contractor at St Paul's, told a Commissioners' Committee tasked with evaluating whether he should be tried for fraud, that the Cathedral Commission paid him 15s. a week for his carpenters, but he paid them on average only 11s.⁸¹ Jennings average mark up on skilled craftsmen's wages was approximately 27 percent. But the correspondence says he was paying varying rates to different men, the more skilled or valuable getting 12s, the lesser 7s.⁸² The Jennings case has been cited by authors to both support and deny the idea that contractors marked up the pay rates they indicated in bills. Gilboy herself examined the account in the Portman papers, as did Knoop & Jones. They arrived at opposite conclusions. Gilboy thought a master might "shave a penny or two off wages" but thought it unlikely.⁸³ Most subsequent architectural historians have instead agreed with Knoop & Jones's

⁸⁰ Campbell, 'The Finances', pp.334 - 339

⁸¹ The accusation of fraud is part of a complex conflict over Wren's role. Jennings was accused of not paying his workmen properly, but the Commissioners later accepted this was standard practice: See Campbell 'Building' p.159. Wren Society, Vol XVI. Jennings's men are in the St Paul's account books at 2s 6d per man per day for the period to 1710, (LMA CLC/313/I/B/303/25473/38, 39, 40, and 41).

⁸² Lang, *Rebuilding St.Paul's after the Great Fire of London* p.80-90, See Wren Society Volume XVI, 'Frauds and abuses', also.

⁸³ Gilboy, *Wages in Eighteenth Century England.*, page 17

conclusion: Jennings willingly offered the fact that he took a margin on wages, and he insisted this is standard practice. No evidence was sought to the contrary, and he was not prosecuted. Until now, no other evidence of direct payments has been uncovered with which to compare the Jennings evidence.

However, William Kempster, the mason contractor on site at St Paul's Cathedral from 1701 – 1711, kept some day books recording the wages he paid to the masons he employed on the project.⁸⁴ During this period his team were working on some of the most demanding parts of the structure, including the west front and the geometric staircase. The books are in a bundle of probate papers of his and his father's at the National Archives. They are qualitatively different to those kept by institutions: they are Kempster's own, and as well as recording the weekly pay given to his masons, they include memoranda about cash owed, skill requirements, call records for masons for 1700 – 1704 and 1706 - 8, and sawing records. The figures given for men on call correspond directly with the cathedral's accounts for his day bills. The books also show that he was borrowing money from his father and subsequently his 'sponsor' to pay his men and keep them on site.⁸⁵ Although these records appear unique, there is no reason to think that Kempster was operating in an unusual manner. He was the son of another mason contractor, Christopher Kempster, who had been working on St Paul's until the 1690s, and the team and contracts for which his records survive were partly inherited from another contractor John Thompson, whose team were present 1694 to 1700. He was also involved in a number of other major projects of the kind that have supplied us with day rates for wage series. For economic historians the books have considerable significance. They are

⁸⁴ Kempster's books are at TNA PRO106/145.

⁸⁵ While the royal dockyards were able to pay wages in arrears, passing credit costs on to employees, independent building contractors lacked the same capacity :Schwarz, *London in the Age of Industrialisation : Entrepreneurs, Labour Force, and Living Conditions, 1700-1850.*" p.249; Craig Muldrew, 'Wages and the problem of monetary scarcity in early modern England' in *Wages and Currency : Global Comparisons from Antiquity to the Twentieth Century*, ed. Jan Lucassen (Bern, Switzerland, New York: Peter Lang, 2007).

the only known example of a building contractors own call and pay records for the late seventeenth or early eighteenth century.

Figure 2. Kempster’s Masons pay at St Paul’s 1700 – 1702. Note, based on 166 observations, in weekly pay groups as paid, November 1700, December 1700, March 1701, November 1701, June 1702, July 1702. TNA PRO145/106.

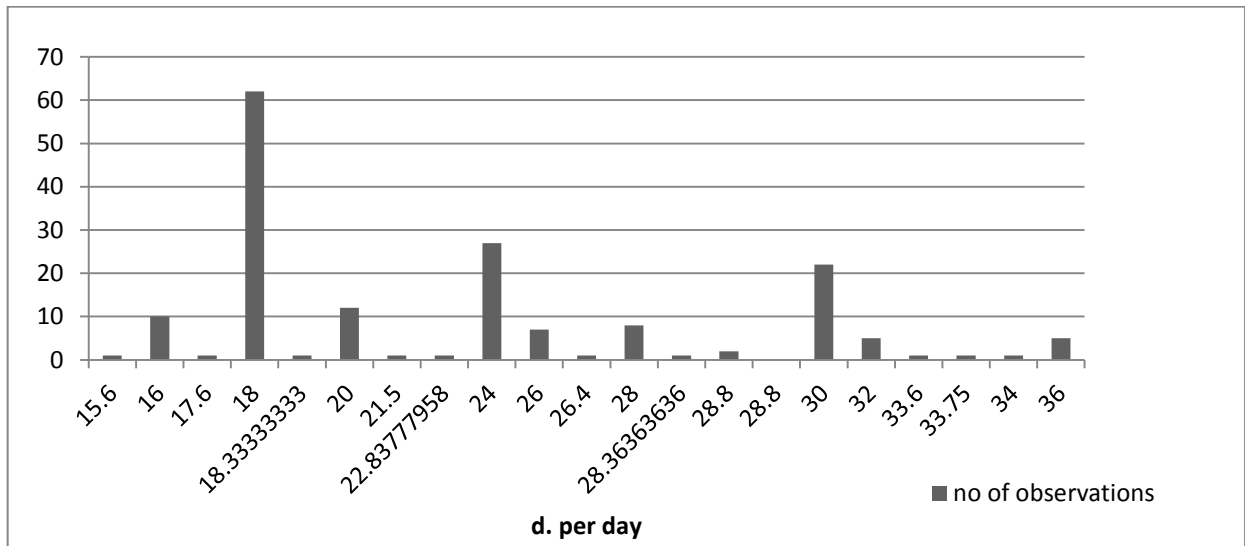
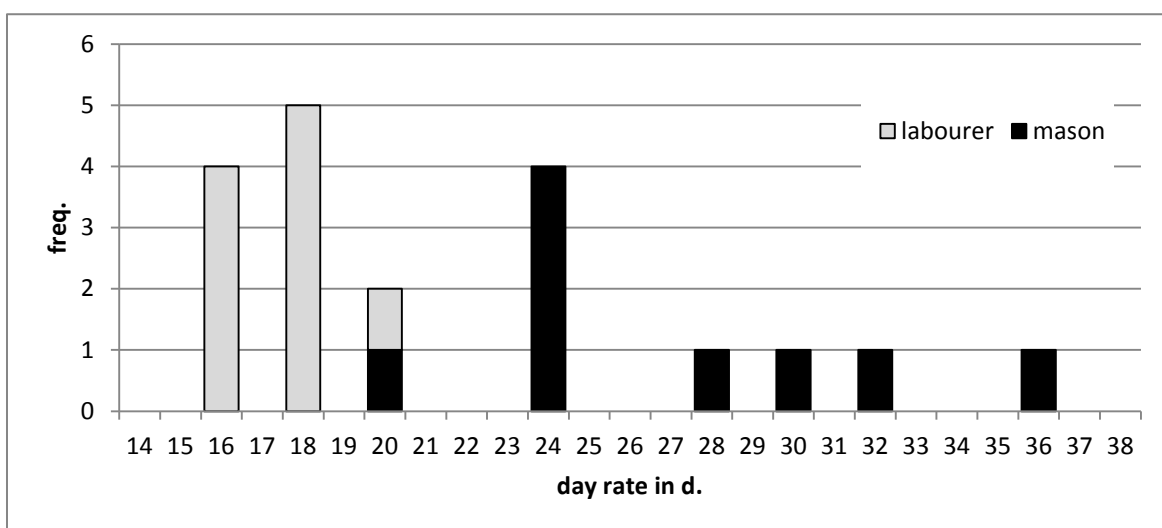


Figure 3. Day rate distribution w/e 7th June 1701, Kempster masons and labourers.

Source TNA C106/145



The rates Kempster paid his masons varied greatly. He noted their wages alongside a tally of the days (measured by the half day) that they worked each week. Kempster's team began work in October 1700, and worked through to the end of December. There was then no work recorded in the daybook until February 4th 1701, when a small team returned. At this point, three masons who had been receiving 26d. per day until December 1701 reappeared, but they took a significant cut in pay, to 24d. per day; they continued at that rate until December 1702. In the latter part of 1708, when the number of workers reached over forty on most days, Kempster divided the list by category, with 'Masons on call', 'Ruff layers & their labour', and 'Labourers' each listed separately; the highest wages were given to a small unlabelled group placed at the head of the list, however. To give a sense of the form of Kempster's wage payments, figures 2 and 3 report the distribution of rates for two representative weeks, the 7th December 1700 and the 7th June 1701 (note that the summer and winter day rates were the same). In December, eleven masons on wages between 24 and 34d. per day worked alongside ten labourers, who received 16 to 20d. per day. In June, the distribution was similar, although the range of pay for the masons was more widely distributed.

The overall pattern of pay for the 46 weeks for which Kempster had men on site between October 1700 and October 1701 can be seen in Figure 4, which reports the average day rate that each named worker received during this period.⁸⁶ The mean wages of the 18 masons ranged from 21d. to 37d; the overall mean wage was 27.3d, the median wage was 26d, while the modal wage was 24d. As noted above, the wages of his labourers were between 16d. to 18d. Overall, the mean, median and modal rate Kempster paid his ten labourers was 18d. per day, while the Cathedral also hired large numbers number at 16d, for which we only have

⁸⁶ As the rate each individual earned could varied between weeks, I report the mean of all the recorded weekly day rates they received.

collective records. This suggest the mean labourers rate overall at St Paul's was approximately 17d.

The number of weeks each mason worked varied, but they roughly fall into two groups: those who only appeared for short periods, as little as one week; and those who were hired very regularly, including two masons who were present on 45 of the 46 recorded weeks. If we look at how the 378 payments to masons and 362 payments to labourers that Kempster made were distributed across the different daily rates that he paid (Figure 5), we can see that he mainly hired masons at two pay levels: 35 percent of his payments were at 24d. per day; while another large cluster of payments, 23 percent, were at 30d. per day. He had regular employees at both levels; churn was no higher among the lower paid than the higher paid masons. Nor, as is clear, were these pay rates tightly fixed by convention; other masons were paid wages that were scattered around these two modal peaks. The implication is that Kempster's workforce of masons fell into two loosely defined levels, with tiered pay that reflected different levels of skill.

Figure 4. Distribution of day rates paid to Kempster masons and labourers October 1700 - October 1701, St Paul's Cathedral n=28 . Source TNA C106/145

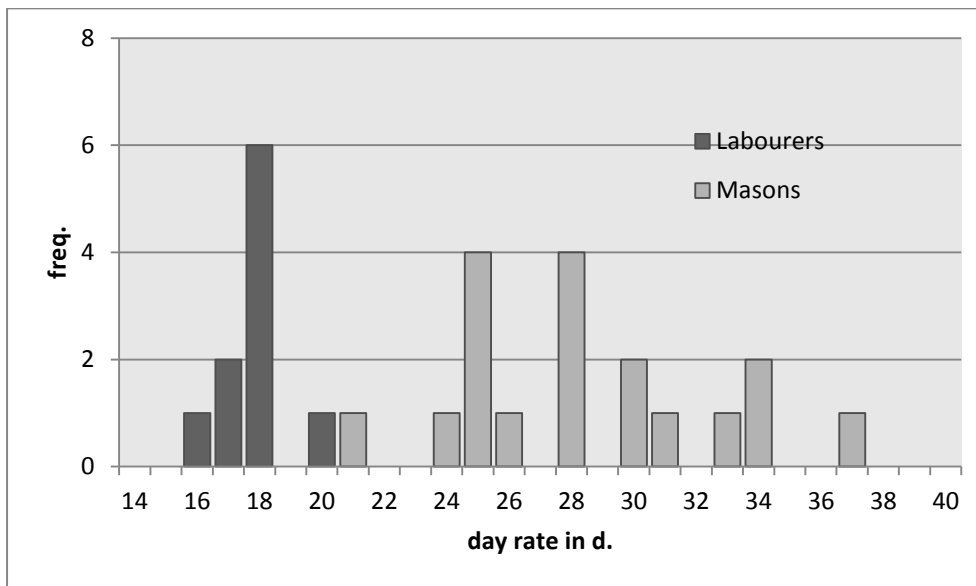
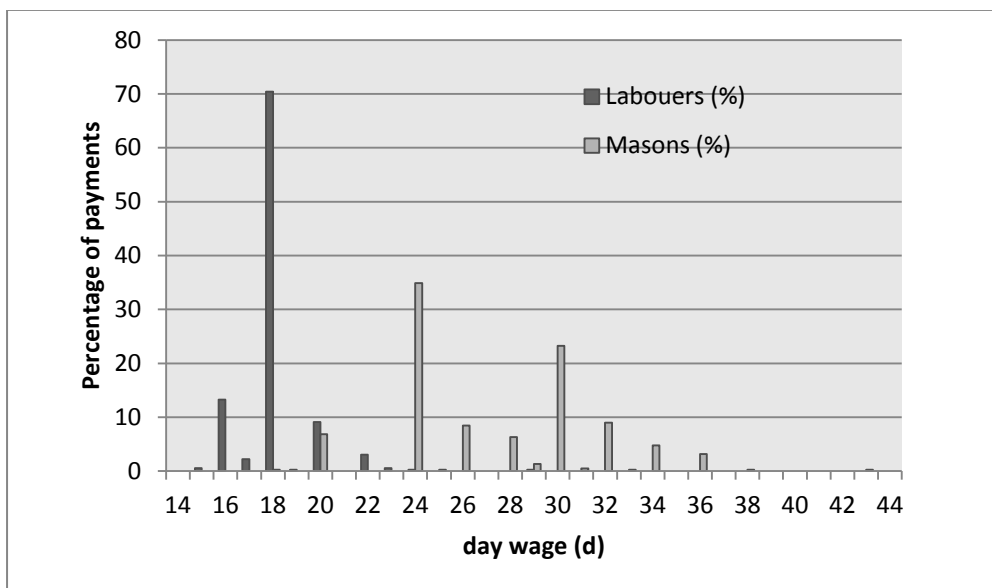


Figure 5. Day rates paid by Kempster as percentage of total pay October 1700 – October 1701. Source TNA/106/145



We can trace a few of the workers listed in Kempster's books, and the better paid among them were very experienced. Richard Richards, who headed the list of 'Masons on Call' in the July 1708 accounts, was a freeman of the Masons' Company, and had been working at St Paul's twelve years before, in September 1694, as part of the team of Christopher Kempster, William's father. Joseph Smith, whose name came after Richards on Kempster's July list of masons, had also been working on the site in 1694, as had Thomas Allen. Richards and Smith

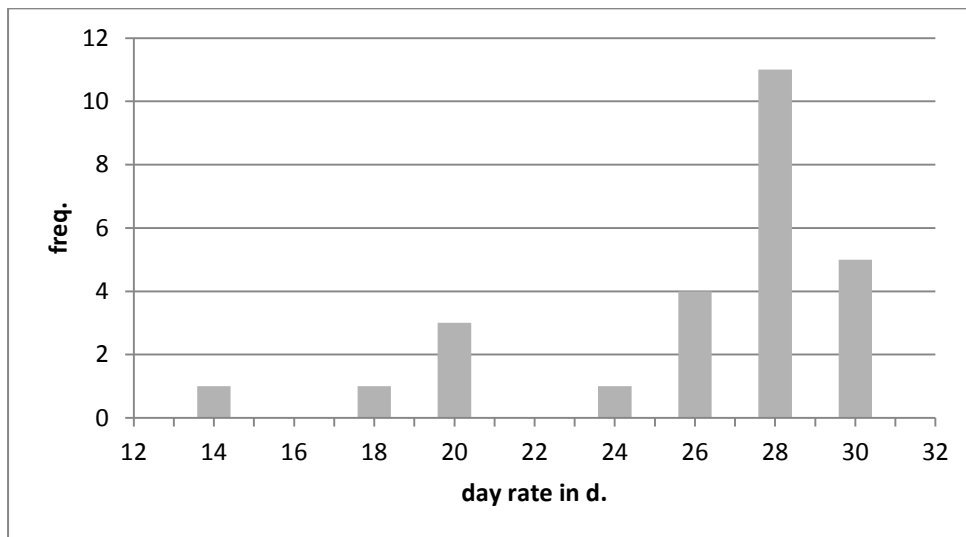
earned 30d. a day throughout the 1708 accounts, but Allen never received more than 28d. At least three of the masons working for Kempster in 1701 (one the highest paid employee listed, on 36d a week, the other two on 32d. and 28d. respectively) were recorded of the Masons' Company search in 1694, and so had accumulated at least a reasonable amount of experience.⁸⁷

The work Kempster's men carried out at St. Paul's was highly skilled, even exceptional.

Figure 6 gives the day rates of the men who carved the columns of the West front that we still see today. The contract was shared between Kempster and Samuel Fulkes, another mason contractor favoured by Wren. The work was thought of as prestigious, and Kempster's account of the rates in on a separate sheet marked carefully 'an account of the masons time it was on the columns'. The distribution of rates shows that the mean day rates for masons on site was in the region of 26d. per day. This, of course was entirely dependent on the level of skill present on site each day. It should be noted that the mason contractors provided most of the stone carving at St Paul's, so these higher rates (30 – 36d. per day) include carvers and the most skilled men who fitted the staircase.

⁸⁷ The men are John Barker, William Cooper and J. Magnus. Barker is recorded in Kempster's other pay records as a carver, substantiated by the fact he was apprenticed to a carver according to Knoop & Jones. Several other men who appear in Kempster's books appear in masons company records; Michael Growden, Peter & Nic Abraham, Will Ash, and others. However, not all men can be traced. It remains a possibility that large-scale contractors used mobile gang labour paid at cheaper rates than normally paid in London: i.e. but it should be stressed that a significant number of the Kempster team are found in London records, and it should also be noted that many of them are found consistently over the period 1700 – 1708 at St Paul's.

Figure 6. Day rate distribution Kempster “masons time as it was on the columns” 1708 . Source TNA C106/145



We know from the records of St Paul's that Kempster was charging the men out 'on call' – when they were on day rates - at 2s. 6d. or 30d per day, which is the rate taken for that period in the Gilbois series, and which the rebuilding commission had kept fixed since 1675.⁸⁸ But we also know from the Boulton series that many charge out rates in London at that time were much higher. Boulton's shows charge out rates for the period 1700 to 1710 of 30 to 42d. (mostly 36d.) There are no observations in the Boulton data after 1691 below 30d. a day for a craftsman. Likewise, for labourers after 1700 there is only 1 observation under 21d. per day. Yet the St Paul's rate - because they were paying them directly - was 16 and 18d. per day. Between 1670 and 1720 there is an upward trend in the day rate of labourers and craftsman in Boulton's data, for craftsmen for instance, there is rise in the lowest rate from 18 to 32d. The St Paul's rates were steadily 30d. throughout this whole time. Table 3 shows the deviation of Kempster's data from Boulton's rates using an average day rates from Kempster's figures of 26d, and a St Paul's average of 17d. per day for labourers.⁸⁹

⁸⁸ LMA CLC/313/B/I/25473/40, 41 shows Kempster's charging 2s. 6d. for masons to St Paul's in the same period.

⁸⁹ Based on the median wage for the data presented here in figures 3 to 6.

Table 3: Percentage difference between Boulton series and Kempster pay per day.

Year	Boulton Craft	Kempster Craft	% difference	Boulton Labour	St Paul's Labour	% difference
1700	31.5	26	-17.4	24	17	-29.1
1701	32	26	-18.75	24	17	-29.1
1702	36	26	-27.7	24	17	-29.1
1705	34	26	-23.5	25	17	-32
1706	32	26	-18.75	26	17	-34.6
1707	32	26	-18.75	26	17	-34.6
1708	31	26	-16.1	25	17	-32
Average	32.8	26	-20.8	25	17	-32

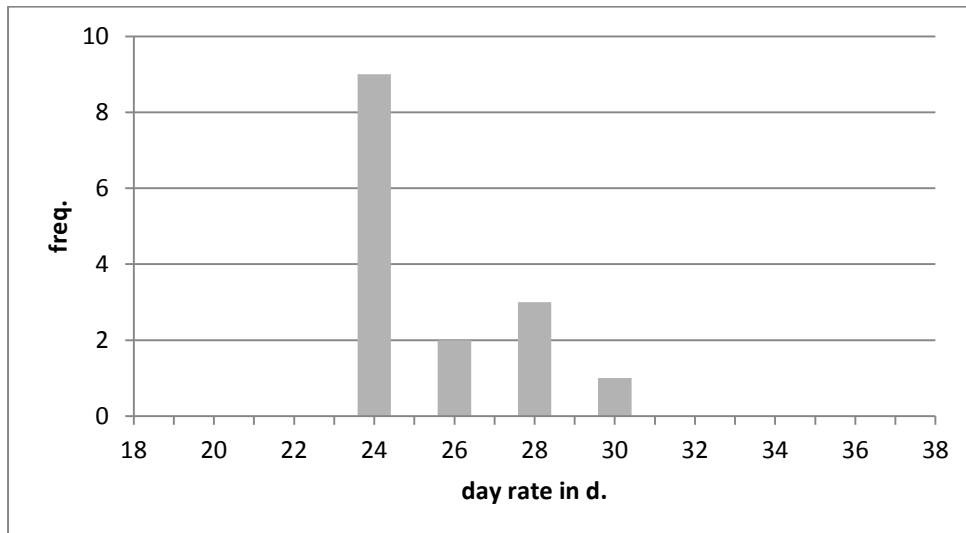
Source: Boulton, 'Wage Labour', pp. 288-89.

There is other evidence which challenges the existing series. Bridge House or London Bridge is the only site where there are ample records of both directly paid and contracted labour continuously to the mid nineteenth century.⁹⁰ The wages recorded there are a complex combination of day rates and tide rates, but pay was significantly lower than Gilboy or Schwarz recorded. Figure 7 shows a distribution of only craftsmen's pay in 1661 including pay for 6 tides a week, the mean was 25.37d. for well over a day's work, without the tides mean pay per day would have been 19.78d. per day for craftsmen. Tides worked were unpredictable. Labourers were paid 7s. a week for a six day week in this period. In the decades up to 1737 many carpenters and labourers were paid only by the tide. Carpenters earned 18d. a tide, and with an average of nearly seven tides a week their equivalent day pay was 21d. Labourers earned half this rate. Low pay at the Bridge persisted. William Wilmor,

⁹⁰ Bridge House refers to the institution and estates which held and managed London Bridge and buildings at the Southwark end of London Bridge owned by the City.

master Land Carpenter, was still paid 16s. a week, or 32d. per day in 1788.⁹¹ Labourers average pay per day throughout the 1750s and 60s was between 11 and 12d.⁹²

Figure 7. Distribution of craftsmen's pay, (Carpenters, Bricklayers, masons) at London Bridge October 1661, including tides. n=24



Previous historian's sources and contemporary printed guides to the wages paid to building labour in private house building, give lower rates than existing series also. Dorothy George cited masons on 30d. a day in 1775.⁹³ William Pain's *Builders companion* of 1761, a guide for the gentlemen builder's client, reports a few day rates, but those given that match Gilboy's rates are described as the highest estimate. The rest are twenty percent below that rate.⁹⁴ A 1747 guide to different careers open to young persons, (Campbell) suggests that rates for building journeymen were a half crown a day, 20 percent lower than Gilboy's figure.⁹⁵ The evidence firmly indicates that a rate of twenty percent less than the existing series for craft and at least that for labourers was that which was actually paid to men in the period. Authors who have examined the building trades in the nineteenth century have shown

⁹¹ LMA Bridge House Estates CLA/07/FN/03/27 – 29. As noted earlier, section II above, Boulton highlighted lower pay at Bridge House throughout the seventeenth century.

⁹² See LMA CLA /007/FN/04/005, Tide carpenters bills.

⁹³ George, *London Life in the Xviiiith Century*. p.166.

⁹⁴ Pain, *A Builder's Companion*. The highest rate for a bricklayer is 3s. per day in 1761. Masons and carpenters are given in measured rates only.

⁹⁵ Campbell, *The London Tradesman*.

that a twenty percent mark-up applied to all wage rates.⁹⁶ It should not surprise us that the eighteenth century worked on a similar basis.

VII

Was the contracting model established elsewhere at this time? Whilst Woodward's study of Northern England suggest trades dramatically different in scale and scope to London, what of Southern England building wages? That series is a composite of data drawn from sources that are highly similar to London's series. It was derived by Phelps Brown and Hopkins from Thorold Rogers data up to 1700 and extrapolated from Gilboy's Maidstone data for 1730 to 1810. They themselves highlighted that Rogers took the highest wages found and that his series was based on a very limited number of observations.⁹⁷ Most of Thorold Roger's provincial data is from a limited number of Oxford and Cambridge colleges, whose building projects were of a similar scale and complexity to those in London. Indeed, many of the people involved were the same: Sir Christopher Wren was responsible for much of the work reported in Thorold Rogers' college sources and he used some of the same contractors in Oxford as in London.⁹⁸ Examinations of the building and vouchers archives at New College, which is the longest and most consistent series given by Thorold Rogers' for wages, confirm that direct labour was not employed at Oxford after 1600. Rather the vouchers show that the contracting system being used in large and small scale construction in Oxford was virtually the same to London.

⁹⁶ C. G. Powell, *An Economic History of the British Building Industry 1815-1979* (London: London : The Architectural Press, 1980).p.33

⁹⁷ E. H. Phelps Brown and Sheila V. Hopkins, "Seven Centuries of Building Wages," *Economica* 22, no. 87 (1955).

⁹⁸ For a list of his projects at the universities see Colvin, *A Biographical Dictionary*. See fn. 18 on Kempster in Oxford.

By way of example, throughout the 1690s John Doude, mason, appears in the vouchers at New College. His bills are in the same format as the examples from London given above. Masons or “his man” are charged out at 1s. 6d. per day in 1690, and labourers or others at 1s.⁹⁹ Similarly, in 1707 a bill for mason’s and labourers pulling down and replacing the walls in the garden and levelling the yards was charged out at 18s for 16 days.¹⁰⁰ Many bills that give no day rates at all, merely a price for whole contracts. In 1740 the college was charged £25 for “building a summer house and laying paving”. As in London, the bills have no allowance for carriage, tools or the other constituents of overhead mentioned above. Building craftsmen’s recorded day wages across Southern England were shaped by the same contracting system in use in London. The Southern England wage data should be deflated by a similar amount. This would preserve the capital’s wage premium, but at a markedly lower real level.

Britain’s wages have not always been viewed as high, in fact, as Wallis recently noted economic historians have long held widely diverging beliefs about the nature of labour in Britain.¹⁰¹ Until the late 1990s, many theories about Britain’s development centred on low wages and a flexible labour force, and it was posited that high wages in the Low Countries had been the reason why the Golden Age in Holland did not bring about industrialisation. Moreover, there has been dissent about the interpretation of pre-industrial Britain as characterised by high wages.¹⁰² Methodological, theoretical and historical challenges have

⁹⁹ New College Oxford archives vouchers 11367, and 11368 1690 – 92.

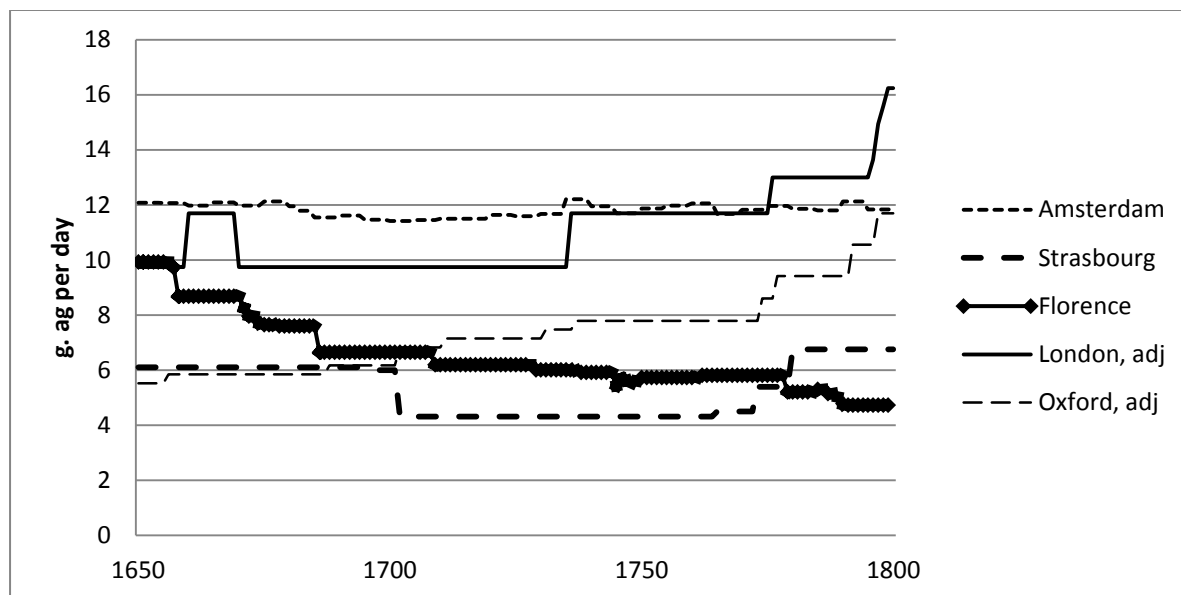
¹⁰⁰ New College Oxford archives vouchers 11372

¹⁰¹ Patrick Wallis, “Labour Markets and Training,” in *Economic History of Modern Britain*, ed. Roderick Floud, Jane Humphries, and Paul Johnson (The Cambridge economic history of modern Britain. Volume 1. 1700-1870, 2014).p.189:

¹⁰² For a theoretical perspective see W. Arthur Lewis, “Economic Development with Unlimited Supplies of Labour,” *Manchester School* 22, no. 2 (1954).also Joel Mokyr, “Dear Labor, Cheap Labor, and the Industrial Revolution,” in *Favorites of Fortune : Technology, Growth, and Economic Development since the Industrial Revolution*, ed. Patrice L. R. Higonnet, Henry Rosovsky, and David S. Landes (Cambridge, Mass: Harvard University Press, 1991). McCloskey, *Bourgeois Dignity*, chapter 22, Humphries, “*The Lure of Aggregates and*

questioned how high wages fitted with the large qualitative evidence of low living standards, the relevance of a male breadwinner family, and the mechanism of capital's decision to substitute.¹⁰³

Figure 8. Comparative Craftsmen nominal wage per day, with adjusted London series, (after Allen 2001). Note: based on Allen's real wage data at <http://nuffield.ox.ac.uk>.



the Pitfalls of the Patriarchal Perspective: A Critique of the High Wage Economy Interpretation of the British Industrial Revolution."

¹⁰³Mokyr, *The Enlightened Economy : An Economic History of Britain, 1700-1850.*, page 268 – 272, also See Humphries, Humphries, "The Lure of Aggregates and the Pitfalls of the Patriarchal Perspective: A Critique of the High Wage Economy Interpretation of the British Industrial Revolution."709-10, The factor of cheap coal of course, remains, notwithstanding that many have made the point that the Dutch could also have accessed the coal such as McCloskey, in note 93 above, , see also John U. Nef, *The Rise of the British Coal Industry* (London: London : G. Routledge, 1932).for transport considerations.

Figure 9. Comparative Labourers nominal wage per day in silver, with adjusted London series, (after Allen 2001). Note: based on Allen's wage data at <http://nuffield.ox.ac.uk>.

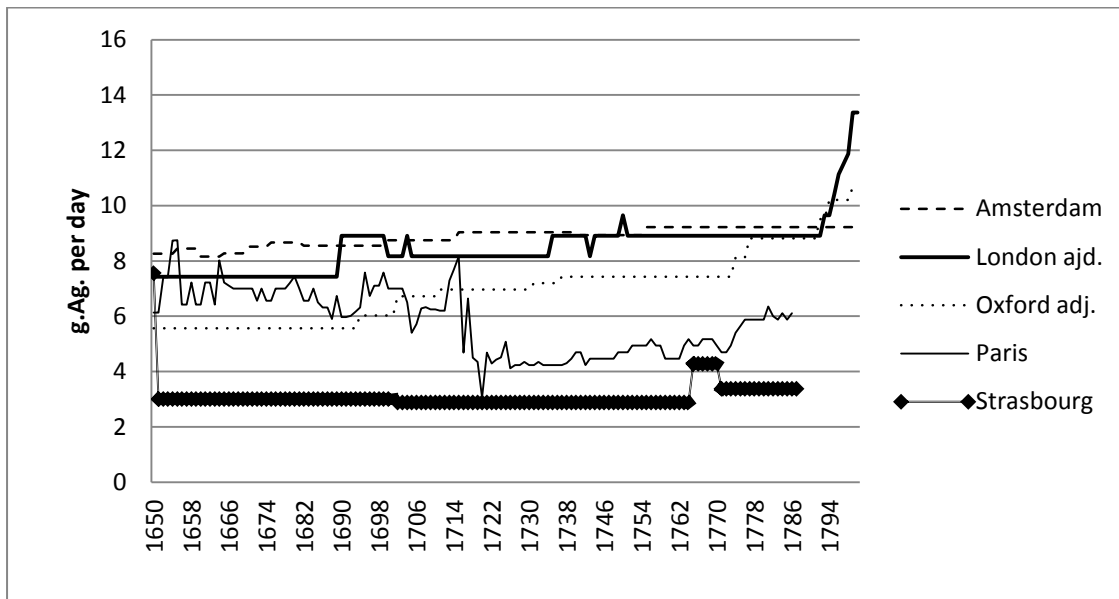
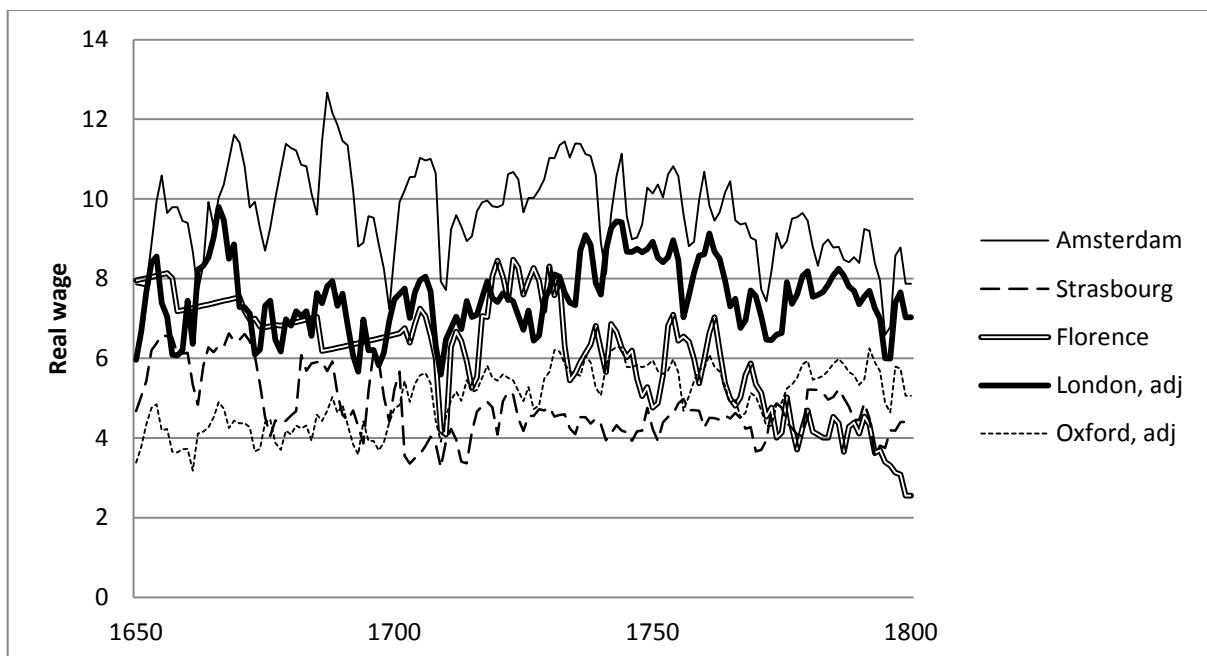


Figure 10. Comparative Craftsmen's Real wages with adjusted London series, (after Allen 2001). Note: based on Allen's real wage data at <http://nuffield.ox.ac.uk>.



It is crucial to ask if the issue of contractors' margins affects wage series from elsewhere in Europe, as in light of the new evidence of wages the "historical problem" of why technological development happened in Britain in the eighteenth century may re-present itself.¹⁰⁴ Perhaps we simply need to lower our estimate of wages across the board, which would affect our understanding of welfare, but not of the potential importance of factor prices. But, initial research suggests that the contracting system did not work in the same way as in Southern England elsewhere, or at least not to the extent of the new London figures.

For Amsterdam the sources that Allen draws upon are from deVries and Van DerWoude's 1997 data.¹⁰⁵ Their figures were actually for the whole of Western Dutch Republic, including the hinterland, so it understates the city rate.¹⁰⁶ In contrast to London, Dutch sources are admiralty shipwharves, ropeworks, drainage authorities charged with maintaining dikes, and public works bodies of hinterland towns responsible for fabric repairs, not prestigious ecclesiastical projects. Men received drink and sometimes food on a more regular basis.¹⁰⁷ Amsterdam was still directly employing crafts people and labourers as late as the 1760s, whereas all works were contracted out a century before in England.¹⁰⁸ Further archival

¹⁰⁴ Allen, *The British Industrial Revolution in Global Perspective*. p.1

¹⁰⁵ De Vries, 'An Inquiry into the Behaviour of Wages', Van der Wee, 'Prices and Wages as Development Variables'.

¹⁰⁶ The Amsterdam figures that contributed to it were from Nusteling, *Welvaart En Werkgelegenheid in Amsterdam, 1540-1860* : page 252 – 4, and they are higher than the composite.

¹⁰⁷ J. deVries "The Labour Market," *Economic and Social History in the Netherlands* 4 (1992). J. deVries "How did Pre-industrial Labour Markets Work?," in George Grantham and Mary MacKinnon, eds., *Labour Market Evolution* ((London, Routledge, 1994), pp. 39-63. J. deVries "An Employer's Guide to Wages and Working Conditions in the Netherlands, 1450-1850," in Carol Leonard and B.N. Mironov, eds., *Hours of Work and Means of Payment: The evolution of conventions in pre-industrial Europe. Eleventh International Economic History Congress*, Milan, 1994, pp. 47-64.

¹⁰⁸ Archief van het Stadsfabriekambt en Stadswerken en Stadsgebouwen, inventory number 4.

research of the type done here for London would be needed to understand fully the differences.¹⁰⁹

For other cities, sources have similar comparison issues. Malanima has shown that Italian wages have been underestimated.¹¹⁰ The Strasbourg wage series comes from a nineteenth century source which details figures from Mulhouse – a rural area 103 km south of the city.¹¹¹ Other series for France are higher.¹¹² The question of whether English monetary policy inflated silver wage level has been raised.¹¹³ Further work on contracting systems is urgently required.

As figures 8, 9 and 10 show, the necessary revision to the wage series that I propose here indicate, given existing data, that the cost of labour in London only exceeded those in the maritime Netherlands after 1785, when the innovation and invention of mechanized production method had already begun to be adopted in Britain. Provincial English wages only approached parity with wages in the Dutch Republic in 1800. Even if English silver wages were a third lower than was previously thought, they were still substantially higher than wages in many European centres. However, they no longer stand out against those in Amsterdam, Paris or Antwerp. Whilst the price of energy remains, the wage figures no longer seem to offer a clear explanation for English performance and divergence from North Western Europe.¹¹⁴

¹⁰⁹ de Vries *Ibid.* notes that in the first quarter of the eighteenth century Dutch sailors and British sailors out of the two ports were paid exactly the same., page 82..Jelle Van Lottum, "Labour Migration and Economic Performance: London and the Randstad, C. 1600-1800," *The Economic History Review* 64, no. 2 (2011).

¹¹⁰ Paolo Malanima, "When Did England Overtake Italy? Medieval and Early Modern Divergence in Prices and Wages," *European Review of Economic History* 17, no. 1 (2013).

¹¹¹ Charles Auguste Hanauer. 1878. *Études économiques sur l'Alsace ancienne et moderne (denrées et salaires)*. Paris : Société industrielle de Mulhouse.

¹¹² Global Price and Income History Group. 2015. *Prices, wages and rents in Paris, 1450-1789*, <http://gpih.ucdavis.edu/Datafilelist.htm>; Global Price and Income History Group. 2015. *Prices and wages in various French Towns (non Paris), 1450-1789*, <http://gpih.ucdavis.edu/Datafilelist.htm>;

¹¹³ N.J Mayhew, "By Weight or Number? The International Comparison of Prices and Wages'." (Paper given at The Institute of Historical Research, June 19th, : IHR, 2015).

¹¹⁴ Summary of coal and energy inputs in Mokyr *Enlightened Economy*, page 101, 209, and generally Wrigley, *Energy*

In the long run study of wages the effects of organisations and agents, or services have not been sufficiently taken into account.¹¹⁵ In the case of the building industry in England, a failure to understand the contracting system and how it apportioned financial risk on large projects has given a false impression of the relationship between capital and labour in the building industry. This has led to an overstatement of workers' earnings, and thus a distorted view of their welfare and the market for labour, and the incentives for capital investment in the economy as a whole. The wages that men received in the building industry were a product of the bargaining between contractors and institutions and the pricing of risk, more than they were bargaining of men and employers. Given that so many sectors and industries in the eighteenth century in London were managed in a system of subcontracts and positions further research should be directed to understanding the difference between London wage structures and those elsewhere.¹¹⁶

This article has shown that existing records of early modern wages were a product of the institutions, business cycles and bargaining costs in particular trades, and shown new evidence that wages for men in the building industry were at least 20 percent lower than previously thought. It has also shown that real pay received by workers varied widely by skill level. The findings call for new substantive research on means and levels of earning in other areas of England, and other regions of Europe. If we want to use wages as a measure of output, living standards or anything else we must understand the organizations and institutions that paid those wages, as much as we do those who received them.

¹¹⁵ Broadberry, *Market Services and the Productivity Race*, Introduction.p.6

¹¹⁶ See Sidney Pollard, *The Genesis of Modern Management : A Study of the Industrial Revolution in Great Britain* (London: London : Edward Arnold, 1965).pp. 38-39, 47,

Appendix: Sources, and records of Building works used London 1660 – 1800.

Institution/ Site	Dates	Types of work	Types of records	Where held
St Paul's Cathedral	1660's through 1720's	Extraordinary, rebuilding of Cathedral under Christopher Wren.	Abstracts of accounts, Aquittance books, Day & Call books, meetings of commission and minute books.	LMA CLC/313/I/B/003/MSS25473/19 - 43 CLC/313/I/E/005/MS25485/003,8,9,
St James' Garlick Hill, St Paul's	1700 - 1708	“ “	Private day books of Christopher Kempster, mason Contractor	TNA PRO C106/145
Greenwich Hospital	1698 - 1709	Extraordinary. Construction of Naval Hospital.	Minutes and Account Abstracts	TNA ADM 67/2 and 4
Greenwich Hospital		“ “	Bill book of Edward Strong, Mason contractor	LMA CLC/B/227/MS00233
Westminster Abbey	1700 – 1780's	Extraordinary 1712 – 1722 works to Abbey under direction of Christopher Wren. After 1722, ordinary work	Contractors Bills. Fabric Committee accounts 1712 – 1722.	Westminster Abbey Muniments. Cat no's 34513, 35417, 35418
Middle Temple	1600 – 1780's	Ordinary work and modification	Treasurers accounts, abstracts	ACCVOUBI, MT.2/TUT MT2 / TRB/ No 5.

		to chambers and buildings.	and bills.	MT2/TOT/3/2 and like
Office of the Kings Works (OKW)	1660's - 1800	Ordinary and Extraordinary	Abstracts, and monthly accounts detailing contractors bills for all palace sites.	TNA WORK 5 /1 to 88
Bridge House	1660's - 1800	Ordinary		CLA/007/FN/04/09 – 21, and CLA/007/FN/03/021 to 29
Westminster Bridge	1739 - 44	Extraordinary	Contracts and contractors bills and some abstracts.	TNA WORKS 5/ 194,5, 6, 7,8
City of London various sites	1660's through 1780's	Ordinary & Extraordinary		COL/SJ/09/02, 3, 4, 5, 6, 10. COL/SJ/OF/05/173 COL/SP/05/073
Churchwarden accounts	1660's through 1750's	Ordinary	Piece rates recorded on warden's accounts. Rare day rates	St Botolph Aldgate, St Clement Danes, Account books, 1690's to 1770's sampled online. Tim Hitchcock, Robert Shoemaker, Sharon Howard and Jamie McLaughlin, <i>et al.</i> , <i>London Lives, 1690-1800</i> (www.londonlives.org, version 1.1, 24 April 2012).
City Churches	1670's	Extraordinary		CLC/313/J/018/MS25541/003,4

Archival Sources:

LSE Archive, Beveridge Price History D:3/4/5, E:7b/8/9/10/24a/25 F:1/8/9.

LMA COL CC MRK /02/01.

TNA WORKS 5 /56, Abstracts of accounts 1709 – 26

LMA CLC, MS00233.

CLC/313/I/B/014/MS25483/001

MT2/TOT/3/2

Westminster Abbey Muniments 34513, 36156, 34514, 34518

TNA WORK 5/146-166.

CLA/007/FN/03/25

New College Oxford archives vouchers 11367, and 11368 1690 – 92.

New College Oxford archives vouchers 11372

Bibliography and References:

Addis, B., *Building: 3,000 Years of Design, Engineering and Construction* (London, , 2007).

Allen, R., *The British Industrial Revolution in Global Perspective, New Approaches to Economic and Social History* (Cambridge ; New York, 2009).

Allen, R. C. 'The Great Divergence in European Wages and Prices from the Middle Ages to the First World War', *Explorations in Economic History* 38 (2001), pp. 411-447.

Allen, R. C. 'Why the Industrial Revolution Was British: Commerce, Induced Invention, and the Scientific Revolution', *Economic History Review* 64, no. 2 (2011), pp. 357-384.

Beveridge, W. H. B., *Prices and Wages in England : From the Twelfth to the Nineteenth Century / Vol.1, Price Tables:Mercantile Era*, 1st edn, 1965).

Boulton, J. 'Wage Labour in Seventeenth-Century London', *The Economic History Review* 49, no. 2 (1996), pp. 268-290.

Bowley, A. L., *Wages in the United Kingdom in the Nineteenth Century : Notes for the Use of Students of Social and Economic Questions* (Cambridge, 1900).

Brett-James, N. G., *The Growth of Stuart London*, 1935).

Broadberry, S. and Gupta, B. 'The Early Modern Great Divergence: Wages, Prices and Economic Development in Europe and Asia, 1500-1800', *Economic History Review* 59, no. 1 (2006), pp. 2-31.

Brown, E. H. P. and Hopkins, S. V. 'Seven Centuries of Building Wages', *Economica* 22, no. 87 (1955), pp. 195-206.

Campbell, J., *Building St Paul's* (London, 2007).

Campbell, J. W. P. "'The Finances of the Carpenter in England 1660-1710: A Case Study on the Implications of the Change from Craft to Designer-Based Construction"', in S. Cavaciocchi ed., *L'edilizia Prima Della Rivoluzione Industriale. Secc.Xiii-Xviii*, 2005), pp. pp. 313-346.

Campbell, J. W. P. 'Building a Fortune: The Finances of the Stonemasons Working on the Rebuilding of St Paul's Cathedral 1675-1720. ', *Proceedings of the Third International Congress on Construction History*. (2009).

- Clark, G. 'The Condition of the Working Class in England, 1209–2004', *Journal of Political Economy* 113, no. 6 (2005), pp. 1307-1340.
- Colvin, H. M., *A Biographical Dictionary of English Architects, 1660-1840* (London, 1954).
- Colvin, H. M., Mordaunt Crook, J., Downes, K., Great Britain. Department of the Environment. and Great Britain. Ministry of Public Building and Works., *The History of the King's Works Volume 5 1660 - 1782*. 6 vols (London, 1976).
- Dobson, C. R., *Masters and Journeymen : A Prehistory of Industrial Relations, 1717-1800*, *Croom Helm Social History Series* (London, 1980).
- George, M. D., *London Life in the Xviiiith Century* (London, 1925).
- Gilboy, E. 'Demand as a Factor in the Industrial Revolution', in, *Facts and Factors in Economic History. Articles by Former Students of Edwin Frances Gray*, (Cambridge, Mass, 1932).
- , *Wages in Eighteenth Century England* (Cambridge, 1934).
- Grassby, R. 'The Rate of Profit in Seventeenth-Century England', *The English Historical Review* 84, no. 333 (1969), pp. 721-751.
- Hudson, P., *The Industrial Revolution, Reading History* (London, 1992).
- Humphries, J. 'The Lure of Aggregates and the Pitfalls of the Patriarchal Perspective: A Critique of the High Wage Economy Interpretation of the British Industrial Revolution', *The Economic History Review* 66, no. 3 (2013), pp. 693-714.
- Kelly, M. and Ó Gráda, C. 'Ready for Revolution? The English Economy before 1800', *UCD Centre for Economic Research Working Paper Series; WP14/18* (2014).
- Knoop, D. and Jones, G. 'The London Mason in the 17th Century', *Ars Quatuor Coronatorum* LVIII part i 1935 (1935).
- Lang, J., *Rebuilding St.Paul's after the Great Fire of London* (London ; New York ; Toronto 1956).
- Latham, M. 'The City Has Been Wronged and Abused!': Institutional Corruption in the Eighteenth Century', *The Economic History Review* (2015), pp. n/a-n/a.
- Lewis, W. A. 'Economic Development with Unlimited Supplies of Labour', *Manchester School* 22, no. 2 (1954), pp. 139-191.
- Malanima, P. 'When Did England Overtake Italy? Medieval and Early Modern Divergence in Prices and Wages', *European Review of Economic History* 17, no. 1 (2013), pp. 45-70.
- McKellar, E., *The Birth of Modern London* (Manchester University Press, 1999).
- Mobus, M. 'Surviving Late Payments: Strategies of Christopher Wren's Masons from Burford', *Proceedings of the first Conference of the Construction History Society* 1, no. 1 (2014), pp. 273 - 279.
- Mokyr, J. 'Dear Labor, Cheap Labor, and the Industrial Revolution', in P. L. R. Higonnet, H. Rosovsky and D. S. Landes eds., *Favorites of Fortune : Technology, Growth, and Economic Development since the Industrial Revolution*, (Cambridge, Mass, 1991).
- , *The Enlightened Economy : An Economic History of Britain, 1700-1850*, *The New Economic History of Britain* (New Haven, 2009).
- N.J Mayhew. 'By Weight or Number? The International Comparison of Prices and Wages'.', in, (Paper given at The Institute of Historical Research, June 19th, , 2015).
- Nef, J. U., *The Rise of the British Coal Industry* (London, 1932).
- Nisbet, J., *A Proper Price* (London, 1997).
- Pollard, S., *The Genesis of Modern Management : A Study of the Industrial Revolution in Great Britain* (London, 1965).
- Powell, C. G., *An Economic History of the British Building Industry 1815-1979* (London, 1980).
- Rappaport, S. L., *Worlds within Worlds : The Structures of Life in Sixteenth-Century London*, *Cambridge Studies in Population, Economy, and Society in Past Time* (Cambridge, 1988).
- Reddaway, T. F., *The Rebuilding of London after the Great Fire* (London, 1951).
- Rogers, J. E. T., *A History of Agriculture and Prices in England: 1259-1793* (Oxford, 1866).
- Rudé, G. F. E., *Hanoverian London 1714-1808*, *History of London* (London, 1971).

- Schwarz, L., *London in the Age of Industrialisation : Entrepreneurs, Labour Force, and Living Conditions, 1700-1850, Cambridge Studies in Population, Economy, and Society in Past Time* (Cambridge England ; New York, 1992).
- . 'Custom, Wages and Workload in England During Industrialization', *Past and Present* 197 (2007), pp. pp. 143-176.
- Schwarz, L. D. 'The Standard of Living in the Long Run: London, 1700-1860', *The Economic History Review* 38, no. 1 (1985), pp. 24-41.
- Summerson, J. N., *Georgian London* (London, 1945).
- Van Lottum, J. 'Labour Migration and Economic Performance: London and the Randstad, C. 1600-1800', *The Economic History Review* 64, no. 2 (2011), p. 531.
- van Zanden, J. L. 'Wages and the Standard of Living in Europe, 1500–1800', *European Review of Economic History* 3, no. 02 (1999), pp. 175-197.
- Wages and Currency : Global Comparisons from Antiquity to the Twentieth Century*. Edited by J. Lucassen (Bern, Switserzland, New York, 2007).
- Wallis, P. 'Labour Markets and Training', in R. Floud, J. Humphries and P. Johnson eds., *Economic History of Modern Britain*, First edition. edn., (2014), pp. 178-210.
- Woodward, D., *Men at Work : Labourers and Building Craftsmen in the Towns of Northern England, 1450-1750*, (1995).