**Matthew Boulton, William Murdock and James Watt:**

**Appraisal for ‘Golden Boys’ Statue**

**March 2021**

**Birmingham Museums Trust**

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# **Methodology**

This report began with a simple premise: produce biographies of prominent historical figures Matthew Boulton, William Murdock and James Watt with reference to their local businesses and personal connections with global trade, particularly that linked to the British Empire. Boulton, Murdock and Watt were key figures in what Peter M. Jones has described as Birmingham’s ‘Industrial Enlightenment’ 1760-1820 and all are commemorated in the city’s famous statue by William Bloye, with assistance from Raymond Forbes Kings, known informally as the ‘golden boys’ statue.[[1]](#footnote-1) The statue itself was unveiled in 1956, after a long process of fundraising and development. In 1939, Richard Wheatley bequeathed £8,000 to enhance Birmingham’s civic space, to which the City Council added another £7,500. William Bloye was asked to submit designs in 1938 and 1943, although the project was temporarily delayed. Final casts were eventually made in 1953. The figures of Boulton, Murdock and Watt are represented in close discussion of technical drawings of mechanical apparatus, and the proximity of all is symbolic of the collaboration and teamwork which underpinned their enterprise.[[2]](#footnote-2)

With main British archives and libraries closed at time of writing in the Covid-19 era (March 2021), this project was primarily based upon desk-based research. As a result, the report - especially Boulton and Murdock sections - is a synthesis of existing knowledge culled from secondary literature and readily available digital sources. However, the section on James Watt has been informed by research undertaken on microfilms and archival sources for two previous projects. During work for the report ‘Slavery, Abolition and the University of Glasgow (2018), I undertook research on microfilms series ‘Industrial Revolution: A Documentary History’: Series 1: ‘The Boulton & Watt Archive and the Matthew Boulton Papers from Library of Birmingham’.[[3]](#footnote-3) Secondly, as a former holder of a *History West Midlands* Fellowship, I undertook archival research on the James Watt papers in the Library of Birmingham, Archives and Collections in August 2018.

# **Summary**

This report illustrates that Matthew Boulton, William Murdock and James Watt were all linked to British colonialism and slavery in the eighteenth and nineteenth centuries, sometimes directly (for example, via family businesses) whilst other connections were indirect (via banking connections) and occasionally tangential. The survey of Matthew Boulton’s background do not reveal connections with Atlantic slavery or British colonialism, and there is evidence to suggest his early business focus was Europe, especially France. Nevertheless, he was indirectly connected to West India commerce via his relationship with the London banking firm Raymond, Williams, Vere, Lowe & Fletcher, owing debts when the firm of Boulton & Watt (B&W) was established in the 1770s. As Boulton’s business concerns expanded, so too did his customer base. For example, he received orders for luxury items from the West Indies in 1799. The relationship with the East India Company (EIC) via Soho Mint was likely of far greater importance, producing coinage and other items. This was a potentially huge economic relationship (e.g., one order was worth £4,000 in 1780) and this will require detailed work in ledgers to ascertain the scale and its significance to the development of the firm Boulton & Watt after 1775. In the firm’s early phase (especially in Cornwall, England), domestic rather than Atlantic business was prioritised although Boulton injected capital sourced from EIC business at a crucial stage in 1780. Boulton had no issue socialising with EIC statesmen, or with Caribbean enslavers, the latter whom he also marketed his steam-engines to. However, whilst there is evidence of business dealings with the EIC, there is no known evidence that B&W exported steam engines to the West Indies before Boulton and Watt’s retirement in 1800. Given the widespread interest for potential sales, it remains a mystery why they chose not to export in the era of the first patent (1775-1800).

James Watt was directly complicit in Atlantic slavery whilst resident in the west of Scotland in a way that neither Matthew Boulton nor William Murdock ever was. His personal involvement in trafficking the young black child Frederick from Greenock in 1762 represents the only clear example identified in this study that one of these three participated in the enslavement of other people. It also seems likely that slavery-derived capital - via his merchant father’s subsidies - was crucial to Watt’s development and early practice as an instrument maker in Glasgow. There are some qualifiers. It is unknown just how profitable that James Watt senior’s Atlantic concerns were, and by extension how much they contributed to Watt’s rise. Moreover, colonial commerce does not seem to have been a decisive factor in any of James Watt’s own business concerns, nor especially profitable on a personal level whilst he was in Glasgow. His investment in Delftfield pottery in Glasgow – which exported goods to West India planters – was to prove a profitable one in the longer-term. With Boulton in Birmingham after 1774, Watt conversed with West India planters, although seems to have shown displeasure at Boulton’s socialising with directors of the East India Company on one occasion. Whilst Boulton and Watt were far removed from what would have been understood at the time as being abolitionists, both occasionally conveyed – publicly and privately – expressions of token solidarity for the movement, exemplified by the welcome for Olaudah Equiano in Birmingham and the James Watt’s letter to French merchants that advocated the gradual abolition of slavery. These expressions were heavily qualified - for the pair wooed Caribbean planters in the last quarter of the 18th century, a relationship their sons were to exploit in full after 1800.

Unlike James Watt, there does not seem to have been any imperial influence upon William Murdock in his early years. After relocating to Birmingham in 1777, he spent over twenty years of his engineering career in Cornwall as an underpaid and arguably underappreciated employee of the firm of Boulton & Watt. After Boulton and Watt’s retirement in 1800, their sons Matthew Robinson Boulton, Gregory Watt and James Watt junior took over and had no issues dealing with Caribbean planters. The firm required expertise after the retirement of the founders, and – since the business of exporting steam engines to Caribbean enslavers became large-scale after 1803 - the irony is that William Murdock became indirectly implicated in a way that Matthew Boulton and James Watt were not. Murdock’s expertise was rewarded with a large annual wage from 1810, and he was employed by a firm inextricably connected to Caribbean slavery before final abolition in the British West Indies (1834-8). Murdock retired in 1830 possessing a major fortune by contemporary standards, albeit not as wealthy as his two associates.

# **Matthew Boulton (1728-1809)**

**Background and education**

Matthew Boulton, financier, industrialist and entrepreneur, was born in 1728 in Snow Hill, Birmingham, the eldest son of Matthew Boulton (d.1759) and Christiana (d.1785), the daughter of a Mr Piers in Chester. Matthew, the subject of this report, was one of four children. He was the second but eldest surviving son, a brother dying in infancy in 1726. The young Matthew received schooling in Rev. John Hausted’s academy and was later said to have shown some familiarity of English literature and the classics (though reputedly due to self-learning rather than school instruction). Aged around fourteen, he entered his father’s business and became a partner when he reached twenty-one (see below).[[4]](#footnote-4) Matthew Boulton married twice. Firstly, around 1756, to Mary the eldest daughter of Luke Robinson, described as an ‘opulent mercer’ in Lichfield (a dealer in textiles, especially expensive fabrics). Mary died soon afterwards (c.1759), with no surviving children. Boulton quickly married his deceased wife’s younger sister, Anne (d.1783), who was seven years his junior (although forbidden by ecclesiastical, but not common, law). Some in the Robinson family, notably his brother-in-law, were opposed to the marriage: since Anne stood to inherit £28,000 (around £51.7m sterling in modern values), aspersions were cast on Boulton’s motives. They were nevertheless married on 15 June 1760. Whilst there were legal complexities about husband’s possessing a marital inheritance, Boulton apparently acquired the fortune around 1765, by which time he was thoroughly established in business.[[5]](#footnote-5) There were two children from the marriage; Anne (d.1829), and Matthew Robinson Boulton (1770–1842), the latter was to inherit and expand his father’s business interests.

**Family business**

Matthew Boulton senior (d.1759) was a ‘Steel Toy Maker’ who produced goods such as buttons and buckles for shoes intended for export (note the difference in the contemporary and modern understandings of ‘toys’). Within three years of starting work with the family firm, the younger Boulton produced an innovative inlaid buckle which boosted the family business. He became a partner aged 21 and he inherited the business when his father died in 1759.[[6]](#footnote-6) Boulton’s early business activities were recorded for posterity when he appeared as a witness before a Committee of the whole House in the British Parliament on 22 April 1760. Boulton was one of several prominent manufacturers who petitioned parliament in order to prohibit the export of buckle-chapes (a separate trade from making buckles). Boulton stated the returns from buckle-making were substantial and employed 8,000 workers. Moreover, he claimed that prohibiting the export of chapes (which allowed the fastening of buckles to ribbons) would increase buckle exports: this was effectively one branch of trade attempting to restrict the success of another. The parliamentary evidence suggests that Europe was the premier export market for buckles; especially Spain, France and Germany. Robinson’s brief survey of Boulton’s foreign buckle trade also suggests the focus was on Europe, rather than the Americas.[[7]](#footnote-7) His experience in parliamentary lobbying and marketing was to serve him well in later ventures.

**Soho Manufactory, Soho House and the Lunar Society**

Matthew Boulton’s early business concerns gradually evolved to combine the role of manufacturer and merchant. Soon after his father’s death in 1759, Boulton looked for a suitable site for expansion of ‘ye manufacturing of various articles in ye Birm[in]g[ha]m Hardware and toy Trade’. Between 1761 and 1766, what became known as Soho Manufactory was built in Handsworth (the site was advantageous as it was close to Hockley Brook, a tributary of the Tame). The works became the largest factory in the world whilst Boulton improved Soho House on the site.[[8]](#footnote-8) The residence later provided the Lunar Society – Boulton’s intellectual peer group – with a base for regular meetings.[[9]](#footnote-9) The Lunar Society was a club frequented by a small group of pioneers from various disciplines including medicine, manufacturing and natural philosophy. These men have been described by historian Jenny Uglow as the ‘fathers of the industrial revolution’. The group’s experimental application in diverse spheres such as chemistry, engineering and medicine made many of these men – such as James Watt, Erasmus Darwin, Josiah Wedgewood - world famous.[[10]](#footnote-10) Boulton also established industrial connections. In 1762, he entered into partnership with John Fothergill - each partner brought £5,000 capital - thus meshing the former’s manufacturing expertise with the latter’s mercantile networks. The partnership lasted until 1781, and early ventures included the manufacturing of steel jewellery and buttons. Whilst Forthergill had many foreign connections, these did not prove lucrative. According to historian Jennifer Tann, the Boulton-Fothergill partnership was loss-making across the duration of the eighteen years of partnership. Dickinson supports this view, arguing when the partnership ended in 1780, it had losses of £11,000 and without Boulton’s wives’ estates, the firm would have been bankrupted.[[11]](#footnote-11)

**Sheffield Plate, Ormolu, Silver Plate**

Matthew Boulton cast a wide entrepreneurial net, investing in multiple industrial ventures out of Soho. The production of Sheffield plate was established in 1762 and for the next twenty-five remained the only producer outside of Sheffield itself.[[12]](#footnote-12) In 1768, Boulton began making ormolu (an alloy used for ornaments, which previously had been a French monopoly) for products such as clocks. His main market was initially Europe, rather than the Americas. Writing to the James Adam in October 1770, he noted: ‘I have likewise establish’d a Correspondence in almost every mercantile Town in Europe’.[[13]](#footnote-13) Boulton also brought new goods to auction in Christies sale-rooms in London. Annual sales took place in 1770, 1771 and 1778. These sales were marketed – via daily newspapers and direct contact - to royalty, the aristocracy and the gentry. It seems possible that Boulton’s later customer base included imperial statesmen. In 1771, for example, Boulton dined with John Motteux, the Governor of the East India Company, whilst in London.[[14]](#footnote-14) Around 1765, Boulton expanded into the manufacture of silver plate. At first, Birmingham lacked an Assay office (to allow articles to be hallmarked). Having to send items to Chester, York or London was risky, and although there was opposition from these cities, Boulton lobbied and gathered support. Two Assay offices were subsequently established in Sheffield and Birmingham around 1773. Boulton sourced the silver locally, making tureens, candlesticks, vases and coffee pots.[[15]](#footnote-15) It seems the British aristocracy and gentry were his main customer base, although orders were placed from the West Indies in 1799, presumably from resident enslavers or merchants.[[16]](#footnote-16) Given Boulton’s expensive wares were marketed to high society, and the prevalence of West India absentees and East India nabobs amongst the ranks of the late-eighteenth-century English gentry, it seems possible that colonial *arrivistes* were amongst his customer base, although this conjecture can only be answered with examination of ledgers and letter-books. Nevertheless, for James Keir, Scottish chemist and fellow member of the Lunar Society, Boulton’s ventures were ingenious but innovativeness was not ‘sufficient to ensure profitable success in Trade’. In particular, the ormolu vases proved too expensive for general sale, whilst the silver plate could not sell anywhere except London. The production of these goods did bring Boulton much fame and attracted many visitors from across the UK and internationally.[[17]](#footnote-17)

**Boulton and Watt partnership**

Matthew Boulton had been interested in an improved steam engine to resolve issues around the water supply at the Soho Manufactory, and was corresponding with Benjamin Franklin on these issues as early as 1766. He learned from his friend Dr John Roebuck, the founder of Carron Iron Works who had sunk coal mines in Bo’ness in Scotland, of his protégé, James Watt. Watt was born in Greenock in the west of Scotland in 1736. He worked with his father’s mercantile business, training as an instrument maker in London in 1755 and was employed at Old College - now the University of Glasgow - afterwards (see below). Roebuck had financially supported the development of the steam engine, and Watt had previously experimented with engines at a workshop behind Kinneil House, the Roebuck residency. Roebuck’s bankruptcy in 1774 brought Boulton and Watt together in a collaborative partnership and Watt permanently relocated to Birmingham that year.[[18]](#footnote-18) Soon after Boulton’s death, he recalled how he was first shown the Soho works in 1767, although Boulton was not present. Since 1763, Watt experimented with Old College’s Newcomen’s steam-engine and sought a patent in London for an improved steam engine in 1768. He was introduced to Boulton at this point, and they kept up correspondence afterwards. Due to bankruptcy in 1774, Dr Roebuck assigned his share of the patent to Boulton and Watt moved permanently to Birmingham that year. Watt acknowledged that without Boulton, the steam engine would never have been improved the way it did:

His generous patronage, the active part he took in the management of the business, to his judicious advice & to his assistance in contriving & arranging many of the applications to various machines, the publick is indebted for great part of the benefits they now derive from that machine; without him, or some similar partner (could such a one have been found) the invention could never have been carried by me to the length it has been.[[19]](#footnote-19)

Boulton’s personal wealth, good credit and political lobbying were certainly to prove useful; he subsidised the development of the improved steam engine whilst obtaining an extension of the patent from Parliament on 22 May 1775 (which also covered Scotland, unlike Watt’s in 1768). With the Fothergill partnership not covering the steam engine business (and he died in 1782), the Boulton-Watt partnership began in earnest in 1775. Their partnership lasted for twenty-five years, covering the duration of the extension of the patent.

**Boulton & Watt Steam Engines: Great Britain and the West Indies**

In the early days of the Boulton & Watt partnership, orders were placed for engines in diverse industries such as distillers, iron works and collieries in Staffordshire, London and Cornwall. The Cornish business developed to such an extent that the appointment of a resident agent was required. As the business developed, William Murdock came looking for a job in 1777 (and was sent to Cornwall in 1779, see below) whilst there was a requirement for expansion capital.[[20]](#footnote-20) The business was capital hungry. Indeed, it has been estimated that Boulton & Watt required investment of between £40,000 and £50,0000 before the steam engine business became profitable.[[21]](#footnote-21)

In the classic *Capitalism and Slavery*, noted Caribbean historian Eric Williams argued that Atlantic slavery and its commerce underpinned the British Industrial Revolution. The financing of the Boulton & Watt steam engine was cited as a prime example how capital accumulated from West India commerce stimulated British industry.[[22]](#footnote-22) For in 1778, Matthew Boulton was indebted to Raymond, Williams, Vere, Lowe & Fletcher, a banking house based in the city of London. Watt also had a personal bond with the bank, though he maintained the finance was extended only to Boulton. By 1785, Boulton paid off debts which meant that Watt was released from the personal bond much to his relief as it released him from, in his own words, ‘hell on earth’.[[23]](#footnote-23) The main business of the bank was tied up with West India commerce and had already ‘advanced Boulton large sums’. Both partners were aware of the nature of the bank’s commercial business, with Boulton writing to Watt about the bank’s financial situation in July 1778: ‘Even in this emergency, Lowe, Vere & Company may yet be saved, if ye West Indian Fleet arrives safe from ye French fleet…as many of their securities depend on it’.[[24]](#footnote-24) The merchant bank, therefore, loaned capital to West India merchants, who in turn settled their accounts after ships arrived carrying slave-grown produce such as cotton, sugar and rum. The West India elite’s repayments (with interest) created surplus capital for banks which stimulated the domestic economy via lending to industrialists and associated enterprises, in this case Matthew Boulton.

Whilst expansion capital was sourced from a bank with West India securities, sugar planters were themselves desirous of Boulton & Watt steam engines. In the 18th century, wind, water and animals were the natural sources of power that drove sugar mills in the Caribbean (with animal-power being the dominant source). Animal powered mills had high recurrent costs in terms of foodstuffs and replacement mules.[[25]](#footnote-25) By examining the application of the Boulton & Watt stationary steam engine to the Jamaican sugar industry, the historian Veront Satchell illustrates the benefit of steam to Caribbean enslavers. Firstly, the previous dependency on wind, waterpower and cattle to drive mills and crush sugar cane was expensive in terms of animal power and manpower (both free and enslaved) and inefficient in extracting juice. Steam engines quickened the pace of extraction of the juice, and required fewer cattle and manpower (though skilled engineers were required to set up the engines). Given the push for amelioration of the conditions of enslaved people as well as the increasingly competitive sugar market, Satchell envisioned the introduction of more reliable steam engines as the reaction of planters to domestic and international pressures, especially the British abolition movement.[[26]](#footnote-26)

The parliamentary movement for abolition began with the introduction of Wilberforce’s first bill in 1791. Abolition was delayed by Henry Dundas’ infamous insertion of the word ‘gradually’ into Wilberforce’s bill in 1792. Ameliorative policies were introduced in 1797, and the trafficking of African enslaved people was not abolished in the British Parliament until 1807. The diffusion of steam-power *could* have been represented an ameliorative measure across this period: engines on sugar estates might reduce planters’ costs and effect a small reduction for the labour of enslaved people. That seems to have been the thinking of William Wilberforce, leading abolitionist in the British Parliament, who enquired in May 1789 - through an intermediary (Samuel Whitbread, MP and brewer) - if the steam engine could be deployed in the West Indies.[[27]](#footnote-27) On the other hand, the eventual introduction of the steam-engine to the West Indies proved more cost-effective for enslavers up to emancipation in 1834. Matthew Boulton and James Watt were resident in Birmingham as the British movement for the abolition of the trafficking of African enslaved people evolved after 1787. Whilst many of the Lunar men were committed abolitionists – such as Erasmus Darwin, Josiah Wedgewood and Joseph Priestley – Boulton was equivocal on the matter. However, Boulton did join the group to welcome Olaudah Equiano, the formerly enslaved African, who visited Birmingham in 1789. Boulton also subscribed to the famous autobiography, *The Interesting Narrative of the Life of Olaudah Equiano* (1789), one of the key texts during the movement for abolition.[[28]](#footnote-28) Had Boulton & Watt chosen to deal with West India planters in the last quarter of the 18th century, there may have been pressure exerted from the bona fide abolitionists amongst the Lunar men.

Boulton & Watt steam engines were undoubtedly sold to enslavers in the West Indies in the final stages of Caribbean slavery. However, there remains confusion as to the exact role of Matthew Boulton and James Watt, as well as the chronology of the first sales. A recent research audit by *Heritage England* (2020) concluded:

The industrialist and progressive reformer Matthew Boulton developed business dealings with the Caribbean plantations from his Birmingham Soho factory. With James Watt, Boulton developed new steam engines that were sold to the sugar plantations, which used steam power to replace wind, water or horse power.[[29]](#footnote-29)

Whilst Boulton and Watt were certainly aware that some West India planters were eager to install steam-engines on their estates, the audit infers both were involved with sales and this is a contentious point. For Boulton and Watt retired before the first official exports to the Caribbean occurred.

Whilst his personal views on abolition are ambiguous, Boulton had no issue socialising with West India planters and discussing business opportunities. [[30]](#footnote-30) In April 1783, Boulton dined with three enslavers whom he described to Watt:

Mr Pennant, who is a very amiable man, with ten or twelve thousand pounds a year, has the largest estate in Jamaica; there was also Mr Gale and Mr Beeston Long, who have some very large sugar plantations there, who wish to see steam power in lieu of horses.[[31]](#footnote-31)

In 1784, Boulton also dined with John Dawson, a trafficker in enslaved people based in Liverpool, who wished to discuss the export of steam engines to Trinidad.[[32]](#footnote-32) However, as will now become clear, none of these discussions materialised into orders of the steam-engine to the Caribbean.

As noted by historian Jennifer Tann, patents for steam power on sugar plantations were granted in Jamaica in 1766 and 1770, although these early experiments were not successful. Tann suggests the first enquiry about the possibility of a Boulton & Watt steam engine from an enslaver was made by William Pulteney in 1776.[[33]](#footnote-33) By 1787, it was still being rumoured that Boulton & Watt were exporting to Jamaica. An engineer, George Glenny, offered his services in May that year having been informed that ‘you intend to erect a Steam Engine on the Island of Jamaica’.[[34]](#footnote-34) Nothing seems to have come from these plans. Questions remain why Boulton & Watt did not export steam engines to the Caribbean across the duration of their partnership: this may have been a principled refusal to deal with West India planters, or perhaps a simple case of making sure their technology was not pirated. In 1787, Simon Taylor - the wealthiest enslaver in late-eighteenth-century Jamaica - discussed a tactic of advising Boulton to send out a demonstration model, which would allow residents with knowledge of sugar mills to steal the technology:

Respecting Mr Bolton, untill he sends out modell, & letts people know the premium he expects for his machines, and convinces them they will answer, he will gett no encouragement here, I should think if he was so certain of the success, that he would wish to have one erected on an estate even at his own expence, to be reimbursed should it answer, or leave to take his materials away if it did not, and that would convince people of its utility, for at present we here have only his own ipse dixit [i.e. unproven assertion]. As you justly observe sending out only one man is nothing, we want nothing new from him, but his mode of applying the steam to the turning the mill, the method of hanging his boiler to the most advantage to save coal, for machinery work and making the mill we know more about it than he does, or can be expected to know, and if once any person steals that mode from him, all his expectation from this island is at an end, as there is not patent that does, or can extend to this country.[[35]](#footnote-35)

The risks of industrial espionage in transatlantic context could help explain why Matthew Boulton and James Watt apparently did not sell steam engines directly to enslavers in the British West Indies (though the firm Bateman & Sherratt of Salford copied the B&W designs and a version made its way onto Lord Penrhyn’s Jamaican plantation in 1796).[[36]](#footnote-36) Historians Jennifer Tann and Veront Satchell both date the first order for a licensed Boulton & Watt steam engine from the West Indies to 1801, and a version was not exported to the Caribbean until 1803.[[37]](#footnote-37) Matthew Boulton and James Watt had retired in 1800 – when their original patent expired - and passed the business onto their sons, Matthew Robinson Boulton and James and Gregory Watt.[[38]](#footnote-38) The development of Soho Foundry after 1796 will be considered below.

**Soho Mint**

The Soho Mint was established in 1788. The mint was described (in Boulton’s own words) as consisting of eight large machines capable of striking 120 coins per minute - including currency used in France and England. In late-eighteenth-century English industrial cities, there was a dearth of adequate base metal coinage with which to pay labourers and counterfeits were also widespread. Boulton was attentive to these deficiencies as early as 1772, and later aimed to resolve the issues by harnessing the power of steam - including for rolling, pressing and striking - for the mass production of standardised currency, in the process making coinage more difficult to replicate.[[39]](#footnote-39) The coins were not exclusively for the domestic market. Boulton agreed to provide coinage for the East India Company in 1786, which was a key motivation underpinning the expansion into coinage production.[[40]](#footnote-40) The Soho Mint later manufactured coinage for the American colonies (copper coins), the Sierra Leone Company (silver coins) and the East India Company (EIC). Currency from the Soho Mint was thus used across the British Empire, in colonies where enslaved, free and unfree labour was prevalent.[[41]](#footnote-41) One such example was the EIC colonies in Asia, particularly in the Bombay Presidency in 1791 and 1794.[[42]](#footnote-42) The EIC ensured the flow of wealth and goods from Asia to Britain from 1600 to 1833 (especially in the heyday after 1757). Whilst Atlantic commerce was dominated by slave-grown sugar and cotton, the EIC monopoly centred around exploitative trade in raw goods and luxury items.[[43]](#footnote-43)

The Soho Mint’s cheaply manufactured copper coinage saved the EIC from producing their own coins, thus proving effective in terms of saving labour and costs. Sue Tungate noted that Boulton produced as many as 17 million coins were made for the EIC in one year (1791) alone.[[44]](#footnote-44) The Boulton-Watt Company also produced copper medals awarded for the exploits of imperialists such as Marquis Cornwallis after the Third Anglo-Mysore War of 1792.[[45]](#footnote-45) According to James Watt, Boulton supplied the EIC with reels used to organise silk, as well as tobacco boxes (the latter at a ‘low price’) in the 1770s.[[46]](#footnote-46) Boulton was also consulted about the suitability of export goods by the Macartney Embassy to China in 1792-4 (which was ultimately a failure).[[47]](#footnote-47) The full scale and significance of Boulton’s relationship with the EIC remains unclear, although substantial payments were made at pivotal moments. At a precarious time for Boulton & Watt in 1780, the East India Company paid Boulton £4,000 and placed another ‘large order for reels’ soon after.[[48]](#footnote-48) The personal views of Boulton and Watt towards the East India Company’s exploitative methods awaits detailed examination, but James Watt was said to have shown ‘displeasure’ when EIC directors attended Boulton’s function at Albion Mill in April 1786.[[49]](#footnote-49)

**Soho Foundry**

In January 1796, Matthew Boulton discussed a new venture which him and James Watt had substantially invested in:

I and my partner Mr. Watt have lay’d out about ten thousand pounds in erecting a new iron foundry upon the banks of Birmingham Canal, near the coal mines, for the purposes of casting our cylinders, pumps and everything relating to our manufactory of steam engines by which we shall be enabled to make many improvements and to attaining greater perfection than was possible for us to do by our former mode of employing various founders in different parts of the kingdom.[[50]](#footnote-50)

An entirely new works was developed, less than a mile from Soho Manufactory, and what became known as the Soho Foundry was opened on 30 January 1796. This initiated a major transformation in production. As the end of the Boulton & Watt master patent approached its expiry in 1800, there was an expansion in the business, principally via the rotative engine. The first order for a Boulton & Watt rotative steam engine came in 1783 with the first engine installed three years later. This necessitated a shift into the manufacturing of parts and builders of engines - customers required pre-made parts to be supplied and the subsequent onsite erection of a fully operational engine. A new firm, Boulton, Watt & Sons was established in 1794, introducing Gregory Watt (who died in 1804), James Watt junior and Matthew Robinson Boulton into the business.[[51]](#footnote-51) As noted above, Matthew Boulton and James Watt both retired in 1800, and Matthew Robinson Boulton and James Watt junior owned equal shares of the subsequent firm, Boulton, Watt & Co. by 1809. The sons exported across the globe. Between 1803 and 1825, almost 120 Boulton & Watt steam engines made their way to the plantations of the Caribbean and South America; British Guiana (51), Jamaica (42), Trinidad (12) and elsewhere. Exports slowed in the quarter-century after 1825.[[52]](#footnote-52) The level of demand from the Caribbean exceeded any other foreign or domestic market, with the exception of the cotton industry which was the leading industrial sector in Great Britain prior to 1825.[[53]](#footnote-53) Boulton and Watt’s fully exploited the relationship after the retirement of their fathers. Similarly, it was not until after 1800 that steam power was harnessed by the East India Company (though the India sub-continent became one of the largest overseas market for Boulton & Watt steam engines between 1790 and 1830). Into the 19th century, the Boulton Mint Co. designed mints for India (drawings suggest for Bombay and Calcutta) which represented the ‘most advanced technological thinking in mint design anywhere in the world’.[[54]](#footnote-54) For Dickinson, the Soho Foundry was a ‘positive gold mine, and the junior partners reaped what the older men had sown’. Matthew Boulton died on 17 August 1809 and his will was proved for £150,000 after his decease, equivalent to £136m sterling in modern values.[[55]](#footnote-55) For comparison, £100,000 and above was regarded as a nationally significant fortune in nineteenth-century Great Britain. Only around 210 people left this sum in the decade 1809 to 1819, with Boulton numbered amongst them in a recent study.[[56]](#footnote-56)

# **William Murdock (originally Murdoch) (1754-1839)**

**Background and education**

According to one late Victorian writer, ‘Watt stands first in its history, as the inventor [of the separate condenser for the steam engine]; Boulton second, as its developer and support; and Murdock third, as its developer and improver’. William Murdock (1754-1839) was born on 21 August 1754 at Bellow Mill in old Cumnock in Ayrshire in the west of Scotland (his family name was Murdoch but the spelling gradually altered after he moved to England). William was the eldest of five children. His father, John, was a millwright, miller and farmer. His mother Anne, (née Bruce, d. 1800) was sister of the agent for the local gentry landowner, James Boswell, ninth Laird of Auchinleck, whose property the Murdock family cottage and the mill was located upon.[[57]](#footnote-57) William attended the parish school in Old Cumnock (connected with the local Presbyterian Kirk) under the supervision of William Halbert. He learned to read and write, perhaps a little Latin, and was said to have shown some ability with arithmetic.[[58]](#footnote-58) After travelling to Birmingham in 1777, William was offered a job as an engineer with Boulton & Watt and ultimately relocated to Cornwall with the steam-engine business. On 27 December 1785, he married Anne Paynter, the daughter of a local mine captain. They had four children together; two died in infancy. Two sons, William (b. 1788) and John (b. 1790) followed although Anne Murdock died soon after the youngest son’s birth.[[59]](#footnote-59) These two sons were educated at Ayr Academy after 1801.[[60]](#footnote-60)

**Family business**

The lives of the Murdock family were shaped by the dramatic changes underway in late-eighteenth-century Scotland. Like many others amongst the Scottish gentry, the Laird of Auchinleck, James Boswell, was committed to ‘improvement’, a movement that influenced aspects of the economy and society, including industry and agriculture. Steam-power was introduced to Ayrshire coalfields in 1719 and John Murdock was employed by the Laird of Auchinleck in various roles which included the installation of machinery in coal-works at Birkieknowe and Gasswater. He was also said to have worked in Carron ironworks, installing the first iron-toothed gearing in a millwork in 1760.[[61]](#footnote-61) The young William’s formative years were heavily influenced by his father’s working activities: he helped on the farm, worked in the mill, and sometimes prepared machinery. He was also said to have helped build a bridge over the rover Nith (although it seems this might have been repairs of a bridge that crossed Lugar water, rather than a new construction). Father and son are also credited with the construction of a wooden horse, which had the capacity to rapidly travel two miles. It seems that Boulton was aware of this contraption, later writing to Watt in August 1784: ‘his father hath a wheeled carriage…to go without horses… [and which] was one of the first mechanical amusements which Brown [William Murdock] ever turned his attention to in his youth’.[[62]](#footnote-62) Like Boulton and Watt, Murdock’s father work shaped his early years and provided a route into a career. Whilst there were similarities with Boulton as both were involved with innovative manufacturing in early life, Murdock’s family were of a lower rank. After Murdock travelled to Birmingham in 1777, all combined with James Watt to make a highly effective team.

**Employment with Boulton & Watt**

Aged 23, William Murdock left Ayrshire for Birmingham to pursue a career with Boulton and Watt in 1777. The initial meeting, perhaps mythologised by Victorian commentators, has Murdock walking two-hundred and fifty miles to Soho and asking Boulton for a job (with Watt absent). After an initial refusal (as no jobs were seemingly available), Boulton was said to have been impressed by Murdock’s wooden hat - reputed to have been manufactured in a lathe - and perhaps in the understanding that skilled engineers were in much demand. Indeed, the early Boulton & Watt steam engines were commissioned especially for bespoke purposes and delivered part-made which necessitated the employment of skilled engine erectors to assemble on site.[[63]](#footnote-63) At a subsequent visit, Murdock was offered a trial and later engaged for two years between 15s and 18s per week (£39-£46 per annum) depending whether he was resident at home, elsewhere in the UK or in London.[[64]](#footnote-64) He must have been highly regarded: other mill-wrights were offered terms by B&W at 12s per week.[[65]](#footnote-65) For wider comparison, the wages of a male farm servant in Lanarkshire in Scotland were around £6-7 in 1793.[[66]](#footnote-66) Thus, Murdock started his career with Boulton & Watt on ample wages compared farm servants in his home nation, but as his value to the company increased his wage rises were not incremental.

**Engine Erector in Scotland and England**

In the spring of 1777, a steam-engine was erected in Wanlockhead mine in Dumfries and Galloway, Scotland. The engine allowed the mine to be sunk at a greater depth (and more coal extracted) as the engine would draw more water than previous. This was William Murdock’s first job as an independent engine erector.[[67]](#footnote-67) Watt recommended Murdock for the post, describing him as a ‘very sober, ingenious young man’. And by January 1779, Murdock was also highly regarded by Boulton: ‘I think Wm. Murdock a valuable man and deserves every civility and encouragement’.[[68]](#footnote-68) Murdock gained valuable experience and independence, introducing innovations and improvements to engines that were later to cause issues with James Watt. In 1779, William Murdock was sent to Cornwall in England on behalf of Boulton & Watt and was to spend several years supervising engines in Cornish copper and tin mines. Cornwall became crucial to the embryonic Boulton & Watt business. The firm had a permanent residence there, and a resident agent, Thomas Wilson. The premiums paid to the firms from Cornwall mines was also substantial; estimated at £139,400 between 1781 and 1800.[[69]](#footnote-69) Murdock was crucial to the operation and Boulton was aware of his importance, famously commenting to Watt in 1784: ‘We want more Murdocks, for of all others he is the most active man and best engine erector I ever saw’.[[70]](#footnote-70) Late Victorian accounts represented Murdock as a very hard worker, and one who ‘travelled from mine to mine and often worked for long period without rest and little food’.[[71]](#footnote-71) Nevertheless, Watt was suspicious of Murdock’s motives and as a result often blocked wage rises. Murdock’s wages were £1 per week up to 1780, but he occasionally received substantial gifts of ten guineas (£10 10s) from Boulton and mine-owners.[[72]](#footnote-72) The modest wages Murdock received under Boulton & Watt are relevant to this study, as will be explained below when assessing his fortune. Occasionally, Murdock became an ‘Adventurer’ (shareholder) in some Cornish mines, although his role as an engineer with legal commitments to maintenance carried risk. At Seal Hole (Wherry) mine, Murdock erected a rotative engine, and although this was effective, the sulphuric qualities of the water in the mines meant engines parts were easily corroded and replaced at Boulton & Watt’s expense (and, due to the contract wording, also cost Murdock and Wilson). In December 1791, Wilson warned Watt to consider the ‘risk of future loss from Murdock…he is almost heartbroke on the occasion, and it is confounded hard that he should lose what he has earned by the sweat of his brow’. B&W offset his costs. Murdock ultimately had shares in around seven mines, though these were sold off before he returned to Birmingham in the late 1790s.[[73]](#footnote-73)

**Inventions and Improvements**

‘A genius overshadowed’ was how one Bradford newspaper described William Murdock in 1939.[[74]](#footnote-74) There is no question that Murdock was an ingenious inventor in his own right and according to his biographer John C. Griffiths, he made major technological contributions in four key areas: ‘steam-engine design, self-propelled vehicles, machine tools, and gas lighting’. Nevertheless, whilst his improvements often contributed to the Boulton & Watt enterprise, he did not always get the appropriate credit or remuneration.[[75]](#footnote-75) One of his numerous innovations was the ‘sun-and-planet motion’ improvement which facilitated rotary motion. Both Victorian commentators and modern biographers of Murdock accept he was responsible for the improvement, which ‘enabled the quantum leap forward in the Industrial Revolution’.[[76]](#footnote-76) In the 1790s, Murdock also worked on a prototype of the wheel carriage engine.[[77]](#footnote-77) However, Murdock is most famously associated with the invention of gas for lighting. He made several experiments in his house in Cross Street in Redruth, Cornwall.[[78]](#footnote-78) Despite his long-term residence in the county, it was not to be a permanent stay. In 1798, Murdock began the move out of Cornwall to Birmingham, partly for health recuperation. In March 1800 - just as Murdock made his move to Soho permanent - Cornish miners made him an offer of £500 per annum to remain in the county as they realised his importance to the efficient functioning of steam engines. Although he kept his house in Cornwall until 1810, Murdock permanently relocated to Soho in 1800 as it offered greater possibilities.[[79]](#footnote-79) In 1889, fifty years after his death, Murdock’s residency was memorialised outside his former home as noted in *The Cornish Telegraph*:

William Murdock Lived in this house 1782-1799. Made the first Locomotive here and tested it in 1794. Invented Gas-lighting and used it in this house in 1792. Erected by Tangye Bros., Birmingham.[[80]](#footnote-80)

In Soho, Murdock was spurred into action by French developments around gas lighting - in which M. Le Blond proposed to light up a Parisian street - and restarted experimentation in 1801. As a demonstration on the Peace of Amiens in March 1802, Murdock lit up the Soho Works. Although James Watt junior was initially reluctant to support another patent, gaslighting later became a feature of the Boulton & Watt business, which meant further investment of £5,000 in the Soho works.[[81]](#footnote-81) In February 1808, Murdock’s paper ‘On the Application of Gas from Coal to Economical Purposes’, and although not presented by him, it revealed his thoughts and some of the applications. He had been experimenting since 1792, and was using gas for lighting in his Redruth home within two years. The first successful installation on a major works was Philips and Lee’s cotton mill in Manchester in 1805. A famous, perhaps anecdotal, exchange occurred when Murdock was asked: ‘Do you mean to tell us that it will be possible to have a light without a wick?’, to which Murdock replied: ‘Yes, I do indeed’. The legislator was said to have responded, ‘Ah, my friend, you are trying to prove too much!’.[[82]](#footnote-82)

The Royal Society of London recognised his achievements. William Murdock’s paper (allegedly written by James Watt junior) of February 1808 was published in *Philosophical Transactions.* In November 1808, Murdock was awarded the Rumford gold medal with the Latin inscription’ Ex Fumo Dare Lucem’ [to give light from smoke]. James Watt junior’s support of Murdock for the prize was not simply altruistic: monopolistic companies had already initiated plans to secure charters on gaslighting and Boulton & Watt thus sought to establish the credentials of their employee, and demonstrate that the firm were already involved in a significant way, in order to prevent the establishment of a monopoly over which they would have had no authority. Ultimately, Boulton & Watt were granted a charter to exploit street and domestic lighting, as well as in factories and mills. The prize, according to historian David Phillip Miller, cloaked the ‘venture with scientific credibility’.[[83]](#footnote-83) Despite the significant contribution, for one Victorian writer, Murdock ‘left the benefits of his invention to the public, and returned to his labours at Soho’.[[84]](#footnote-84) Indeed, it is estimated that Murdock earned less than £600 for his commission (1.5%) on the apparatus produced by Boulton & Watt for gas lighting between 1806 and 1814.[[85]](#footnote-85)

**Murdock’s Employment in Later Years**

By 1800, William Murdock’s business connections with Boulton and Watt was underpinned by strong personal relationships. Despite what might be described as a sometimes fraught relationship with James Watt in the past, Murdock was entrusted with the informal instruction of his younger son, Gregory Watt (1777 – 1804). Murdock also became the superintendent of Soho Foundry in 1800, mentoring James Watt junior. Thus, he consolidated his personal and business relationships with Boulton & Watt, and even assigned all his patents (for example slide-valve and the rotary engine) over to the firm. He made a number of innovations in the foundry (for example, applying compressed air to a Blast Engine).[[86]](#footnote-86) Murdock continued to innovate around steam, helping the younger partners of Boulton & Watt apply the principles of steam to the development of new methods of navigation. In 1814, Boulton & Watt applied two condensing engines to propel a steamer on the Clyde, purchasing Caledonia, a vessel built on the Clyde at Port Glasgow for a series of experiments. The firm spent around £10,000 up to 1817 on the ship which was eventually sold to the Danish Government.[[87]](#footnote-87) What seems apparent is that Murdock did not initially get the credit he deserved, but later became an integral part of the Boulton, Watt & Sons business and was well rewarded for his service after 1800.

According to historian Joseph Melling, William Murdock had a ‘brilliant career as a foreman and independent inventor’, yet this brilliance did not initially lead to large financial rewards. After 1777, Murdock ‘frequently applied’ to James Watt for a wage rise and was ‘almost as frequently refused’. James Watt, in particular, was suspicious of Murdock’s motives noting the ‘man must always be our servant not [us] his’. Watt was said to have been opposed to grant Murdock partnership status, although some profits were shared. At the same time, Murdock ‘became more rather than less essential’ to Boulton and Watt’s progress.[[88]](#footnote-88) Historian Eric Roll argued that William Murdock ‘experienced a very romantic rise to fame and fortune’ via employment with Boulton & Watt. Beginning on 15 shillings per week his wages were reputed to be around two guineas (£2 2s) for ‘many years’. However, according to modern biographer Griffiths, by 1784-5, Murdock was ‘becoming financially independent’ (with wages around £40 per annum, and savings over £90). He later lost money in unsuccessful experiments with steam engines, and due to Boulton & Watt’s legal issues with Cornish mine-owners.[[89]](#footnote-89)

Nevertheless, William Murdock was well remunerated by the end of the eighteenth century. From February 1798, he was receiving a ‘consolidated payment’ of £300 per year.[[90]](#footnote-90) In March 1800, he was promoted to engineer and superintendent at Soho Foundry. His salary was £300 per annum, and a commission of 1 percent of all goods sold that had been manufactured at Soho. Historian Eric Roll claims Murdock had a ‘share in the business’ after 1804, as he had £3,000 ‘placed to his credit with the London banking house of the firm’. However, biographer Griffiths took a different view on Murdock’s relationship with the firm: arguing that he simply allowed his salary and commissions to accrue over several years. Overall, between 1800 and 1812, Murdock received a total of £8,136 in salary and commission from Boulton & Watt, some of which he allowed to accrue in the firm’s bank over many years. In 1810, he refused a partnership (adding support to the biographer Griffiths’ view of the connection) and instead opted for a salary of £1,000 per annum.[[91]](#footnote-91) For comparison, the average adult male wage in England in 1810 was £46 per year.[[92]](#footnote-92) In other words, Murdock’s per annum wage from 1810 to 1830 was over twenty times the average annual wage in early nineteenth-century England.

When considering Boulton & Watt’s nineteenth-century international expansion, the timing of Murdock’s rising remuneration is significant. According to historian Veront Satchell, orders from the Caribbean for Boulton & Watt steam engines were second only to the British cotton industry between 1803 and 1825.[[93]](#footnote-93) Given Murdock was modestly paid for many years, yet enjoyed a substantial salary from 1810 onwards, it seems reasonable to conclude he profited from a business interconnected with Caribbean slavery in a way that Boulton and Watt did not (as both retired in 1800). He used his wealth wisely in later years. In 1817, he built the neo-classical Sycamore House at Handsworth – located about half a mile from the Soho Factory - where he lived until his death. Murdock’s insistence that he was paid £1,000 per annum rather than accepting a partnership in Boulton & Watt looks to have been a smart decision. In September 1830, James Watt junior complained that the engine business had for ‘several years proved unprofitable’ and that Murdock’s declining health meant he was of ‘little service’ yet the ‘sum paid annually [to Murdock was] exceeding our emoluments’. Murdock’s wages were paid up to 30 September 1830 at which point the connection was terminated. Whilst the firm were seemingly in financial trouble by that point, Murdock’s wage had remained constant for twenty years.[[94]](#footnote-94) William Murdock died aged 85 on 15 November 1839 and one obituary began:

So remarkable a man, whose talents and inventions have contributed to the advantage of Society, and whose ingenuity was so well known, should not be allowed to go out of the world without some special notice.[[95]](#footnote-95)

Whilst he was likely died intestate, his wealth on death has been estimated at somewhere between £30,000 and £40,000 sterling (between £25m-£33m in modern values).[[96]](#footnote-96) Murdock was buried near Matthew Boulton and James Watt in St. Mary's Church, Handsworth in Birmingham.[[97]](#footnote-97)

# **James Watt (1736-1819)**

## **Background and Education**

James Watt (1736-1819), inventor, the ‘great improver’ of the steam engine, was born in Greenock on the banks of the river Clyde in the west of Scotland.[[98]](#footnote-98) His mother and father, James Watt senior (1698-1782) of Crawfordsdyke and Agnes Muirhead, were married in 1729 and their fourth child, James, arrived on 19 January 1736.[[99]](#footnote-99) His mother provided some home learning, before he attended a commercial school and excelled in mathematics. Aged around eleven, he attended Greenock grammar school and learned Latin and Greek. After leaving school aged around sixteen, he was employed ‘for a year or more’ with his father’s business. However, after his mother’s death in 1753, Watt relocated to Glasgow, the bustling commercial hub around twenty miles inland along the river Clyde valley.[[100]](#footnote-100) In July 1764, James Watt married Margaret Millar (also known as Peggy), his cousin and the daughter of a wright, Daniel Miller. The marriage brought five children, although only two reached adulthood: Margaret (1767-1796) and James Watt junior (1769-1848). Margaret Watt died in September 1773, the year before Watt relocated to Birmingham.[[101]](#footnote-101) Watt married for a second time in 1777 to Ann MacGregor (died 1832) and had further two children: Gregory (1777–1804) and Janet (1779–1794).

## **Family Business**

Throughout James Watt’s childhood and formative years, his father operated as an Atlantic merchant in the port of Greenock. According to a Victorian biographer of Watt, his father was, amongst other interests, a ‘shipwright, a ship chandler, supplying vessels with nautical apparatus, stores and instruments, a builder and a merchant’.[[102]](#footnote-102) The latter term ‘merchant’ was a broad and ambiguous occupational description at the time, covering traders in general items as well as those involved with commerce in produce grown by enslaved people. As a result, it has been almost disregarded in previous accounts that, beginning in the 1730s and lasting until the 1760s, Watt’s father was involved with transatlantic commerce between Scotland, the West Indies and North America. His preferred trade method was the ‘supercargo system’, which involved commissioning young Scotsmen to take up semi-permanent residency in North Carolina to facilitate the trade in produce grown by enslaved people. Similarly, the Watt enterprise sometimes involved the occasional trafficking of enslaved people.[[103]](#footnote-103) In early 1743, for example, he resolved a dispute with James Castellan, a merchant who had trafficked an enslaved boy on Watt’s ship between North Carolina and the West Indies.[[104]](#footnote-104) The scale of these concerns do not suggest Watt senior was at the pinnacle of mercantile commerce in the west of Scotland, although neither were they insignificant either. Nevertheless, these were not Watt senior’s sole interests and it impossible to state how profitable the Atlantic concerns were, and by extension the significance of slavery and its commerce to the family enterprise over a thirty-year-period, without detailed, quantitative research in mercantile ledgers.

## **Merchant, Instrument Maker, Surveyor, Engineer, Investor**

After the Union of 1707, the west of Scotland in general and Glasgow in particular was transformed by the effects of transatlantic commerce, notably the *entrepôt* trade in Virginia tobacco. The city became the premier commercial hub in eighteenth-century Scotland and rapid economic and urban change followed. After 1753, James Watt was involved with multiple concerns that interconnected with Atlantic commerce. He undertook mercantile training in Glasgow and lived in the city for several years (1753-4; 1756 onwards), his residence split up with a period training in London in 1755-6. On his return, he worked as an instrument maker within Old College and operated his own concerns before departing for Birmingham in 1774. Whilst colonial commerce was not the principal source of his income, he worked as his father’s mercantile agent in Greenock, Glasgow and London and sometimes collaborated with his brother, John.

In Glasgow in 1753, James Watt was trained in mercantile business after taking up residency with his maternal uncle, John Muirhead, a working merchant, thus complementing theory with practical experience.[[105]](#footnote-105) Watt senior provided financial assistance to support his son’s progression. In June 1754, Watt sent his father the invoice for classic mercantile paraphernalia purchased in Glasgow, including a chest box, marble paper and pencils (valued at £19).[[106]](#footnote-106) However, James Watt was destined for more than the life of a merchant in Glasgow. In the summer of 1755, he relocated to London for a year, ultimately securing instruction (not a formal apprenticeship) with John Morgan, a mathematical instrument maker based in Cornhill. Watt began his learning by working on maritime instruments known as Hadley’s quadrants whilst continuing to work for his father who underwrote the significant cost of the training (20 Guineas, £21 sterling).[[107]](#footnote-107) James Watt undertook at least some business for his father in London. On 5 August 1755, he placed ‘all the things you ordered’ on board the ship *Sally* destined for Greenock.[[108]](#footnote-108) He was largely dependent upon his father’s support in London: ‘my living here is very hard upon you especially as trade is so dull at present. But am improving all I can that I may be the sooner able to do for myself’.[[109]](#footnote-109) By June 1756, Watt was planning a return to Glasgow. In preparation for the career shift, he requested his father purchase tools at an estimated cost of £23 12s.[[110]](#footnote-110) His father’s support (subsidising training and tools) was life-changing: equivalent to £85,000 sterling in modern values.[[111]](#footnote-111)

James Watt operated as his father’s mercantile agent on return to Glasgow. He was mainly a general merchant selling a variety of goods but this occasionally involved dealing with colonial produce on his father’s behalf. For example, on 27 September 1756 (soon after he returned from London) Watt immediately notified his father after he was informed of a ‘great error’ in the terms of the tobacco account.[[112]](#footnote-112) Thus, after James Watt’s London training, father and son were involved in an enterprise dealing in slave-grown produce. He did not enjoy the trappings of elite mercantile wealth, however, and his correspondence often hints at penury and ongoing dependence upon paternal support. On one occasion he requested £3 from his father to repay some debts as ‘I never have been able to spare so much’.[[113]](#footnote-113) In late 1756, Watt undertook work for Old College which confirmed his career change. He cleaned astronomical instruments bequeathed to the university by Alexander MacFarlane, Old College alumni and Jamaica planter and enslaver.[[114]](#footnote-114) Whilst Watt’s career shift and involvement with the planter’s instruments has become famous, he had no actual dealings with the enslaver who was long deceased by the time he returned to Glasgow. James Watt simply cleaned instruments for the university for which he was paid £5 sterling.[[115]](#footnote-115) By late 1757, James Watt was regarded as the university’s mathematical instrument maker (analogous to a modern technician) and subsequently moved into a bespoke workshop in the Old College precinct near Glasgow cross in spring 1758.[[116]](#footnote-116) Watt’s business in the 1750s was not only university related: he also opened a shop making Hadley’s quadrants, although these took so long to make that the business was often unprofitable.[[117]](#footnote-117) As late as December 1760, James Watt senior and junior had an open account current in a joint-enterprise business.[[118]](#footnote-118)

James Watt had other business activities in Glasgow that interconnected – directly and tangentially – with Atlantic commerce. In 1761, Watt’s shop sold maps of the river Clyde and Davis quadrants, which were likely purchased by merchants intent on improving navigation skills and their knowledge of the river and further afield.[[119]](#footnote-119) In the mid-1760s, Watt traded in salt - a product his father also used for curing fish. Salted fish was exported to the eighteenth-century British West Indies and became the staple diet of the enslaved population.[[120]](#footnote-120) In 1764, James Watt invested – with some familial support - in the Delftfield pottery in Glasgow. This business had a transatlantic strategy and focus; exporting pottery and earthenware across the British-Atlantic world, including Antigua, Trinidad, Jamaica and Grenada in the British West Indies, likely to grace planters’ dinner tables. Watt became a co-partner and advisor - his investment of £240 in 1764 rose twenty-fold to £4,800 (in shares and loans) when he died in 1819.[[121]](#footnote-121) In 1772, James Watt also took on surveying work for a Glasgow West India merchant, John Robertson. It seems likely the merchant wished to assess the viability of an expansion into an estate on the island of Carriacou in the south-east Caribbean and the potential profitability of cotton grown by enslaved people.[[122]](#footnote-122) Thus, Watt had varied mercantile interests across his residence in Glasgow (1753-1774). It seems unlikely that colonial commerce made him wealthy: he famously owed debts to several people right up to the 1780s, whilst patrons - John Roebuck and ultimately Matthew Boulton - provided seed-corn funding for his early experiments on the steam engine.[[123]](#footnote-123) Although the Watts were not an elite mercantile family, it has recently come to light that the enterprise were involved in the trafficking of a young black child during James Watt’s residence in Glasgow.

## **The Watt Family Enterprise and Trafficking the Enslaved**

James Watt occasionally worked with his brother John (known as ‘Jockey’) in joint enterprise, although the younger sibling was more directly invested in mercantile business. Three years younger, Jockey was a trained bookkeeper and closely followed the same path as his father whilst James Watt moved into instrument-making. Seeking commercial opportunities, Jockey moved around British-Atlantic port towns and cities: Greenock, Glasgow (in 1756), Liverpool (in 1758) and Bristol (in 1760) before relocating to Virginia in North America on 20 June 1761.[[124]](#footnote-124) The family business retained an Atlantic focus into the mid eighteenth-century. In July 1761, Jockey and his father were seemingly commissioned to transport tobacco for the Glasgow firm, Buchanan & Simpson, one of the city’s tobacco concerns and major traffickers in enslaved people.[[125]](#footnote-125)Although Jockey attempted to establish himself on his own account, both Watt sons took charge, at times, of the family mercantile concern. In late 1761, Jockey moved around between Bristol and Glasgow, returning to the west of Scotland. He was present in Greenock in early 1762 to take up mercantile business (at this point, he seems to have branched off on his own account separately from his father).[[126]](#footnote-126) By June 1762, Jockey was again across the Atlantic, writing to his father in June from a ship docked off the coast of Bermuda. However, in late 1762, Jockey drowned somewhere between Jamaica and Cuba, aged twenty-four.[[127]](#footnote-127)

James Watt utilised the family networks to advance his own concerns. In May 1761, when Jockey was in Bristol, he asked if he could acquire goods (brass and ivory) used in the production of Hadley’s quadrants, also enquiring about the movement of a fleet to St Christopher (St Kitts) in the Leeward Islands in the British West Indies.[[128]](#footnote-128) The chronology of his brother’s departure, and ultimate death abroad, is important. It seems that James Watt occasionally took responsibility for the family enterprise, in the absence of his brother. On 17 March 1762, Walter McAdam ‘received from John Watt a Black Boy which I promise to deliver to Mr John Warrand Mercht in Glasgow’.[[129]](#footnote-129) As noted by legal historian John W. Cairns, McAdam was a Glasgow carter, and he was commissioned via a standard obligation of carriage of goods agreement to deliver the child, named only as Frederick, to a merchant in Glasgow named John Warrand.[[130]](#footnote-130) The merchant, John Warrand, based in Glasgow’s Saltmarket, had responsibility for delivering Frederick to a prominent Scottish gentry family, the Spynies of Brodie House. The Spynies were based in Forres near Elgin in northeast Scotland.[[131]](#footnote-131) A surviving list of clothing shows Frederick was to be attired in clothing worn by page boys: breeches, a waist-coat, a black cravat, shoes and a blue coat.[[132]](#footnote-132) It was common for black children to be sold in eighteenth-century Britain, especially young boys, to be employed in country houses.[[133]](#footnote-133)

Brodie House was some 170 miles of Glasgow, which meant Frederick would likely have been trafficked via Perth to northeast Scotland. However, it seems possible that the young child emancipated himself.[[134]](#footnote-134) On 3 October 1762, James Brodie wrote to ‘James Watt junior merchant in Greenock’ requesting:

I am surprised I have never heard anything of any Black Boy. If he is not gone North I beg you will send him by the first opportunity directed for Brodie House near Forres. I shall be glad to have your answer in course of post and an account of what he has cost you since his arrival at Greenock and the cost of my letters. I am sensible you have been at a great deal of Trouble upon my account. I shall be glad of the opportunity to show my Gratitude.[[135]](#footnote-135)

The Brodie salutation to ‘James Watt junior’ in the letter of October 1762, and indeed the acknowledgement he had worked on the account, is of major significance. For this correspondence reveals it was James Watt (1736-1819), inventor and future ‘great improver’ and not James Watt senior (1698-1782) who was responsible for the family enterprise at this point. James Watt III (1769-1848), who later became known as ‘James Watt junior’, was not yet born.

How to explain James Watt’s role in trafficking Frederick and the child’s status in Scotland? Prior to 1778, the legal status of people brought to Great Britain after being enslaved was ambiguous. Neither the Scottish or English Parliaments passed legislation that codified slavery as in the Americas but that did not prevent ruthless enslavers from treating their formerly enslaved people as legal property. For example, public sales were common.[[136]](#footnote-136) Historian Simon Newman’s work paints a vision of slavery within Georgian Britain, arguing that ‘slavery was as real for such people in Britain as it was for others in Jamaica or Virginia’.[[137]](#footnote-137) According to legal historian John W. Cairns, people of African descent were held as enslaved property in eighteenth-century Scotland. Whilst the practice was ‘socially and legally anomalous’, and there was no specific legislation or codification, this was ‘slavery without a Code Noir’.[[138]](#footnote-138) At the same time, most enslaved people were employed in domestic service, ‘not in a different position from that of free servants’ except for the constant threat of forced return to chattel slavery societies.[[139]](#footnote-139) However, the famous Joseph Knight case in Scotland in 1778 - in which a formerly enslaved man won his freedom in Scottish courts from his enslaver - set a precedent that chattel slavery was inconsistent with Scots law.

## **Watt in Birmingham**

By the time of the Joseph Knight case, James Watt had relocated to Birmingham. As explained above, Matthew Boulton was friends with Dr John Roebuck and had become aware of his protégé, Watt. Roebuck financially supported Watt’s early experimentation with the steam engine at Kinneil House in Bo’ness in east-central Scotland. Roebuck’s bankruptcy in 1774 released Watt from the relationship and he moved to Birmingham that same year.[[140]](#footnote-140) Boulton’s business acumen was instrumental to the development of the steam-engine and the partnership lasted for twenty-five years, covering the duration of the extension of the patent from 1775 to 1800. They key question – as with Boulton described above – concerns James Watt’s relationship with Caribbean plantation owners and enslavers before both retired in 1800.

As shown above, both Boulton and Watt were in discussions with Caribbean enslavers in the last quarter of the eighteenth-century, and some had raised the possibility of exporting steam engines to sugar estates. James Watt had direct discussions with other Scots, on one occasion providing a prospectus outlining the potential of steam on sugar estates. In 1783, Charles McDowall wrote to William Graham of Airth (who had an estate in St Ann, Jamaica) discussing the possibility of a steam engine on the estate.[[141]](#footnote-141) Watt had already provided McDowall with detailed technical information on the operations of the engines and noted: ‘we have alter’d all the Engines in Cornwall except one, and many on other parts of England. We are now busy in contriving to work mills of many kinds by fire engines’. McDowall was aware of the current deficiencies of windmills in Jamaica which were ‘often blown down by hurricanes’. He understood that it was necessary to import skilled engineers from England to train enslaved people, and advised potential buyers to enquire with ‘James Watt Esq, Engineer at Birmingham’. To what extent the reluctance to send out employees, and the fear of losing control of their technology, influenced Boulton & Watt’s decision not to ship out steam engines to the Caribbean before 1800 can only be surmised.[[142]](#footnote-142)

James Watt built direct relationship with planters elsewhere. In 1786, Richard Pennant (Lord Penrhyn), who owned an estate and enslaved people in Jamaica, wrote to Watt:

I wish much to have the pleasure of conversing with you on the subject of

steam engine for Jamaica. I propose coming to Lichfield to a late dinner . . .

Saturday the 10th February and I shall be very glad of your company to dine

with me . . . But should it not be agreeable to you to come to Lichfield I will

alter my plans and I will be at the Hotel at Birmingham Saturday morning the

10th when I hope 1 shall have the pleasure of seeing you.

The outcome of these conversation is unknown, but an official Boulton & Watt steam engine was not erected on Penrhyn’s estate until 1815.[[143]](#footnote-143) James Watt looks to have been in discussion with enslavers whilst resident in Birmingham, though more research is required to understand why these negotiations did not materialise into orders until after 1800.

James Watt’s had many personal contradictions regarding his relationship with Atlantic slavery. As a young man in Glasgow he was involved with transatlantic commerce and complicit in the trafficking of a black child in 1762. In Birmingham, he communicated with planters about the potential of steam for sugar production, although he later expressed private support for the abolitionist movement. As historian Malcolm Dick notes, Watt became a private critic of slavery. On 31 October 1791, Watt responded to French merchants Messrs Beguye & Co. of Nantes who had ordered a steam-engine to be shipped to the French West India colony Saint Domingue (modern day Haiti). What has become known as the Haitian Revolution began on 22 August 1791 - the only successful overthrow of colonial masters by self-emancipated formerly enslaved people in the Atlantic world - and Boulton & Watt immediately suspended production:

The late unpropitious news from St Domingo has made us suspend the prosecution of the order for your Engine until we hear from you. We have written to the foundery for that purpose and expect that no material expense has yet been incurred. We thought it out duty to give you this information, to relieve part of your anxiety in case any fatal accident should have befallen you friend Mr. Bertrand. We sincerely condole with the unhappy sufferers, though we heartily pray that the system of slavery so disgraceful to humanity were abolished by prudent though progressive measures.[[144]](#footnote-144)

This statement has been uncritically accepted by some scholars at the University of Glasgow as an example of Watt’s abolitionist credentials, although there are several ambiguities that remain unresolved.[[145]](#footnote-145) Firstly, the correspondence reveals that Boulton & Watt had accepted an order for an engine to be shipped to a pre-revolutionary Saint Domingue in which slavery was regulated under the Code Noir (the ‘Black Code’). Established in 1685 by King Louis XIV, this governed the internal regime of colonies and the lives of the enslaved. Whilst there is no evidence that Boulton & Watt exported engines to the British Caribbean before 1800, the extent of their eighteenth-century business with merchants who shipped to the French West Indies, and by extension enslavers, remains unknown. Secondly, Watt expressed sympathy for the ‘unhappy sufferers’; that is, the colonial masters overthrown in the revolution. Thirdly, whilst Watt advocated the end of the ‘system of slavery’, he was in favour of a gradual approach rather than the more radical immediate abolition - although to be fair, not even William Wilberforce advocated an end to the entire system in the 1790s. Thus, Watt privately advocated gradual abolition in correspondence with French merchants in Nantes who dealt with colonial enslavers. Was he in favour of a gradual French abolition in order to protect British interests? Can his views be extrapolated to chattel slavery in the British West Indies?

James Watt at least nominally supported the British movement for the abolition of the trafficking in African enslaved people led by William Wilberforce after 1787. As the public sent increasing numbers of abolitionist petitions to parliament, Josiah Wedgewood wrote to Watt in February 1788: ‘I take it for granted that you & I are on the same side of the question respecting the slave trade. I have joined my brethren here in a petition from the pottery for the abolition of it, as I do not like a half measure in this black business’. Entries in James Watt’s cash book suggests he contributed subscriptions of one guinea to ‘the negro bill’ (presumably an abolition petition) on 25 January 1788 and again on 13 April 1789.[[146]](#footnote-146) It may be that the mature Watt later opposed the system upon which some of his family wealth was based.

As historian David Phillip Miller shows, James Watt valued material success and retired to life as a wealthy late eighteenth-century gentleman. He purchased land and estates in Heathfield in Birmingham and Doldowlod (amongst others) in Wales. He is reckoned to have spent around £5,000 on buildings and ground on Heathfield House, which he resided in from 1790. He spent many years in his workshop within the residence in his retirement years. James Watt died on 25 August 1819. Miller has thoroughly investigated his earnings in life and wealth on death and estimates the ‘lower limit’ of Watt’s fortune to be ‘upwards’ of £60,000.[[147]](#footnote-147) However, since Watt had transferred much of wealth before he died, it was likely have been much more. Even so, this is estimated to be around £50.7m sterling in modern values.[[148]](#footnote-148)

# **Key Points**

## **Matthew Boulton**

* Born in Birmingham in 1728, to a family of ‘toymakers’.
* Capital for businesses sourced from two advantageous marriages.
* Early business ventures seem to focus on Europe rather than Americas (and thus were not directed towards slave-owners), but there is a recorded example of exporting goods across the Atlantic (e.g., orders for silver placed from the West Indies in 1799).
* Long term business relationship with imperial behemoth, the East India Company (Soho Mint - coin production, and reels for silk).
* Impossible to estimate scale and significance of East India Company relationship, but was potentially large-scale.
* Boulton cultivated relationships with West India planters and enslavers after 1775, outlining the potential for steam-engines on sugar estates.
* There is no known evidence that Boulton & Watt sold steam engines directly to West India planters during period of the first patent (1775-1800). After joint-retirement, firms handed over to sons who accepted orders from West India planters.
* Boulton did not publicly speak in support of abolition after 1787 (unlike others in the Lunar Society such as Wedgewood, Darwin and Priestley), but subscribed to the seminal autobiography of Olaudah Equiano, a formerly enslaved African.
* Died in Birmingham in 1809 worth c.£150,000 sterling.

## **William Murdock**

* Born in 1754 at Bellow Mill in old Cumnock in Ayrshire in the west of Scotland.
* Father was a mill-wright on the estate of James Boswell, the laird of Auchinleck.
* Early life centred on agricultural and manufacturing work in the era of Scottish improvement.
* Employed with Boulton & Watt from 1777.
* Spent a long period in Cornwall (1779-1800), where he was arguably underpaid and underappreciated by B&W hierarchy.
* A noted inventor in his own right including steam carriages and gas lighting, with many improvements on B&W steam engines.
* Returned to Soho in Birmingham in 1800, where he took up a mentor role with James Watt’s son and a senior position in Soho Foundry.
* Received large remuneration from Boulton & Watt and Sons whilst the firm was exporting steam engines to the Caribbean after 1803 (e.g., wages were £300 per annum from 1798, rising to £1,000 in 1810 until his retirement in 1830).
* Died in Birmingham in 1839, worth c.£30,000-40,000 sterling.

## **James Watt**

* Born in Greenock in the west of Scotland in 1736.
* Watt’s father, James Watt senior, was a merchant with multiple interests including transatlantic businesses.
* His father’s Atlantic concerns often involved the trade in slave-grown produce (especially tobacco and sugar), and the occasional trafficking of enslaved people between North America and the West Indies.
* His father subsidised Watt’s training as an instrument maker in London and purchased tools for his business in Glasgow in 1755-6.
* In Glasgow, James Watt was a general merchant with occasional involvement with the Atlantic trades, supervising his father’s tobacco account and collaborating with his brother, John, an Atlantic merchant.
* In 1762, James Watt was directly complicit in the trafficking of a black boy (named only as Frederick, and likely enslaved) from Greenock to Glasgow.
* In Birmingham from 1774, he held discussions with West India planters, but showed displeasure on one occasion to Boulton socialising with a director of the East India Company.
* In later life, privately expressed an opinion that the system of slavery should be gradually abolished, and likely subscribed to abolitionist petitions sent to the British Parliament in 1788 and 1789.
* Died in Birmingham in 1819, worth upwards of £60,000.

# **Recommendations for Further Research**

1. Matthew Boulton’s professional connections with the East India Company seem to have been substantial, and the nature and extent of this relationship could be more fully explored as well as the significance to the Boulton & Watt enterprise in key years (e.g., in 1780, when Boulton sunk profits from the East India account into the firm, which was in a precarious financial position).
2. It is well known that Boulton & Watt had a credit relationship with a West India merchant bank, but the significance of this relationship to the firm, and by extension to the development of steam engines, will require further research and detailed, quantitative analysis.
3. Matthew Boulton and James Watt had no issues negotiating with Caribbean enslavers after 1775, but it remains unknown why they did not follow up the marketing with exports of steam engines to the British West Indies. Further archival research might reveal Boulton and Watt’s personal stance, as well as the shift in institutional strategy that followed when their sons took over in 1800.
4. A study of Boulton, Watt & Sons after 1800 in transatlantic context would shed light on the significance of Caribbean slavery to the development of firm and the expansion of the steam engine business, as well as the extent and dissemination of the personal fortunes of those involved, including William Murdock.

1. Peter M. Jones, *Industrial Enlightenment: Science, Technology and Culture in Birmingham and the West Midlands 1760–1820,* (Manchester: Manchester University Press, 2008). [↑](#footnote-ref-1)
2. George T. Noszlopy, Jeremy Beach (ed.), *Public Sculpture of Birmingham,* (Liverpool: Liverpool University Press, 2021), pp.15-16. [↑](#footnote-ref-2)
3. See guide here: <http://www.ampltd.co.uk/digital_guides/i.aspx> Accessed: 1 March 2021. [↑](#footnote-ref-3)
4. H.W. Dickinson, *Matthew Boulton,* (Cambridge: University Press, 1936), pp.23-30. [↑](#footnote-ref-4)
5. Dickinson, *Boulton*, pp.30-6; Jenny Uglow, *The Lunar Men: Friends Who Made the Future* (London: Faber & Faber, 2003), pp.60-3. Modern value of £28,000 in 1760 (estimated here using a Relative Wage Income: Average Earnings, 2019 values) are derived from Lawrence H. Officer and Samuel H. Williamson, ‘Five Ways to Compute the Relative Value of a UK Pound Amount, 1270 to Present’, *Measuring Worth 2021*, Available: [www.measuringworth.com/ukcompare/](http://www.measuringworth.com/ukcompare/) Accessed 1 March 2021. [↑](#footnote-ref-5)
6. Dickinson, *Boulton*, pp.23-30. [↑](#footnote-ref-6)
7. Boulton’s evidence is reprinted in full in Dickinson, *Boulton*, pp.31-3. For wider context, see Eric Robinson, ‘Matthew Boulton and the Art of Parliamentary Lobbying’, *The Historical Journal,* 1964, Vol. 7, No. 2 (1964), pp.209-229; Eric Robinson, ‘Eighteenth‐Century Commerce and Fashion: Matthew Boulton's Marketing Techniques’, *The Economic History Review,* 16 (1963), pp.39-60. [↑](#footnote-ref-7)
8. Dickinson, *Boulton*, pp.41-74. [↑](#footnote-ref-8)
9. Peter Jones, ‘Living the Enlightenment and the French Revolution: James Watt, Matthew Boulton, and Their Sons’, *The Historical Journal,* 42/1 (March 1999), p.159. [↑](#footnote-ref-9)
10. Jenny Uglow, ‘Lunar Society of Birmingham (act. c. 1765–c. 1800)’, *Oxford Dictionary of National Biography,* 24 May 2007; Accessed 8 March 2021. [↑](#footnote-ref-10)
11. Tann, ‘Boulton, Matthew (1728–1809), manufacturer and entrepreneur’, *ODNB*; Dickinson, *Boulton*, p.109. [↑](#footnote-ref-11)
12. Dickinson, *Boulton*, p.52. [↑](#footnote-ref-12)
13. Dickinson, *Boulton*, p.60. [↑](#footnote-ref-13)
14. Robinson, ‘Boulton's Marketing Techniques’, pp.50-53. [↑](#footnote-ref-14)
15. Dickinson, *Boulton*, pp.63-70. [↑](#footnote-ref-15)
16. Kenneth Quickenden, ‘Silver and its Substitutes’, in Matthew Dick (ed.), *Matthew Boulton: A Revolutionary Player,* (Studley: Brewin Books, 2009), p.166. [↑](#footnote-ref-16)
17. James Keir, *Memoir of Matthew Boulton, 1809*, quoted in Dickinson, *Boulton,* pp.70-2. [↑](#footnote-ref-17)
18. Dickinson, *Boulton*, pp.75-85. [↑](#footnote-ref-18)
19. James Watt, *Memorandum Concerning Mr Boulton: Commencing with my first acquaintance with him. Glasgow, September 17th 1809,* Available: <http://sohomint.info/wattmemoir.html> Accessed: 3 March 2021. [↑](#footnote-ref-19)
20. Dickinson, *Boulton*, pp.89-97. [↑](#footnote-ref-20)
21. Richard L. Hills *James Watt Volume 2: The Years of Toil, 1775-1785* (England: Landmark, 2005), p.144 [↑](#footnote-ref-21)
22. Eric Williams, *Capitalism and Slavery,* (London: Andre Deutsch edn., 1964), pp.102-3. [↑](#footnote-ref-22)
23. John Lord, *Capital and Steam Power, 1750-1800* (London: King & Son, 1923), pp.112-3, p.119; Hills *James Watt Volume 2*, p.155. [↑](#footnote-ref-23)
24. Boulton to Watt, 3 July 1778, quoted in Lord, *Capital and Steam Power*, pp.113-4. [↑](#footnote-ref-24)
25. Jennifer Tann, ‘Steam and Sugar: The Diffusion of the Stationary Steam Engine to the Caribbean Sugar Industry 1770-1840’, *History of Technology,* 19 (1997), p.66. [↑](#footnote-ref-25)
26. Veront Satchell, ‘Steam for Sugar-Cane Milling: The Diffusion of the Boulton and Watt Stationary Steam Engine to the Jamaican Sugar Industry, 1809-1830’ in Kathleen Monteith and Glen Richards (eds.), *Jamaica in Slavery and Freedom: History, Heritage and Culture* (Kingston: University of West Indies Press, 2002), pp.246-7. [↑](#footnote-ref-26)
27. Tann, ‘Steam and Sugar’, p.69. For correspondence, see Jennifer Tann, *The Selected Papers of Boulton & Watt: Volume 1 The Engine Partnership, 1775-1825* (London and Massachusetts, Diploma/MIT Press, 1981), p.368. [↑](#footnote-ref-27)
28. Uglow, *The Lunar Men,* p.414; Kenneth Quickenden, Malcolm Dick, Sally Baggott, ‘Introduction:’, in Kenneth Quickenden, Malcolm Dick, Sally Baggott (eds.), *Matthew Boulton – Enterprising Industrialist of the Enlightenment,* (Milton Park, Routledge, 2016), p.12. [↑](#footnote-ref-28)
29. Mary Wills and Madge Dresser, *The Transatlantic Slave Economy and England’s Built Environment: A Research Audit,* (Historic England, 2020), p.92. [↑](#footnote-ref-29)
30. Malcolm Dick, ‘Joseph Priestley, the Lunar Society and Anti-slavery’, in Malcolm Dick (ed.), *Joseph Priestley and Birmingham,* (Warwick: Brewin Books, 2005), pp.74-5. [↑](#footnote-ref-30)
31. Boulton to Watt, 19 April 1783, quoted in Lord, *Capital and Steam Power*, p.192, footnote 4. [↑](#footnote-ref-31)
32. Uglow, *The Lunar Men,* p.414. [↑](#footnote-ref-32)
33. Tann, ‘Steam and Sugar’, p.67. In this correspondence, Pulteney correctly predicted this would bring a ‘large return’ by selling engines to West India planters. See Tann, *Selected Papers of Boulton & Watt: Volume 1*, p.365. [↑](#footnote-ref-33)
34. Tann, *Selected Papers of Boulton & Watt: Volume 1*, p.365. [↑](#footnote-ref-34)
35. ‘Simon Taylor to Chaloner Arcedeckne, Kingston, 6 December 1787’. Accessed at <https://blog.soton.ac.uk/slaveryandrevolution/tag/matthew-boulton/> on 24 February 2021 (original in Cambridge University Library). For a study of Taylor, see Christer Petley, *White Fury: A Jamaican Slaveholder and the Age of Revolution,* (Oxford: Oxford University Press, 2018). [↑](#footnote-ref-35)
36. Veront Satchell, *Sugar, Slavery and Technological Change: Jamaica 1760-1830,* (Saarbrucken: VDM Verlag, 2010), p.130. [↑](#footnote-ref-36)
37. Tann, *Selected Papers of Boulton & Watt Volume 1,* p.365, footnote 1; Tann, ‘Steam and Sugar’, p.70; Satchell, ‘Steam for Sugar-Cane Milling’, p.242; Satchell, *Sugar, Slavery and Technological Change*, p.132. [↑](#footnote-ref-37)
38. John Francis Waller, John Eadie, William John Macquorn Rankine, Edwin Lankester, *The Imperial Dictionary of Universal Biography: A Series of Original Memoirs of Distinguished Men, of All Ages and All Nations,* Volume II, (Edinburgh: William Mackenzie, 1857), p.890 [↑](#footnote-ref-38)
39. Dickinson, *Boulton*, pp.133-143. [↑](#footnote-ref-39)
40. David Symons, ‘Matthew Boulton and the Royal Mint’, in Matthew Dick (ed.), *Matthew Boulton: A Revolutionary Player,* (Studley: Brewin Books, 2009), p.173. [↑](#footnote-ref-40)
41. Dickinson, *Boulton*, p.138; Sue Tungate, ‘Matthew Boulton and the Soho Mint: copper to customer’, (Unpublished PhD Thesis, University of Birmingham, 2011), p.131. [↑](#footnote-ref-41)
42. Mahesh A. Kalra, ‘The Birth of the ‘New’ Bombay Mint c.1790-1830: Matthew Boulton’s Pioneering Contribution to Modernization of Indian Coinage’, *Proceedings of the Indian History Congress,* 74 (2013), p.418. [↑](#footnote-ref-42)
43. Margot Finn, Kate Smith, *The East India Company at Home 1757-1857,* (London: UCL Press, 2018), p.2. [↑](#footnote-ref-43)
44. Sue Tungate, ‘Technology, Art, Design in the Work of Matthew Boulton: Coins, Medals, and Tokens Produced at the Soho Mint’, in Matthew Dick (ed.), *Matthew Boulton: A Revolutionary Player,* (Studley: Brewin Books, 2009), p.186. [↑](#footnote-ref-44)
45. Kalra, ‘Birth of the ‘New’ Bombay Mint’, p.418. [↑](#footnote-ref-45)
46. James Watt, *Memorandum Concerning Mr Boulton: Commencing with my first acquaintance with him. Glasgow, September 17th 1809,* Available: <http://sohomint.info/wattmemoir.html> Accessed: 3 March 2021. [↑](#footnote-ref-46)
47. Maxine Berg, “Britain, industry and perceptions of China: Matthew Boulton, ‘useful knowledge’ and the Macartney Embassy to China 1792–94”, *Journal of Global History*, 1 (2006) pp. 269–288. [↑](#footnote-ref-47)
48. Lord, *Capital and Steam Power*, p.120, p.122. [↑](#footnote-ref-48)
49. Jennifer Tann, ‘Matthew Boulton – Innovator’, in Kenneth Quickenden, Malcolm Dick, Sally Baggott (eds.), *Matthew Boulton – Enterprising Industrialist of the Enlightenment,* (Milton Park, Routledge, 2016), p.50. [↑](#footnote-ref-49)
50. Boulton to Apsley, 23 January 1796, quoted in John Griffiths, *The Third Man: The Life and Times of William Murdoch, inventor of gaslight* (London: Andre Deutsch, 1992), p.302. [↑](#footnote-ref-50)
51. Dickinson, *Boulton*, pp.122-3, pp.163-4, p.168. [↑](#footnote-ref-51)
52. Tann, ‘Steam and Sugar’, p.72. [↑](#footnote-ref-52)
53. Satchell, ‘Steam for Sugar-Cane Milling’, pp.242-3. [↑](#footnote-ref-53)
54. Jennifer Tann, ‘The Diffusion of the Stationary Steam Engine from Britain to India, 1790-1830’, *The Indian Economic and Social History Review,* 29/2 (1992), p.207, p.213. [↑](#footnote-ref-54)
55. Dickinson, *Boulton*, p.172, p.201. Modern value of £150,000 in 1809 (estimated here using a Relative Wage Income: Average Earnings, 2019 values) are derived from Lawrence H. Officer and Samuel H. Williamson, ‘Five Ways to Compute the Relative Value of a UK Pound Amount, 1270 to Present’, *Measuring Worth 2021*, Available: [www.measuringworth.com/ukcompare/](http://www.measuringworth.com/ukcompare/) Accessed 7 March 2021. [↑](#footnote-ref-55)
56. William D. Rubinstein, *Who Were the Rich? A biographical directory of British Wealth-holders, Vol. I., 1809-1839,* (London: Social Affairs Unit, 2009), pp.12-13, p.27. [↑](#footnote-ref-56)
57. Samuel Smiles, *Men of Invention and Industry,* (London: John Murray, 1884), pp.123-4. [↑](#footnote-ref-57)
58. John Griffiths, *The Third Man: The Life and Times of William Murdoch, inventor of gaslight* (London: Andre Deutsch, 1992), pp.11-12 [↑](#footnote-ref-58)
59. John C. Griffiths, ‘Murdock [formerly Murdoch], William (1754–1839), engineer and inventor’, *Oxford Dictionary of National Biography.* 23 Sep. 2004; Accessed 16 Mar. 2021. [↑](#footnote-ref-59)
60. Smiles, *Men of Invention and Industry,* p.140. [↑](#footnote-ref-60)
61. Smiles, *Men of Invention and Industry,* p.126; Griffiths, *The Third Man,* p.7. [↑](#footnote-ref-61)
62. Smiles, *Men of Invention and Industry,* p.126; Griffiths, *The Third Man,* pp.8-11. [↑](#footnote-ref-62)
63. Griffiths, *The Third Man,* p.105. [↑](#footnote-ref-63)
64. Smiles, *Men of Invention and Industry,* p.128. [↑](#footnote-ref-64)
65. Griffiths, *The Third Man,* p.23. [↑](#footnote-ref-65)
66. Henry Hamilton, *Economic History of Scotland in the Eighteenth Century* (Oxford: Clarendon Press, 1963), p.354. [↑](#footnote-ref-66)
67. Eric Roll, *An Early Experiment in Industrial Organisation, Being a History of the Firm of Boulton & Watt, 1775-1805,* (London: Frank Cass, 1968), p.40. [↑](#footnote-ref-67)
68. Griffiths, *The Third Man,* p.24. [↑](#footnote-ref-68)
69. Roll, *Early Experiment in Industrial Organisation*, p.84. [↑](#footnote-ref-69)
70. Griffiths, *The Third Man,* p.102. [↑](#footnote-ref-70)
71. William Fletcher, ‘The Inventor of Gaslighting’, in *The Engineering Magazine Devoted Industrial Progress Vol VI, Oct. 183 to March 1894,* (New York, 1894), p.225. [↑](#footnote-ref-71)
72. Smiles, *Men of Invention and Industry,* p.131 [↑](#footnote-ref-72)
73. Griffiths, *The Third Man,* pp.211-212, pp.227-8. [↑](#footnote-ref-73)
74. ‘William Murdock – A Genius Overshadowed’, *Bradford Observer,* 15 November 1939, p.4. [↑](#footnote-ref-74)
75. Griffiths, ‘Murdock [formerly Murdoch], William (1754–1839)’, *ODNB.* [↑](#footnote-ref-75)
76. Griffiths, *The Third Man,* p.124. [↑](#footnote-ref-76)
77. Griffiths, *The Third Man,* p.164. [↑](#footnote-ref-77)
78. Smiles, *Men of Invention and Industry,* pp.136-7. [↑](#footnote-ref-78)
79. Smiles, *Men of Invention and Industry,* pp.138-141; Griffiths, *The Third Man,* p.226. [↑](#footnote-ref-79)
80. ‘The Redruth Memorial to William Murdock’, *The Cornish Telegraph,* 19 September 1889, p.6. [↑](#footnote-ref-80)
81. Smiles, *Men of Invention and Industry,* pp.138-141. [↑](#footnote-ref-81)
82. Smiles, *Men of Invention and Industry,* pp.141-144; Griffiths, *The Third Man,* pp.238-9; John Alfred Langford (ed.), *A Century of Birmingham Life or a Chronicle of Local Events from 1741 to 1841, Vol. 2* (Birmingham: EC Osborne, 1868), p.152. [↑](#footnote-ref-82)
83. Griffiths, *The Third Man,* pp.261-72; Leslie Tomory, ‘Fostering a new industry in the Industrial Revolution: Boulton & Watt and gaslight 1800-1812’, *The British Journal for the History of Science,* June 2013, Vol. 46, No. 2 (June 2013), p.223; David Phillip Miller, *The Life and Legend of James Watt: Collaboration, Natural Philosophy, the Improvement of the Steam Engine,* (Pittsburgh: University of Pittsburgh Press, 2019), p.164. [↑](#footnote-ref-83)
84. Smiles, *Men of Invention and Industry,* p.144. [↑](#footnote-ref-84)
85. Griffiths, *The Third Man,* p.273. [↑](#footnote-ref-85)
86. Smiles, *Men of Invention and Industry,* p.144, p.151. [↑](#footnote-ref-86)
87. Smiles, *Men of Invention and Industry,* p.154. [↑](#footnote-ref-87)
88. Joseph Melling, ‘Dark Satanic Millwrights? Forging Foremanship in the Industrial Revolution: Matthew Boulton and the Leading Hands of Boulton and Watt’, in Kenneth Quickenden, Malcolm Dick, Sally Baggott (eds.), *Matthew Boulton – Enterprising Industrialist of the Enlightenment,* (Milton Park, Routledge, 2016), p.166, p.169. [↑](#footnote-ref-88)
89. Roll, *Early Experiment in Industrial Organisation,* p.262; Griffiths, *The Third Man,* p.141, p.156, p.159, p.203. [↑](#footnote-ref-89)
90. Griffiths, *The Third Man,* p.227, footnote. [↑](#footnote-ref-90)
91. Roll, *Early Experiment in Industrial Organisation,* p.262; Griffiths, *The Third Man,* pp.303-5. [↑](#footnote-ref-91)
92. This is based on estimation of daily adult male wage rate in England of 37 pence (d) per day, and assuming 300 working days per year in 1810. See Gregory Clark, ‘Average Earnings and Retail Prices, UK, 1209-2017’, *Measuring Worth datasets*, Available: <https://www.measuringworth.com/datasets/ukearncpi/earnstudyx.pdf> Accessed: 22 March 2021. [↑](#footnote-ref-92)
93. Veront Satchell, ‘Steam for Sugar-Cane Milling: The Diffusion of the Boulton and Watt Stationary Steam Engine to the Jamaican Sugar Industry, 1809-1830’ in Kathleen Monteith and Glen Richards (eds.), *Jamaica in Slavery and Freedom: History, Heritage and Culture* (Kingston: University of West Indies Press, 2002), pp.242-3. [↑](#footnote-ref-93)
94. Griffiths, *The Third Man,* pp.332-3. [↑](#footnote-ref-94)
95. Langford (ed.), *A Century of Birmingham Life*, pp.671-2. [↑](#footnote-ref-95)
96. Griffiths, ‘Murdock [formerly Murdoch], William (1754–1839), engineer and inventor’, *ODNB.* Modern value of £30,000 - £40,000 in 1839 (estimated here using a Relative Wage Income: Average Earnings, 2019 values) are derived from Lawrence H. Officer and Samuel H. Williamson, ‘Five Ways to Compute the Relative Value of a UK Pound Amount, 1270 to Present’, *Measuring Worth 2021*, Available: [www.measuringworth.com/ukcompare/](http://www.measuringworth.com/ukcompare/) Accessed 17 March 2021. [↑](#footnote-ref-96)
97. Smiles, *Men of Invention and Industry,* p.155. [↑](#footnote-ref-97)
98. There were three generations of James Watt: denoted here as James Watt senior (1698-1782), James Watt (1736-1819), and James Watt junior (1769-1848). [↑](#footnote-ref-98)
99. J.P. Muirhead, *The Life of James Watt with Selections from his Correspondence, 2nd edn.* (London: John Murray, 1859)*,* p.17; National Records of Scotland (hereafter NRS), Old Parish Registers Births 564/3 Greenock Old or West, f.381. [↑](#footnote-ref-99)
100. George Williamson and James Williamson (eds.) *Memorials of the lineage, early life, education and development of the genius of James Watt*, (Watt Club, 1856), p.133, p.140, pp.154-5. [↑](#footnote-ref-100)
101. Richard L. Hills *James Watt Volume 1: His time in Scotland, 1736-1774* (England: Landmark, 2002), pp.105-6, pp.126-7. [↑](#footnote-ref-101)
102. Muirhead *The Life of James Watt,* p.12. [↑](#footnote-ref-102)
103. Stephen Mullen, ‘The rise of James Watt: enlightenment, commerce, and industry in a British-Atlantic merchant city, 1736-74’, in *James Watt 1736-1819: Culture, Innovation and Enlightenment.* ed. by M. Dick and C. Archer-Parré, (Liverpool: Liverpool University Press, 2020), pp. 39-61. [↑](#footnote-ref-103)
104. Library of Birmingham, Archives and Collections (hereafter BA&C) MS3219/3/86, ‘Letter book, 1743–46’, n.d. [↑](#footnote-ref-104)
105. Hills, *James Watt Volume 1,* pp. 47–8. [↑](#footnote-ref-105)
106. BA&C, MS3219/3/92/Folder 1, ‘Invoice of Goods’, June 1754. [↑](#footnote-ref-106)
107. BA&C, MS 3219/3/93, ‘James Watt to James Watt senior’, 15 July 1755; ‘Mr. Marr and James Watt to James Watt senior’, 6 August 1755. [↑](#footnote-ref-107)
108. BA&C, MS 3219/3/93, ‘James Watt in London to James Watt senior’, 5 August 1755. [↑](#footnote-ref-108)
109. BA&C, MS3219/3/93, ‘James Watt in London to James Watt senior’, 25 October 1755. [↑](#footnote-ref-109)
110. BA&C, MS 3219/3/93, ‘James Watt to James Watt senior’, 19 June 1756. [↑](#footnote-ref-110)
111. Modern value of £43 sterling in 1756 (estimated here using a Relative Wage Income: Average Earnings, 2019 values) are derived from Lawrence H. Officer and Samuel H. Williamson, ‘Five Ways to Compute the Relative Value of a UK Pound Amount, 1270 to Present’, *Measuring Worth 2021*, Available: [www.measuringworth.com/ukcompare/](http://www.measuringworth.com/ukcompare/) Accessed 1 March 2021. [↑](#footnote-ref-111)
112. BA&C, MS 3219/3/92, ‘James Watt to James Watt senior’, 27 September 1756. [↑](#footnote-ref-112)
113. BA&C, MS 3219/3/92, ‘James Watt to James Watt senior’, 6 June 1758. [↑](#footnote-ref-113)
114. ‘MacFarlan Observatory’, Available: <https://universitystory.gla.ac.uk/building/?id=170> Accessed: 25 March 2021. [↑](#footnote-ref-114)
115. Glasgow University Archives (hereafter GUA) 26640/Clerk’s Press, 28: ‘Senate Minutes, 1749–1759’, p. 199. [↑](#footnote-ref-115)
116. BA&C, MS 3219/92/Folder 4 ‘James Watt to father’, 6 March 1758; GUA, 26641/ Clerk’s Press, 29: ‘Senate Minutes, 1759–60’, p.1. [↑](#footnote-ref-116)
117. BA&C, MS 3219/3/92, ‘James Watt to James Watt senior’, 15 September 1758. [↑](#footnote-ref-117)
118. BA&C, MS 3219/3/92, ‘Account Current James Watt with James Watt junior’, December 1760. [↑](#footnote-ref-118)
119. BA&C, MS 3219/3/92, ‘Account Current John Willison to James Watt of Glasgow’, May 1762. [↑](#footnote-ref-119)
120. BA&C, MS 3219/3/92, ‘James Watt to James Watt senior’, 20 September 1765. [↑](#footnote-ref-120)
121. Hills, *James Watt Volume 1,* p.162-176; George Haggarty, ‘Scotland crosses the Atlantic: evidence for eighteenth- and early nineteenth-century ceramic trade’, in Habib, Gray & Forbes (eds.), *Making for America: Transatlantic craftsmanship: Scotland and the Americas in the eighteenth and nineteenth centuries,* (Edinburgh: Society of Antiquaries of Scotland, 2013), pp. 129-149; NRS, Edinburgh Sheriff Court Inventories, SC70/1/21, ‘Last Will and Inventory of James Watt’, 8 June 1820, pp.673-4. [↑](#footnote-ref-121)
122. ‘Industrial Revolution: A Documentary History’: Series 1: ‘The Boulton & Watt Archive and the Matthew Boulton Papers from Library of Birmingham’. Series 1/Reel 20: MI/3/65, ‘Note of some particulars relating to the produce of cotton in Island of Carriacou, 1772’. [↑](#footnote-ref-122)
123. Richard L. Hills *James Watt Volume 2: The Years of Toil, 1775-1785* (England: Landmark, 2005), pp.155-6. [↑](#footnote-ref-123)
124. BA&C, MS 3219/3/95, ‘John Watt junior to James Watt senior’, 20 June 1761. [↑](#footnote-ref-124)
125. BA&C, MS 3219/3/95, ‘John Watt junior to James Watt senior’, 10 July 1761; Jacob M. Price, ‘Buchanan and Simson, 1759–1763: A Different Kind of Glasgow Firm Trading to the Chesapeake’, *William and Mary Quarterly* 40/1 (January 1983), pp.3–41. [↑](#footnote-ref-125)
126. Hills *James Watt Volume 1,* pp.37-38; Series 1/Reel 69: MII/3/3/71, ‘Copy to Messrs Maxwell & McBrain’, August 1762. [↑](#footnote-ref-126)
127. Muirhead *The Life of James Watt,* p.10. [↑](#footnote-ref-127)
128. BA&C, MS 3219/3/92, ‘James Watt to John Watt junior’, 15 May 1761. [↑](#footnote-ref-128)
129. Series 1/Reel 69: MII/3/3/61, ‘Receipt for a Black Boy’, 17 March 1762. [↑](#footnote-ref-129)
130. John W. Cairns, ‘Importing Enslaved Africans into Eighteenth-Century Scotland’, in Oliver Fehrenbacher, Dörte Poelzig und Boris Paal (eds.), *Festschrift for Prf. Drs. Werner F. Ebke* (full title tbc), (Munich, Verlag C. H. Beck, 2021). [↑](#footnote-ref-130)
131. John Burke, *A Genealogical and Heraldic History of the Commoners of Great Britain and Ireland,* Vol. III, (London: Henry Colburn, 1836) p.597. [↑](#footnote-ref-131)
132. Series 1/Reel 69: MII/3/3/62, ‘List of Cloths for Black Boy’, March 1762. [↑](#footnote-ref-132)
133. Stephen Mullen, Nelson Mundell, Simon Newman, ‘Black Runaways in Eighteenth-Century Britain’ in Gretchen H. Gerzina (ed.), *Britain’s Black Past* (Liverpool: Liverpool University Press, 2020), pp.83-84. See also Dolly Mackinnon, ‘Slave Children: Scotland's Children as Chattels at Home and Abroad in the Eighteenth Century’, in Janay Nugent, Elizabeth Ewan, (eds.), *Children and Youth in Premodern Scotland,* (Martlesham: The Boydell Press, 2015), pp.120-136. [↑](#footnote-ref-133)
134. For other examples, see the ‘Runaway Slaves in Britain’ project. Available: https://www.runaways.gla.ac.uk/ Accessed: 12 March 2021. [↑](#footnote-ref-134)
135. BA&C, MS 3219/3/92, ‘James Brodie to James Watt junior in Greenock’, 3 October 1762. [↑](#footnote-ref-135)
136. ‘Runaway Slaves in Eighteenth Century Britain: For Sale’, Available: <https://www.runaways.gla.ac.uk/for_sale/> Accessed: 21 March 2021. [↑](#footnote-ref-136)
137. Simon P Newman, Freedom-Seeking Slaves in England and Scotland, 1700–1780, *The English Historical Review, Volume* 134, Issue 570, October 2019, Pages 1136–1168, [↑](#footnote-ref-137)
138. J. Cairns, ‘Freeing from Slavery in Eighteenth-Century Scotland’, in Andrew Burrows, David Johnston, QC, and Reinhard Zimmermann (eds.), *Judge and Jurist: Essays in Memory of Lord Rodger of Earlsferry,* (Oxford: Oxford University Press, 2103), p.380; ‘Maintaining Slavery without a Code Noir: Scotland, 1700–78’, in N. M. Dawson, Felix M. Larkin (eds), *Lawyers, the Law and History: Irish Legal History Society Discourses and other Papers, 2005-2011,* (Dublin: Four Courts Press, 2013). [↑](#footnote-ref-138)
139. John Cairns, ‘Enforced Sojourners under Grey Skies: Black Apprentices in Eighteenth-Century Scotland’, in E. J. M. F. C. Broers, R. M. H. Kubben (eds.), *Ad Fontes: Liber Amicorum Prof. Beatrix van Erp-Jacobs* (Nijmegen: Wolf Legal Publishers, 2014), p.71. [↑](#footnote-ref-139)
140. H.W. Dickinson, *Matthew Boulton,* (Cambridge: University Press, 1936), pp.75-85. [↑](#footnote-ref-140)
141. 'Thomas Graham Stirling previously Graham', Legacies of British Slave-ownership database, http://wwwdepts-live.ucl.ac.uk/lbs/person/view/2146642181 accessed 20 March 2021. [↑](#footnote-ref-141)
142. National Library of Scotland, MS.10946, ‘Charles M’Dowall to William Graham of Airth’, 22 January 1783, ff.2-3. [↑](#footnote-ref-142)
143. Veront Satchell, *Sugar, Slavery and Technological Change: Jamaica 1760-1830,* (Saarbrucken: VDM Verlag, 2010), p.130, p.219. [↑](#footnote-ref-143)
144. Malcolm Dick, ‘Joseph Priestley, the Lunar Society and Anti-slavery’, in Malcolm Dick (ed.), *Joseph Priestley and Birmingham,* (Warwick: Brewin Books, 2005), pp.74-5; full quote here: *Commerce, Slavery and Anti-Slavery,* Available: <https://www.revolutionaryplayers.org.uk/commerce-slavery-and-anti-slavery/> Accessed: 13 March 2021. [↑](#footnote-ref-144)
145. James Watt, *The University of Glasgow Story*, Available: <https://universitystory.gla.ac.uk/biography/?id=WH0018&type=P> Accessed: 12 March 2021. [↑](#footnote-ref-145)
146. These transcriptions can be found in ‘References to Slaves in the “Archives of Soho”’, Library of Birmingham Archives and Collections. Available: <http://calmview.birmingham.gov.uk/CalmView/app_themes/customer/images/bah-source-Slavery%20in%20Archives%20of%20Soho.pdf> Accessed: 13 March 2021. [↑](#footnote-ref-146)
147. David Phillip Miller, *The Life and Legend of James Watt: Collaboration, Natural Philosophy, the Improvement of the Steam Engine,* (Pittsburgh: University of Pittsburgh Press, 2019), pp.211-3. [↑](#footnote-ref-147)
148. Modern value of £60,000 in 1819 (estimated here using a Relative Wage Income: Average Earnings, 2019 values) are derived from Lawrence H. Officer and Samuel H. Williamson, ‘Five Ways to Compute the Relative Value of a UK Pound Amount, 1270 to Present’, *Measuring Worth 2021*, Available: [www.measuringworth.com/ukcompare/](http://www.measuringworth.com/ukcompare/) Accessed 24 March 2021. [↑](#footnote-ref-148)