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Political arithmetic in eighteenth-century England[1]

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Adam Smith memorably declared that 'I have no great faith in political arithmetick'.[2] More generally, it is often held that in eighteenth-century England, unlike the seventeenth and nineteenth centuries, there was little or no quantitative enquiry. In fact, far from such approaches being rare, they were fairly common, providing an important way whereby contemporaries saw, described and, to a lesser extent, explained the world in which they lived. Under the Hanoverians many statistical data were collected and considered, and exploring how and why this was done reveals much about contemporary perceptions of economy and society. The reluctance to recognize this has had two main effects. First, it has to an extent substantiated the common view that policy makers in the eighteenth century were narrow-minded, unprincipled, and ill-informed. Their failure to count, so the story goes, shows how ill-considered much policy was. Second, it has impoverished our view of eighteenth-century discourse, more especially political economy, helping to concentrate attention unduly upon certain areas and constricting the context employed in the history of ideas. That said, it is not claimed here that eighteenth-century political arithmetic was robust and dominant. There were limitations to the quantitative view, helping to explain why, like Smith, many put little faith in numbers.

Eighteenth-century political arithmetic is a large topic and the discussion which follows ranges far and wide. Consequently, many issues are dealt with only briefly and others not at all. A full history of political arithmetic in the eighteenth century is not attempted here—indeed that could not be done within the confines of a single article. Rather, a survey will be provided to demonstrate the importance and some of the determinants of the quantitative exploration of society, economy, and polity at the time. Concern is directed at breadth rather than depth, such that detailing and highlighting will have to be provided elsewhere.

I

The golden age of political arithmetic is generally held to fall between the Restoration and the Hanoverian accession, beginning in 1662 with the publication of John Graunt's *Natural and political observations upon the bills*

[1] Many thanks are due to the late Donald Coleman. I owe a special debt to Joanna Innes for initiating my interest in this topic and for being so generous with her help.

[2] Smith, *Wealth of nations*, I, p. 534. In 1785, in a letter written from Edinburgh Custom House to George Chalmers, Smith repeated his sentiment: 'You know that I have little faith in Political Arithmetic': Smith, *Correspondence*, p. 288.

of mortality, and passing with the death of Gregory King in 1712 and Charles Davenant in 1714.[3] The term itself was coined by its chief protagonist Sir William Petty in about 1671 or 1672. These four men—Graunt, Petty, King, and Davenant—were the leading political arithmeticians of their day. To them political arithmetic was literally statistical—that is state—thinking.[4] To Davenant, 'By Political Arithmetic, we mean the art of reasoning by figures, upon things relating to government.'[5] This often repeated definition neatly summarizes the discipline's thematic and methodological peculiarities. The breadth of the definition, including within political arithmetic's remit anything of interest to government, is most important. Political arithmetic was not, it is worth stressing, confined to estimates of national income and population, for it might also explore public finances, economic performance, poor relief, military matters, religious affiliation, social order, and so on. The dimensions of public policy set the agenda and, therefore, the potential subject matter of political arithmetic was unfixed and could change from one period to another. Methodologically there was less flexibility. Petty, the great evangelist on this point, believed, 'The Method I take to do this, is not very usual, for instead of using only comparative and superlative Words, and intellectual Arguments, I have taken the course . . . to express my self in Terms of *Number, Weight, or Measure*'.[6] Here, however, none of the late seventeenth-century political arithmeticians were proscriptive on the appropriate statistical methods to be employed. For them, therefore, political arithmetic was both thematically and methodologically a broad church.

There is no doubt that in the second half of the seventeenth century quantitative analysis of society advanced. Petty's Down survey of landholding in Ireland, undertaken between 1654 and 1656, was a breathtaking achievement. In 1659 an Irish census was taken and in 1694 something close to a census was taken in England.[7] Bills of mortality were begun in Glasgow in 1670 and Edinburgh in 1695.[8] In the 1660s and 1670s the Privy Council, building on the experience and experiments of the interregnum, tried various sub-committee structures to gather more information and form trade policy.[9] In 1674 the notorious 'Scheme' of Anglo-French trade—an estimate of the balance of trade between the two nations—was drawn up.[10]

[3] Good introductions to the history of political arithmetic are Matsukawa, 'Origin and significance'; Clark, *Science and social welfare*, ch. 5; Endres, 'Functions of numerical data'.

[4] The first two definitions of 'statist' in the *Oxford English dictionary* are: 'one skilled in state affairs, one having political knowledge, power' and 'one who deals with statistics'. According to Capper, 'Statistics are that comprehensive Part of municipal Philosophy, which states and defines the Situation, Strength, and Resources of a Nation, and is a Kind of political Abstract, by which the Statesman may be enabled to calculate his Finances, as well as guide the Œconomy of his Government': *Statistical account*, p. vii. The term 'statistic' was common in German by the 1750s and in English by the 1790s: Johannisson, 'Society in numbers', p. 344.

[5] Davenant, *Works*, I, p. 128. This was the most common definition employed in the eighteenth century. For example: '*Political Arithmetic*, is the art of reasoning by figures upon matters relating to government, such as the revenues, number of people, extent and value of land, taxes, trade, &c. in any nation': *Encyclopaedia Britannica* (3rd edn., 1797-1801), XV, p. 318.

[6] Petty, *Economic writings*, I, p. 244.

[7] Pender, ed., *Census of Ireland*; Glass, ed., *London inhabitants*, introduction; Schürer and Arkell, eds., *Surveying the people*.

[8] Flinn, ed., *Scottish population history*, pp. 73-4.

[9] Cooper, 'Social and economic policies'; Andrews, *British committees*; Thornton, *West-India policy*.

[10] Priestley, 'Anglo-French trade'; Coleman, 'Politics and economics'.

Two years later the Compton ecclesiastical census, a national count of conformists, Protestant dissenters, and Catholics, was taken.[11] The ending of the excise farm in 1683 and the hearth tax farm the following year made available to central government national tax data.[12] Many of these developments were brought together in 1696 with the establishment of the Board of Trade, the Inspector Generalship of Customs, and the General Register of Shipping.[13]

The use of statistics in policy debate expanded at the same time. Petty, King, and Davenant all made it close to the heart of government, though not always for long.[14] In the press, numerical data began to be utilized more intensively than before. For example, in 1681 Sir Peter Pett began writing his sprawling study of the state of religion in England by making some use of the Compton census.[15] In 1683 John Houghton published trade data extracted from the London bills of entry and in 1693 he supplied parliament with county by county figures of acreage, numbers of houses, and tax revenues, relating each to the other.[16]

Many rightly believe that political arithmetic was a remarkable development, perhaps stimulated by the transformation in scientific thinking that took place earlier in the century. Deane has noted that Petty 'had launched the first scientific research programme in political economy'.[17] Hutchison described it as a 'brilliant flowering in the latter part of the seventeenth century' and Schumpeter thought it was a 'decisive impulse'.[18] Others, however, are not so sure. Appleby dealt briefly with the ideas of individual political arithmeticians but paid no attention to the broader methodological innovations.[19] Blaug ignored political arithmetic as a sub-discipline of economics and the particular contributions to economic thinking made by Petty, King, and Davenant.[20] In fact, even those who stress the importance of political arithmetic then often note that it was a false dawn. Schumpeter believed that in the eighteenth century 'the vast majority very quickly forgot' political arithmetic.[21] Hutchison wrote that, 'Political arithmetic . . . went into a sharp decline in England, a decline which lasted through most, or all, of the eighteenth century . . . the political arithmeticians were ahead

[11] Whiteman, ed., *Compton census*.

[12] Chandaman, *English public revenue*; Husbands, 'Hearth tax', pp. 45, 47, 50, 51.

[13] Clark, *English commercial statistics*; Steele, *Politics of colonial policy*.

[14] Strauss, *Sir William Petty*; Holmes, 'Gregory King'; Waddell, 'Charles Davenant'.

[15] Pett, *Happy future state*; see Goldie, 'Sir Peter Pett'. Whiteman, ed., *Compton census*, p. lxxx notes that Glanvill's *Zealous, and impartial Protestant* also made use of some of the statistics.

[16] Houghton, *Collection of letters*, pp. 153-79. In 1692 he wrote of 'The advantage of this Saturday paper to the Court, parliament, political arithmetician': *Collection for the improvement of husbandry*, I, p. 19; Cobbett, ed., *Parliamentary history*, V, app. X.

[17] Deane, 'Political arithmetic', p. 901. For the Baconian basis of political arithmetic: Bacon, 'Greatness of kingdoms'; Sharp, 'Sir William Petty'; Laslett, ed., *Earliest classics*, introduction; Kargon, 'John Graunt'; Kreager, 'New light on Graunt'.

[18] Hutchison, *Before Adam Smith*, p. 54; Schumpeter, *History of economic analysis*, p. 210.

[19] Appleby, *Economic thought and ideology*.

[20] Blaug, *Economic theory in retrospect*.

[21] Schumpeter, *History of economic analysis*, p. 211.

of their time.'[22] Letwin concurs, for 'by the close of the eighteenth century, political arithmetic had quite faded from the scene'.[23]

In these surveys, the decline of political arithmetic is rarely considered. Clark adduced four reasons. First, 'the slack period of social thought came at much the same time as a slack period of scientific thought'; second, 'inactivity in exploring social facts was part of the general administrative torpor of England into the eighteenth century'; third, 'the attempt was made to apply it separately, not as one element in an all-round examination of human and social life'; and finally he notes that the statistics available were often poorly constructed.[24] This last issue has been widely seized upon, particularly by reference to the famous lampoon of political arithmetic in Swift's *Modest proposal* and Adam Smith's exclamation.[25] To summarize, one strand of the traditional historiography stresses the rise and fall of political arithmetic, while another, more muted, avoids the rise and, thus, the fall.

Recent work has begun to challenge the views just outlined and a good deal of eighteenth-century political arithmetic has been uncovered. Attention, however, has been directed mainly at contemporary attempts to collect vital statistics, giving rise to the erroneous impression that this was the limit to political arithmetic in eighteenth-century England.[26] Consequently, although some identify the efforts of Pitt the Younger and Colquhoun in the 1790s as marking a new departure, most see the modern statistical age as beginning in the 1820s and 1830s.[27] This article argues, however, that revisions of the textbook view of the absence of eighteenth-century political arithmetic must be taken further. The 'art of reasoning by figures upon things relating to government' was at least as common after 1700 as before and, indeed, after 1750 it became much more so.

II

Even superficially the argument that political arithmetic declined from the start of the eighteenth century is surprising. For it was only in 1696 that the collection of trade data was regularized, by the establishment of the Inspector Generalship of Customs, the General Register of Shipping, and the Board of Trade—the last pre-eminently an information gathering bureau. All three are known to have collected diverse quantitative materials for different parts of government in the eighteenth century. Similarly, the tax and debt dimensions of the financial revolution in government required

[22] Hutchison, *Before Adam Smith*, p. 54.

[23] Letwin, *Origins of scientific economics*, p. 140. Similar views are put forward in Clark, *Science and social welfare*, pp. 140, 142; Deane, 'Political arithmetic', p. 902; Blaug, *Pre-classical economists*, p. x; Landes, 'Statistics as a source', pp. 56-7; ch. 5 of Westergaard, *Contributions to the history of statistics* is called 'Stagnation of political arithmetic'.

[24] Clark, *Science and social welfare*, pp. 144-5. Buck, 'Seventeenth-century political arithmetic', pp. 83-4, views political arithmetic as a distinctively Restoration, pre-Newtonian, rhetoric.

[25] Swift, 'Modest proposal'; Wittkowsky, 'Swift's *Modest proposal*'.

[26] See, for example, Buck, 'People who counted'.

[27] Cookson, 'Political arithmetic and war'; Cullen, *Statistical movement*.

departments and ministers to collect and think about quantitative materials.[28] In the public arena, moreover, as Innes has stressed, private individuals (Adam Smith included) also often gathered or used data.[29] There is good evidence that society was generally becoming more numerate through the early modern period.[30] There were, furthermore, writers who explicitly attempted political arithmetic, particularly though not exclusively after mid-century. Arthur Young is perhaps best known, but there were others. Sir James Steuart thought that political economy must include demographic issues within its remit and, in turn, that demography had to be addressed largely in statistical terms.[31] Note might also be made of Andrew Hooke's calculations in 1750 of the national debt, national capital, national income, and the annual increment of stock.[32] There were in fact at least 15 estimates made of national income from Petty to Colquhoun, though by no means all of these were truly original calculations (see table 1).

Table 1. *Contemporary estimates of population and national income for England and Wales, 1667-1815*

Estimator	*Year*	*Population* (m)	*N I* (£m)
Petty	1667	6	40
Petty	1676	6	42
King	1688	5.5	43.5
Davenant	1688		44
British merchant	1713/21	7	49.9
Dekker	1744	8	64
Hooke	1750		100
Massie	1757	6	48
Postlethwayt	1757	6	44
Anon. (Scotland only)	1760	1-2	5
Young	1770		128
Pulteney	1779	7	52.5
Pitt	1798		125
Beeke (incl. Scotland)	1799	11	217
Bell (incl. Scotland)	1799-1800	11	243
Colquhoun	1812-4	17	430

Sources: Studenski, *Income of nations*, p. 51; Deane, 'Early national income estimates'; Hooke, *Essay on the national debt*; [Massie], *Sir Matthew Decker's scheme*, p. 88; Postlethwayt, *Universal dictionary*, q.v. 'Political arithmetic', 'People'; Anon., *Dissertation on the chief obstacles*, pp. 13, 17.

In fact, through the eighteenth century a number of writers extolled the virtues of quantitative thinking, in terms resonant of Petty and Davenant. At the start of the century John Arbuthnot wrote an influential essay celebrating mathematical knowledge. This, he thought, 'adds a manly vigour to the mind, frees it from prejudice, credulity, and superstition. This it

[28] Dickson, *Financial revolution*; Brewer, *Sinews of power*, ch. 8.

[29] Innes, 'Social policy'. Smith's exclamation was against the spurious precision of counting. He saw virtue in occasionally thinking about issues quantitatively: see Klein, 'Adam Smith's use of data'.

[30] Thomas, 'Numeracy in early modern England'. See also Cohen, *A calculating people*, ch. 1; Money, 'Teaching in the market-place'.

[31] Steuart, *Principles of political economy*, 1, ch. 13. Steuart's methodology is lauded by Sen, *Sir James Steuart*, ch. 4.

[32] Young, *Political arithmetic*; Hooke, *Essay on the national debt*. Both of these studies and others of their ilk are based on a good deal of guesswork and error, but then much the same could be said of Petty, King, and Davenant.

does in two ways: first, by accustoming us to examine, and not to take things upon trust; secondly, by giving us a clear and extensive knowledge of the system of the world.'[33] He insisted upon the importance of arithmetic to statecraft. Calculations should be made about population, 'stock', land, industry, the balance of trade, public revenues, coinage, and military power. 'This is the true political knowledge', he exclaimed.[34] In his calculations of national income Hooke believed his 'Scheme is perfectly *Newtonian*: Our first Principles are a few Facts well established, and our Conclusions from them clear, natural, and, we hope, just'.[35] This stress on the value of statistics in uncovering fundamental principles of human affairs was developed by Joseph Massie in 1760. He believed that 'The various Branches of our Manufactory and Trade, when nationally considered, may aptly enough be compared to one vast Piece of Machinery' and that it would be possible, with good statistics, to discover the laws governing the mechanism.[36] He wanted data collected on population, prices, wages, labour inputs, and trade, all to be placed within a much more comprehensive evaluation of social and institutional structures. He believed systematized, particularly statistical, commercial knowledge would unlock some more laws of the universe. To one author statistics provided 'the sober garb of exact statement, backed with the irresistible force of arithmetical demonstration'.[37] The views of Arbuthnot, Hooke, and Massie were taken up, explicitly and implicitly, by later commentators, and not just those of a scientific bent.

Even this brief review suggests that it is premature to write off eighteenth-century political arithmetic. Is it possible to be more precise about its extent and nature?[38] In such a short space it is difficult to approach this comprehensively, and what follows is necessarily selective and over-schematic—only some examples of eighteenth-century political arithmetic can be provided. Two routes will be followed, one looking at the use of statistics inside government, the other outside.[39] Once these paths have been explored some of the wider implications can be drawn out.

A start can be made by briefly exploring some of the ways Parliament called upon statistics. From time to time the Commons (and less frequently the Lords) asked for and invariably received reports, often quantitatively based, on various matters.[40] Not all reports were statistical, but many were. It is, however, impossible to know which were and which not, for though the *Journals* note when reports were ordered and delivered the texts of

[33] Arbuthnot, 'Mathematical learning', p. 412. Steele wrote that 'Numbers are so much the Measure of everything that is valuable, that it is not possible to demonstrate the Success of any Action, or the Prudence of any Undertaking, without them.' *Spectator*, no. 174, 19 Sept. 1711.

[34] Arbuthnot, 'Mathematical learning', p. 422.

[35] Hooke, *Essay on the national debt*, p. 46.

[36] Massie, *Representation concerning the knowledge of commerce*, p. 4.

[37] Anon., *Political geography*, p. 7.

[38] The best discussions are by Deane, 'Early national income estimates'; Cookson, 'Political arithmetic and war'; J. Innes, 'The collection and use of information by government, circa 1690-1800' (unpublished and undated paper), Somerville College, Oxford.

[39] It is not argued by this that there was a clear distinction between the two.

[40] These are among the so-called 'Accounts and Papers' valuably listed by Lambert, ed., *Sessional papers*, I, II.

reports have survived only erratically.[41] What can be done is to identify and analyse the main areas of interest (see table 2). In this analysis each account and paper was allowed two subject codes because they sometimes had an ambiguous or dual purpose—as, for example, reports of excise duties received, which might relate to issues of public finance, or the economy, or both.

Table 2. *Subject distribution of Commons accounts and papers by selected session* (%)

Session[a]	*Finance*	*Armed forces*	*Government*	*Economy*	*Others*[b]
1715/6	24	29	11	24	12
1724/5	18	29	12	33	8
1735	18	29	12	33	8
1743/4	16	44	2	34	4
1753	17	16	8	54	5
1761/2	20	33	8	28	11
1772	24	16	6	37	17
1781/2	24	15	17	34	10
1790/1	35	19	11	18	17
All sessions	28	21	11	28	12

Notes: [a] five of the sessions were in peacetime, three in wartime, and one during a rebellion
[b] Others = personal (i.e. wealth and status); law and order; religion; social issues; communications

Source: Lambert, ed., *Sessional papers*, I, II.

Over 88 per cent of all accounts and papers in these sessions related to the four areas of government, finance, the armed forces, and the economy—and most of these would have been quantitative reports. National defence binds together three of these, with the economy the partial exception. National defence was the most important area of policy that the central state itself undertook—rather than leaving it to private individuals, voluntary associations, or local authorities. It was consequently an area of considerable debate.[42] Unsurprisingly, the average proportion of papers in peacetime sessions concerned with national defence was 51 per cent, but in wartime it was 62 per cent.

Across these nine sessions 382 reports (28 per cent of the total) had something to do with the economy.[43] Most of these came from the customs and excise services (which routinely collected such information), either directly or via the Board of Trade. Some reports were for revenue purposes, but many were used to indicate levels of economic activity.[44] The Commons knew that Davenant had exclaimed, that 'The excise is a measure by which we may judge, not only of what the people consume, but, in some sort, it lets us into a knowledge how their numbers encrease or diminish. The

[41] Lambert, ed., *Sessional papers*, I, introduction discusses the sources fully.

[42] Brewer, *Sinews of power*; O'Brien, 'Political economy of British taxation'; Mathias and O'Brien, 'Taxation in Great Britain and France'. On the debates see Dickson, *Financial revolution*, ch. 2; Hoppit, 'Attitudes to credit', esp. pp. 308-12; Pocock, *Machiavellian moment*, chs. 13, 14; *idem*, *Virtue, commerce, and history*.

[43] It is instructive simply to read the index entry 'Trade and manufactures' to Lambert, ed., *Sessional papers*, II, pp. 472-81.

[44] Fine, 'Production and excise'; Mitchell, *British historical statistics*, pp. 397-400; Palmer, *Economic arithmetic*.

customs are the very pulse of the nation.'[45] It is worth stressing the great variety of information supplied here. On the domestic front, data on, for example, coal movements from Tyneside to London and production of candles, soap, beer, salt, and spirits were made available on numerous occasions. Other domestic industries not subject to a national duty, most notably the woollen industry, were judged by import and export figures. Extensive use was made of overseas trade data, with the Commons receiving reports about both major and minor items, about tea and sugar as well as spices and raisins. Data on extraordinarily specific commodities could be produced if need be.[46]

The flow of information into Parliament from the customs and excise services was prolific, but it was not all-encompassing. It is interesting to note what was not made available as well as what was. One gap is in reports relating to the leather industry, which was a very prominent industry at the time. More striking, little use was made of data concerning bullion exports (figures for bullion imports were not even collected) or of output from the Mint, despite the fact that both could have been readily obtained. This is curious, for it is often said that bullion flows provided the central measure of national economic well-being for so-called mercantilists. In 1744, for example, Dekker had declared that 'The Barometer of the general Trade of a Nation is its Mint'.[47] There was a spate of papers concerning such matters delivered to the Commons in 1718, which related to a failed bill regarding the state of the coinage, and in the mid- to late 1770s relating to the recoinage.[48] Otherwise the silence is striking. It is possible that the coinage was exclusively something for the executive to ponder and so kept out of Parliament's way. More probably it reflects the nature of economic discourse at Westminster. That discourse was mainly concerned with specifics and what were taken to be explicit connections, not the asserted causalities at the heart of bullionist doctrines. Ultimately, debate focused upon individual issues, often proposed legislation, not upon broader conceptions of the economic system. Adam Smith had argued powerfully that bullionist doctrines had bewitched policy makers for generations, but from the evidence of the reports sent to the House of Commons he appears, once again, to have been indulging more in polemic than in dispassionate observation.[49]

In what form were statistics presented to Parliament? Those relating to corn provide a good case study. The quantity and quality of harvests profoundly influenced employment and prices and so an appreciation of the corn market would have been crucial to government that understood well the fragility of social order. We know that agricultural production figures

[45] Davenant, *Works*, I, p. 136.

[46] For example, in the trade in straw hats: P.R.O., CO 390/7/3.

[47] Dekker, *Causes of decline*, p. 2. This approach to mercantilism can be taken to begin with Adam Smith, *Wealth of nations*, bk. IV, ch. I. See also Coleman, ed., *Revisions in mercantilism*.

[48] The failed bill did not re-emerge from its second reading in committee: *H. of C. Journals*, XVIII (1714-8), p. 737, 17 Feb. 1718, is its final mention: Li, *Great recoinage*, ch. 12; Ashton, *Economic history*, pp. 170-3; Craig, *Mint*; Palmer, *Economic arithmetic*, pp. 147, 152.

[49] Coleman, 'Adam Smith'; *idem*, 'Mercantilism revisited'.

Table 3. *Accounts and papers relating to corn in the 1766/7 session*

Account	*Ordered*	*Delivered*
Amount of duty on starch, 1740-66	14 Nov.	18 Nov.
The same, for Scotland	14 Nov.	3 Dec.
Quantities of grain exported		
Christmas 1670-96	14 Nov.	24 Nov.
Christmas 1696-1766	14 Nov.	24 Nov.
since 5 Jan. 1766	14 Nov.	24 Nov.
from Scotland, 1707-66	14 Nov.	24 Feb.
the same, since 5 Jan. 1766	14 Nov.	27 Jan.
Bounties paid on corn exported, to 5 Jan. 1766	14 Nov.	24 Nov.
The same, for Scotland	14 Nov.	24 Feb.
The same, since 5 Jan. 1766	14 Nov.	24 Nov.
The same, for Scotland	14 Nov.	27 Jan.
Corn exported, 22 Feb.-26 Aug. 1766	14 Nov.	17 Nov.
Quantity of starch made, Midsummer 1740-66	17 Nov.	20 Nov.
Quantity of starch exported, Christmas 1740-65	17 Nov.	20 Nov.
Spirits extracted from grain, Christmas 1759-66		
for home consumption	21 Nov.	27 Nov.
for export	21 Nov.	27 Nov.
for export, in Scotland	21 Nov.	14 April
Corn exported from Scotland, to 26 Aug. 1766	Not found	25 Nov.
Quantity of wheat, etc, imported since 16 Dec. last	26 March	28 April
The same, for Scotland	26 March	15 May
Amount of duty, 5 July 1765-6 on spirits from corn	31 March	3 April
Spirits extracted from grain & produce of duties, for home consumption, Christmas 1759-Midsummer 1766	31 March	3 April
Quantity of spirits extracted from grain, exported with bounties, Christmas 1759-62	31 March	3 April

Source: Lambert, ed., *Sessional papers*, II, pp. 38-43

were not collected at the time, though some contemporaries made estimates.[50] The Commons found a way round the problem, however, especially by looking at the imports and exports of corn (the data once again provided by the customs service) and later by instituting a remarkably thorough county-by-county collection of corn price data. Starting in the early 1730s and lasting until the middle of the 1770s, reports of corn exports were regularly submitted, often every other session. In the first half of the century the Commons received 13 reports on exports but only three on imports; in the second half there were 22 reports on exports and the same number on imports. Many of these provided data for just two or three years but occasionally more extensive surveys were undertaken. That in 1766 stands out when, as can be seen from table 3, export data back to 1670 were submitted.

This shows what could be done when needed. And in 1766 the needs were great, with a very poor harvest leading to high prices and widespread food rioting.[51] Yet though the Commons did not call regularly for such

[50] Fussell, 'Collection of agricultural statistics'; Mitchison, 'Old Board of Agriculture'; Holderness, 'Prices, productivity and output'.

[51] Ashton, *Economic fluctuations*, p. 153; Charlesworth and Randall, 'Morals, markets and the English crowd'; Randall, 'Gloucestershire food riots'; Williams, 'Midland hunger riots'; Shelton, *English hunger*; Lawson, 'Parliament, the constitution and corn'.

complex and voluminous data it is noteworthy that the material was quickly received. We can see from table 3 that the House was interested in a variety of perspectives, in the long, medium and short term, all presented in tabular form. It also seems likely that, by calling for materials relating to starch and distilling, the Commons wanted to gain some sense of whether corn was being used inessentially.[52] Furthermore, towards the end of the previous session (9 April 1766) it received figures for the price of corn since 1660 at Oxford, Cambridge, Winchester, and Windsor.[53] So, in the absence of output figures for corn production the Commons was able to turn to a number of surrogate indicators to judge what was happening. It had century-long runs of data for corn exports, imports, and prices. It could not, of course, gain a precise picture of agriculture by this means, but the picture was very far from being crudely impressionistic.[54] There was a quantitative base to MPs' knowledge and understanding of the corn market which informed the construction of public policy.

To many, the failure of those in the eighteenth century to indulge in counting is forcefully demonstrated by the absence of a national census before 1801. Specifically, the abortive bills to establish a census in 1753 and a Register General in 1758 are taken to show how little concern there was at the time to enumerate.[55] This is the more striking because, if one commonplace of pre-Smithian economics was concern with the balance of trade, another hardly less significant commonplace was concern with the balance of population. Davenant with profound unoriginality exclaimed that 'People are the real strength and riches of a country'.[56] More to the point, he also thought that, with regard to political arithmetic, 'The foundation of this art is to be laid in some competent knowledge of the numbers of the people'.[57] Yet estimates of Britain's population through the eighteenth century, if numerous, were notoriously ill-based. The abolition of the hearth tax in 1689 had taken away a key basis upon which to speculate. In the eighteenth century no comparable source was available for contemporaries to exploit, though Price made use of the house tax, excise, and London bills of mortality.[58] Population estimates had, then, to be either very rough and ready, or based on local studies. Perhaps the most ambitious effort was Thomas Short's analysis of the London bills and parish registers from over

[52] A bill relating to the making of starch from wheat failed in the Commons at this time, progressing only as far as a first reading on 17 Nov. 1766: *H. of C. Journals*, XXXI (1766-8), p. 14.

[53] Lambert, ed., *Sessional papers*, II, p. 33. These figures, produced by local authorities, had taken much longer to collate, having been ordered on 5 Feb.: *H. of C. Journals*, XXX (1765-6), pp. 763-71, 25 April 1766.

[54] In 1770 a wide-ranging survey of corn prices was instituted by 10 Geo. III, c. 39, 'An act for registering the prices at which corn is sold in the counties of Great Britain, and the quantity exported and imported'. Data were subsequently published monthly in the *London Gazette*.

[55] Glass, *Numbering the people*; Langford, *Polite and commercial people*, pp. 636-7; Buck, 'People who counted', pp. 32-5.

[56] Davenant, *Works*, I, p. 73. This directly echoes [Petyt], *Britannia languens*, pp. 457-8. For some background see Campbell, ' "Of people either too few or too many" '; Statt, 'Controversy over naturalization'.

[57] Davenant, *Works*, I, p. 128.

[58] Price, *Essay on population*; perhaps his most effective critic was Wales, *Inquiry into population*. On the house tax, Dowell, *History of taxation*, II, p. 52; III, pp. 168-72.

160 country parishes and 50 market towns.[59] Yet it was very hard to proceed from local to national estimates. Estimate vied with estimate and Young rightly noted that, 'At present we are very much in the dark on this head; our numbers are guessed every day'.[60]

What use would demographic statistics have been at the time to the central authorities considering the institution of a census? It is true that contemporaries rarely considered the significance of per caput calculations. This was a major weakness of many. However, the usefulness of a census was viewed in rather different terms. One report, reflecting on the failed census bill, recited the arguments in favour of the proposal: 'it would ascertain the collective strength of the nation, and shew where the inhabitants are too numerous, and where they are too few'; it would allow decisions to be made about general naturalization; it would show how many men the armed forces could call upon in an emergency; 'and whether we gain or lose by sending our natives to settle colonies and plantations'.[61] There were, as we have seen, other ways in which the collective strength of the nation might be measured at the time—and in any case population estimates alone could not do this. The point about naturalization was not a major one after the accession of George I. More important, the central concern of the state at the time was defence. Provision of manpower for the army, navy, and militia was a vital objective and it is unclear that population estimates would be of much help in achieving it. Here it is important to note that the Militia Act of 1757 did indeed require parochially based counts of able-bodied men aged 18 to 50.[62] Even in this instance, though, we get a good sense of the limits to counting, for it was the making of these lists by parish constables that most often set off the militia riots where 'The men of the village would . . . rise in order to seize and destroy the lists'.[63] In brief, there were practical, partly socially determined, limits to counting the people. As one contemporary noted, 'There is a certain limit, beyond which human authority can never be obeyed'.[64]

Given the assumptions, prejudices, and priorities of members of both executive and legislature, not all censuses were objectionable. Concern over civil rights and popery meant that in 1767 the House of Lords received a reasonably accurate nationwide count of Catholics; because of concern with depopulation, registers of emigrants were kept at various times; fears of social chaos and the cost of welfare provision meant that there were a number of counts of instances of poverty and poor relief.[65] The imperial

[59] Short, *New observations*; *idem*, *Comparative history*; Jones, 'Dr. Thomas Short'.
[60] Young, *Proposals to the legislature*, p. 4.
[61] *Gentleman's Magazine*, XXIII (Nov. 1753), p. 499.
[62] Western, *English militia*, p. 129.
[63] Ibid., p. 291.
[64] *Gentleman's Magazine*, XXIII (Nov. 1753), p. 501.
[65] 'An account of the number of papists, or reputed papists, of both sexes in England, together with a list thereof', *H. of L. Journals*, XXXII (1768-70), p. 32, 21 Dec. 1767. The number of Catholics was put at 69,376. 'This figure seems to have been the result of a fairly painstaking count of individuals by the parochial clergy': Bossy, *English Catholic community*, p. 184; Smith, *Colonists in bondage*, app.; Bailyn, *Voyagers to the west*, ch. 3; 16 Geo III, c. 40, 'An act for obliging the overseers of the poor . . . to make returns . . . relative to the state of their poor'; 26 Geo III, c. 56, 'An act for obliging overseers

context provides an example of the lengths that were occasionally gone to. London frequently asked for details about colonies, especially their populations, and many censuses were taken. Some of these asked only for totals—usually distinguishing between the sexes, adults and children, free and unfree servants and slaves. Some, however, were linked to attempts to establish a civil register of vital statistics. Many colonies were asked for 'an exact account to be kept of all persons born, christened, and buried, and YOU shall yearly send fair ABSTRACTS thereof to us'.[66] R. V. Wells has found 124 head count censuses, covering 21 American colonies, for the period 1623 to 1775. Often data were requested only for particular colonies, but in 1721, 1731, 1755, and 1773 every colony was involved.[67]

This preoccupation with establishing the size of colonial populations was primarily stimulated by the problem of finding manpower for local militias, though it was also part of a wider concern to come to grips with an expanding empire in which statistics had a part to play. Colonial governors and other officials were sometimes asked to provide information on acreage, climate, soil fertility, harbours, trade, shipping, cultivation, land ownership, natural resources, industrial plant, and inhabitants (including slaves). Some of this was qualitative, some quantitative.[68] The executive in London, usually via the Board of Trade, was concerned to obtain even rough estimates to help with its policy making. At times major reports were put together. One such was in 1721 when the Board of Trade submitted a general report on plantations that made use both of population estimates and of trade statistics. It tried to estimate the value of the plantation trade to the British economy, concluding that 'about one third part of the shipping imploy'd in the foreign trade of this Kingdom is maintained by the Plantation trade'.[69] Cassedy believes that 'Here Political Arithmetic in its broad sense . . . took on a role which Sir William Petty would have approved'.[70]

Naturally, colonial governors did not always find it easy to procure information and much guesswork must have been involved. Poorly developed colonial administrations hampered efforts. With regard to trade data, James Glen, governor of South Carolina, reflected in 1753 that in England 'there being Cruizing Vessels to intercept the Smugglers at Sea, Riding Officers to intercept the Goods on shore, Searchers, Tide Waiters, Land Waiters, Officers to Watch in the Night, others to tend in the day, and Officers kept

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of the poor to make returns . . . relative to the state of the poor'; Eden, *State of the poor*, I, pp. 363-73.

[66] Labaree, *Royal instructions*, II, p. 747.

[67] Wells, *Population of the British colonies*, p. 17. See also Greene and Harrington, *American population* and, generally, Cohen, *A calculating people*. For Ireland Connell has listed 26 population estimates between Petty's of 1672 and that of Eden in 1800: *Population of Ireland*, pp. 4-5; also Pender, ed., *Census of Ireland*.

[68] See, for example, Labaree, *Royal instructions*, II, pp. 742-4; *Calendar of State Papers Colonial, 1701*, pp. 70-1; for nearly annual reports on Newfoundland between 1675 and 1719, P.R.O., CO 390/6/1-15; Hotten, ed., *Lists of emigrants*.

[69] *Calendar of State Papers Colonial, 1720-1*, pp. 408-49; the quotation is at p. 431.

[70] Cassedy, *Demography in early America*, pp. 66-7. For an example of the role of the Board of Trade, information gathering, and policy formation see Malone, *Pine trees and politics*.

on board all Vessels; But here we have few or no Officers'.[71] And if the information was not always well based, neither was it always well used. In London, the political importance of the Board of Trade waned from the early to mid-eighteenth century, such that its use of political arithmetic was far from the only approach to colonial policy.[72] Nonetheless, the statistics that were collected did contribute to the debate and were used more generally.[73]

III

There is plenty of evidence that various branches of government made considerable use of quantitative information through the eighteenth century. However, by no means all of this was officially inspired. Many outside the corridors of power saw counting as an important way of thinking about their world and the possibilities for policy making. Three areas can be explored by way of example.

Demographic issues again provide a convenient and important point of departure. Mortality was a serious preoccupation in the eighteenth century. Much was made of the London bills of mortality (as a brief glance at the debate over gin regulation attests).[74] In 1759, for example, statistics from the London bills for the century before 1758 were published.[75] Much was made particularly of infant mortality, perceptions of which were enhanced by the decision in 1728 to record the ages of the dead within the bills. Here philanthropy and policy, especially in the operation of the Foundling Hospital and Marine Society, merged.[76] The worry, which found potent expression outside Parliament, was not over the total population size, but to ensure that enough infants made it to adulthood, more particularly to manhood, to provide a large pool to be drawn upon by the armed forces. More broadly, the connection between statistical thinking and medicine has rightly been stressed by a number of historians.[77] What one author called 'Medical Arithmetick' was being vigorously championed by the 1780s, though its origins are even earlier. As one author proclaimed 'Without medical arithmetick it is impossible to reach the "grandeur of generality", the sublime of medical divination.'[78] Here efforts were made to collect runs of data not only about mortality but also regarding more specific concerns such as insanity and the success of smallpox inoculation.[79]

Another demographic dimension—the construction of life tables—is worth highlighting. Work in this area by Graunt in 1662 and Halley in 1693 had been major contributions to the development of political arithmetic. Again

[71] Labaree, *Royal instructions*, II, p. 886.
[72] Henretta, '*Salutary neglect*', p. 27; also Basye, *Lords Commissioners of trade*.
[73] For example, Oldmixon, *British empire*, *passim*.
[74] Clark, ' "Mother gin" controversy'; Davison, 'Experiments in social regulation'.
[75] Heberden, *Collection of the yearly bills of mortality*.
[76] McClure, *Coram's children*; Taylor, *Jonas Hanway*; Andrew, *Philanthropy and police*, esp. chs. 3, 4.
[77] Cassedy, 'Medicine and statistics'; Greenwood, *Medical statistics*.
[78] Black, *Arithmetical and medical analysis*, p. vi; *idem*, *Comparative view of mortality*, pp. 37-8.
[79] Black, *Dissertation on insanity*; Watson, *Account of a series of experiments*; Black, *Observations medical and political*; Millar, *Observations on Westminster general dispensary*.

however, this has been seen as a false dawn. Greenwood has remarked that, 'No first-rate English mathematician after Halley gave any critical attention to the theory of the Life Table before the nineteenth century.'[80] If, though, we adopt a less exacting standard and admit within our compass second-rate mathematicians, we find plenty of work going on before 1800. In particular, the importance of the growing annuity and life assurance markets increased commercial pressures for better information and probability theories.[81] Work by de Moivre and Simpson in mid-century had a catalytic effect.[82] The crucial breakthrough, however, came in 1762 with the founding of the Equitable Society for the Assurance of Lives, whose moving spirit was James Dodson, Fellow of the Royal Society and Master of the Royal Mathematical School. We must also note that Richard Price, having made a study of the full vital statistics kept in Northampton between 1735 and 1770 as well as the census taken there in 1746, was consultant to the Equitable.[83] This link between life tables, life assurance, and demography was exemplified in Scotland by Alexander Webster's work. Utilizing statistics for a 20-year period and Halley's study, in 1744 he founded the Scottish Ministers' Widows Fund with Robert Wallace.[84] From this Webster in 1755, at the behest of His Majesty's Advocate for Scotland, made a calculation of Scotland's population, particularly by calling on the Society for Promoting Christian Knowledge for the Highlands and Islands.[85]

The advances in demographic ideas consequent upon the development of life assurance were vital. They had the effect of making many contemporaries much more aware of the nature of mortality, allowing them to see patterns and possibilities where once there was only chance, chaos, and despair. Much of the information and many of the ideas were publicized and debated, often as matters of commercial policy but sometimes as matters of national policy. Perhaps the most significant aspect in public policy terms was the relationship between the development of actuarial studies and the passage of the so-called 'Gambling Act' in 1774. In the early eighteenth century gambling and insurance were seen as intimately related, for insurance was based on chance, not mathematical probabilities. With such probabilities now calculated, the Gambling Act tried to confirm insurance and chance as opposites. As Daston has put it, 'The extraordinary success of the Equitable is the result not only of its exploitation of the regularity of the mortality statistics and the mathematics of probability to fix premiums . . . but also

[80] Greenwood, *Medical statistics*, p. 44.

[81] Two excellent discussions are Daston, *Classical probability* and Hald, *History of probability*. Also Pearson, *History of statistics*.

[82] de Moivre, *Annuities upon lives*; Simpson, *Laws of chance*; *idem*, *Doctrine of annuities*.

[83] Ogborn, *Equitable assurances*, chs. 1-3; Thomas, *Honest mind*, ch. 11; Supple, *Royal Exchange Assurance*, p. 55.

[84] Wallace separately wrote *Dissertation on the numbers of mankind* and engaged with Hume on this: Hume, *Essays*, n. 2, pp. 378-9, 638-9.

[85] Hald, *History of probability*, p. 547; Kyd, ed., *Scottish population statistics*; Flinn, ed., *Scottish population history*, pp. 58-64. Adam Smith believed that 'The late reverend Mr Webster, of all the men I have ever known, [is] the most skilful in Political Arithmetic'. He also detailed Webster's method of estimating Scotland's population and stated that Lord North had access to some of Webster's later calculations: *Correspondence of Adam Smith*, pp. 288, 291.

of its creation of an image of life insurance diametrically opposed to that of gambling.'[86]

A second major area where quantification made an important contribution was in the debate over public finance. This debate has been analysed by a number of historians, but that it had a statistical dimension after *c.*1750 has been largely ignored. One remarkable book, for example, was James Postlethwayt's survey of public revenue from 1688 to 1758.[87] He looked first at the record year by year before providing abstracts for carefully chosen sub-periods. Although he eschewed comment on his tables, their effect was to systematize information about public finance. From the outside this could look amorphous and unstructured, the product of aggregations rather than coordinated planning, but through the efforts of Postlethwayt and others general patterns and developments were identified clearly.[88] And the likely impact of the work was wide, for among the list of some 360 subscribers to Postlethwayt's book were many of the 'great and the good' of the period. There is no doubt that by the 1770s contemporaries had available a good, quantitatively based, long-run perception of public finances. Furthermore, this was given vivid expression by the innovative use of graphical representation of data by William Playfair. He charted, for example, the annual revenues of England and France from 1550 to 1800 and the size of the national debt between 1688 and 1800.[89]

Playfair was concerned with more than just public finances. He also charted exports and imports across the eighteenth century, both in general and for particular trading partners. This provides the third example of the use of the non-governmental quantitative perspective. In 1776 the MP Charles Whitworth published detailed annual trade statistics going back to 1697.[90] Towards the close of the American war George Chalmers employed such data with population estimates (based on investigations into parish registers) to argue that Britain was much more prosperous than it had been in 1688.[91] One author attempting to survey national well-being and believing that 'Political Œconomy is a science' provided data on trade since 1697, the size of the national debt since 1688, and the volume of legislation for enclosure and canals for the years 1789-96.[92] At the same time, Capper was detailing (on a county by county basis) counts of houses and inhabitants, numbers employed in agriculture, as well as acreages, distinguishing between arable, pasture, and uncultivated (including woodland).[93] Bold comparative

[86] Daston, *Classical probability*, p. 175. The act was 14 Geo. III, c. 48, 'An act for regulating insurance upon lives, and for prohibiting all such insurances, except in cases where the person insuring shall have an interest in the life or death of the person insured'. It perhaps needs placing in the context of wider concerns over gaming in the 1770s: see Langford, *Polite and commercial people*, pp. 571-4; Raven, 'English state lotteries'. Related points are made by Thomas, *Religion and the decline of magic*, pp. 779-82.

[87] Postlethwayt, *History of the public revenue*.

[88] Others include Whitworth, *Collection of the supplies*; Sinclair, *History of the public revenue*.

[89] Playfair, *Commercial and political atlas*. The first edition was published in 1786.

[90] Whitworth, *State of the trade of Great Britain*. Whitworth edited Davenant's collected works.

[91] Chalmers, *Estimate of the comparative strength of Britain*. In certain respects Chalmers followed the lead of Anderson, *Origin of commerce*.

[92] Clarke, *Survey of strength and opulence*, pp. 1, 14-6, 54-6, 121, 130.

[93] Capper, *Statistical account*, pp. 66-81.

surveys were also attempted, such as one study of the relationship between population and land in the British Isles and in other European states.[94] More specific studies were also undertaken, such as Smith's into the corn trade and Maitland's into the state of London.[95]

IV

Though the foregoing discussion has been selective it is clear that much use was made of quantitative information through the eighteenth century, more especially in its second half. Political arithmetic did not die with King and Davenant; it was certainly kept alive, though at times only barely so before the accession of George III. Thereafter it was employed widely and readily. Crudely, four factors kept political arithmetic going in the eighteenth century: the wider intellectual context which had some faith in numbers; the need of both central and local government for information; the existence of agencies able to provide data; and public debates about policy and projects.

Through the eighteenth century, and with gathering force and pace, the broader intellectual climate was conducive to political arithmetic. The place of science within society expanded and the spirit of enquiry widened. Scientific societies flourished, not just in London but across the nation, drawing members from landed and urban society.[96] Furthermore, it must be remembered that at the time polite society made no hard and fast distinction between humanities and science, as a glance at publications such as the *Gentleman's Magazine* attest. More pointedly, science and public policy began to interact. To cite only a few examples, attempts to regularize national weights and measures, calendar reform, improvements in the measurement of longitude, pressure, and temperature, along with the establishment of the Ordnance Survey and mean time are all indicative of a wider search for knowledge and order in which quantification was central to both perceptions and actions.[97]

More widely, both the growth of the press in the eighteenth century and the vastly enhanced legislative activity of Parliament after 1688 increased dramatically the scope and need for public debate. Parliament's new role after the Glorious Revolution was in fact vital in institutionalizing political arithmetic. Facilitating this, developments in the customs and excise services consequent upon the financial revolution in government created administrations able to produce data at little or no marginal cost. Ministers, parliamentarians, and pamphleteers were all prepared to use numbers to establish or promote policy positions. Such debate was, of course, often self-interested and the numbers employed were unreliable if not downright lies—the point is simply to stress the evident willingness which existed to employ quantification as one weapon in the arsenal of the politician, commentator, lobbyist, and projector. It was a valued weapon even if it was not a decisive one.

[94] Anon., *Political geography*. There are some echoes here of Templeman, *New survey*.
[95] Smith, *Three tracts*; Maitland, *History of London*.
[96] For example, Schofield, *Lunar society*; Evans, 'Diffusion of science'.
[97] Hoppit, 'Weights and measures'; Heilbron, 'Introductory essay'; Howse, *Greenwich time*; Waters, 'Nautical astronomy'; Seymour, ed., *Ordnance Survey*.

Were there particular reasons why political arithmetic appears to have gained ground after *c.*1750? One major factor was that the growing cost of war after 1756 was associated with many attempts to count the associated burdens—on manpower, taxpayers, financial markets—by those both within and outside government. Renewed fears of national bankruptcy which began to be voiced loudly at the close of the Seven Years War (1763), and failure in the American War, intensified concern about the true strength of the British empire. National wealth and income were at issue and some debated their extent by using quantitative evidence. Inside government, worries over servicing the national debt stimulated some central reform—which was also part of Pitt's education in political arithmetic.[98] Indeed, Pitt raised the profile of political arithmetic considerably and sought out data fairly assiduously in his efforts to overhaul the nation's finances in the 1780s and 1790s. The introduction of the income tax in 1799 was a major departure, *requiring* social scientific analysis at the heart of government.[99] Another stimulus to the greater use of quantitative materials towards the end of the eighteenth century was the increasing pressure being placed on local authorities. Eastwood has noted a procedural modernization within local government, 'requiring . . . a considerably greater volume of information'.[100] Population growth in the context of regionally specific economic change and heightened instability (harvest failures, financial crises, and the emergent trade cycle) posed profound difficulties. In parts of the south and east the problems of poverty mounted. In urban areas crime became a critical issue. Local administrative innovations took place, from poor law unions and the introduction of the Speenhamland system to the establishment of small debt courts and associations for the prosecution of felons.[101] All required the collection, collation, and analysis of qualitative and quantitative information.

V

Clearly, quantitative enquiry did not carry all before it during the eighteenth century. There were limits to what was achieved, limits which might, crudely, be thought of as either those of a desire or an ability to pursue political arithmetic. For the first, we have seen that the government often wanted to count particular groups within the population, but that it was unwilling to make the effort to conduct a full national census. Equally, much depended upon the abilities of administrative bodies to collect and communicate data—material held in the parish was very difficult to organize on a national level. Even data which were given a high priority by government could be problematic. Contemporaries, for example, were well aware of the limitations of trade data based only upon official valuations—Henry Martin, Inspector General of Exports and Imports, made great play of this in 1718.

[98] Torrance, 'Social class and bureaucratic innovation'; Binney, *British public finance*; Breihan, 'Economical reform'; Reitan, 'Edmund Burke'.

[99] See his speech introducing the income tax in Cobbett, ed., *Parliamentary history*, XXXIV, cols. 10-8; also Cookson, 'Political arithmetic and war'.

[100] Eastwood, ' "Amplifying the province of the legislature" ', p. 283.

[101] Langford, *Public life*.

The limitations of the excise service were also laid bare at the end of the American War.[102] Inaccuracies of available data naturally restricted the willingness of many to adopt the quantitative view and, of course, provided plenty of grist to Swift's satirical mill.[103]

The limits to quantitative thinking in the eighteenth century were not just those imposed by available data. By modern standards data were handled unimaginatively, only rarely being 'manipulated' or refined. Partly, this arose from the tentative steps taken towards conceiving of 'populations' and categories, both essential prerequisites for quantitative analysis. In large part, however, this was due to the limited range of statistical techniques available. Frequently, totals would simply be provided to speak for themselves. Little effort was made to correlate (even in the form of crude ratios), and juxtaposing one number or series with another was held to be enough. Tabular presentation was for most the height of sophistication. From such tables, Chalmers argued, the 'eye instantly perceives the disposition of the parts and the arrangement of the whole'.[104] Yet in truth they could provide only a limited way of seeing, especially when the table was large and undigested. Moreover, as Clark noted, if particular datasets were valued, there was no sense of systematically exploring the mechanisms linking one set with another. Very few emulated Petty's experimental calculations and in that way eighteenth-century political arithmetic was less adventurous. Gregory King, whatever his faults, had tried to look at society generally in quantitative terms and express key relationships between component parts arithmetically. He had no successor in the eighteenth century. It was, therefore, not political arithmetic which died with King and Davenant, but something closer to econometrics. That said, there were developments in the eighteenth century aside from the range of data collected. Perhaps the most remarkable imaginative leap was Playfair's development of graphs. He rightly believed that:

> The advantage proposed, by this method, is not that of giving a more accurate statement than by figures, but it is to give a more simple and permanent idea of the gradual progress and comparative amounts, at different periods, by presenting to the eye a figure, the proportions of which correspond with the amount of the sums intended to be expressed . . . this mode unites *proportion*, *progression*, and *quantity*, all under one simple impression of vision, and consequently one act of memory.[105]

From his publishing record Playfair may have had some success in showing the importance of a new method, but his efforts were not followed up for many years. This, allied to the restricted range of available statistical techniques and the accuracy and inaccuracy of the numbers themselves, meant that quantitative information was not viewed in the eighteenth century as all-powerful. If some (Whitworth and Chalmers, for example) thought

[102] P.R.O., CO 390/12, fos. 9-10; *Reports from the Committee on illicit practices.*

[103] Swift was also troubled by some of the claims made for what we would call social science. See Craven, *Jonathan Swift.* I am grateful to Paul Langford for this reference.

[104] Chalmers, *An estimate*, p. 37.

[105] Playfair, *Commercial and political atlas*, pp. ix-x. For a discussion see Funkhouser and Walker, 'Playfair and his charts'.

data might provide unimpeachable facts, for others such information was imprecise, supplying no more than a general sense or context to be placed alongside qualitative perceptions. To them a number was not usually viewed as inherently more valuable than an opinion.

In the field of quantitative enquiry Eastwood has noted instructive comparisons to be made between the mid-eighteenth and the early nineteenth century.[106] We are struck by the absence of Royal Commissions of enquiry in the eighteenth century, of the dependence upon Commons select commitees, semi-official efforts, and private initiatives to address problems, and of the ad hoc relationship between those efforts and executive authority. We are struck by the much more limited and less intense statistical approaches compared to the early Victorian period. It is noticeable how much information was not routinely made available on an annual basis and how between Gregory King and Henry Beeke in 1799 most political arithmetic was narrowly conceived or poorly constructed or both.[107] Political arithmetic through the eighteenth century usually followed lines etched out in the late seventeenth century. There was no great development in the type of information collected nor in how that information might be handled.

What explains these limitations of eighteenth-century political arithmetic? A central factor may have been the nature of the executive lead given. The government accorded the highest priority to national defence and happily utilized political arithmetic alongside other information and opinions in the forming of policy in this area. Elsewhere, however, the government was much less decisive in providing a lead. In the eighteenth century general domestic policy was often undertaken reluctantly, not least because the political nation put such weight upon localism and the sanctity of particular rights and property. Innovation most frequently arose from the specific context and was more often stimulated by short-term considerations than structured, institutionalized decision making.[108] Consequently, the role of independent MPs and advisers outside Westminster and Whitehall was especially important. It is true that generally the role of 'scientific' enquiry expanded, sometimes having an impact directly upon public policy—for example, Joseph Banks, President of the Royal Society from 1778 to 1820, actively encouraged the government to make full use of experts.[109] However, it was also the case that such associations between the executive and experts were essentially the product of ad hoc arrangements.

VI

It has been shown that developments in the second half of the eighteenth century built upon a culture of quantification which had been kept alive

[106] Eastwood, ' "Amplifying the province of the legislature" '; also Clokie and Robinson, *Royal Commissions*, pp. 46-53.

[107] Beeke, *Observations on the income tax*. McCulloch believed that 'during the long interval between Sir William Petty and Dr Beeke, statistical science could hardly be said to exist': quoted in Cookson, 'Political arithmetic and war', p. 43.

[108] Langford, *Public life*, provides the best discussion of this and related issues.

[109] Mackay, *In the wake of Cook*; Gascoigne, *Joseph Banks*.

after the death of Davenant and King. Pitt, Colquhoun, and others are best seen here as providing a link in an evolutionary chain that connects the two eras when the statistical view was vigorously championed, the late seventeenth century and the mid-nineteenth.[110] Many quantitative data were collected and many quantitative opinions were expressed in the eighteenth century, making their way into debates over the state, economy, and society. By 1800 the cumulative effects of this were marked. The development of demographic statistics and actuarial practices was helping to identify patterns, undermining for some the sense that length of life was entirely random.[111]No less fundamental was the evidence which had been gathered by the 1790s of just how much larger and more productive the economy had become in the course of a century. This was crucial for a number of debates, such as those over the national debt and poverty. For example, Eden's *State of the poor*, published in 1797, argued that expenditure on poor relief 'has not kept pace . . . with our increased ability to pay them', supporting this by reference to a wide range of quantitative evidence.[112] Both inside and outside government the contemporary mindset was not as quantitatively vacuous as has often been supposed. If quantitative evidence did not yet provide unimpeachably hard facts, it did provide more than numerical guesswork. Consequently, by 1790 many believed the economy was clearly stronger than it had been a century before, better able to support a large national debt and the burdens of transfer payments. In both these respects it is interesting to note something of a disjunction with the views of Adam Smith—to the extent, perhaps, of contributing to the debate over the slowness with which his ideas were generally accepted.[113] More generally, the awareness that in so many areas political arithmetic was alive and vigorous in the eighteenth century requires the history of economic ideas for the period to be broadened and enriched. A new piece has to be fitted into the puzzle.

Somewhat flippantly Hume suggested that 'The greater part of mankind may be divided into two classes; that of *shallow* thinkers, who fall short of the truth; and that of *abstruse* thinkers, who go beyond it. The latter class are by far the most rare: and . . . by far the most valuable.'[114] There is no doubt that much eighteenth-century political arithmetic was 'shallow' and it was sometimes ill-based. It was, though, also abundant, providing for many an important language of rhetoric and, for rather fewer, a vital help to decision making.

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[110] Cullen, *Statistical movement*.

[111] Or, as Hacking has put it, this was part of the *Taming of chance*.

[112] The quotation is from Eden, *State of the poor*, I, p. 407. Data are used through all three volumes.

[113] An issue discussed by Teichgraeber, ' "Less abused than I had reason to expect" '; Willis, 'Role in parliament'; Rashid, 'Dugald Stewart'; *idem*, 'Adam Smith's rise to fame'.

[114] Hume, *Essays*, p. 253.

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