WILLIAM PETTY

And the Ambitions of Political Arithmetic

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Contents

Note to the Reader

Original spelling has been maintained in all quotations from primary sources and interpolations are marked; however, early modern characters, abbreviations and ligatures no longer in use have been silently modernized, as has use of '£' and similar symbols. When quoting from modern editions of early modern works, I have maintained the editor's conventions. William Petty's handwriting was notorious even in his own time, and the exact transcription of his words is in some cases open to question. When in doubt I have put my guess in brackets with a query.

Introduction: William Petty and Political Arithmetic

Hic jacet author & magister rerum,
Hic jacet author politico-arithmeticae,
quam nemo a Pythagora ad Cartesium descripsit,
Hic jacet qui fecit quod erat faciendum,
qui demonstravit, quod erat demonstrandum.[1]

William Petty (1623–1687)

William Petty's name is not particularly well known today. Unlike that of his celebrated associates, Thomas Hobbes, Robert Boyle, and Samuel Pepys, Petty's fame, considerable in the seventeenth century, declined rapidly thereafter. In some respects this is not surprising: Petty did not, like Hobbes, produce a comprehensive and shocking political philosophy, nor did he, like Boyle, give his name to any scientific law, nor, like Pepys, leave behind an entertaining diary. In other respects, however, Petty's low historiographical profile is harder to understand. No less an authority than Karl Marx thought him 'the founder of political economy', and economists and historians of economics still locate in Petty's 'political arithmetic' the roots of the classical liberal economics of Adam Smith and David Ricardo.[2] Petty's interest in population data, meanwhile, has earned him

[1] 'Here lies the author and master of things,/Here lies the author of political arithmetic,/which no-one from Pythagoras to Descartes described,/Here lies he who did that which was to be done,/who demonstrated, that which was to be demonstrated.' This is how Sir Peter Pett imagined Petty's epitaph: 'Sir Peter Pett's Pindarick on the Politicall Arithmetick' (undated), BL MS Add. 72899, f.61.

[2] Karl Marx (trans. Emile Burns). *Theories of Surplus Value, Part I* ([1861]; Moscow: Progress Publishers, 1967), 1. See Wilson Lloyd Bevan, 'Sir William Petty: A Study in Economic Literature', *Publications of the American Economic Association* 9:4 (1894), 13–102; Charles Henry Hull, 'Petty's Place in the History of Economic Theory', *Quarterly Journal of Economics* 14:3 (1900), 307–340; E. A. J. Johnson, *Predecessors of Adam Smith: The Growth of British Economic Thought* (New York: Prentice Hall, 1937); William Letwin, *The Origins of Scientific Economics* (London: Methuen, 1963); Joyce Appleby, *Economic Thought and Ideology in Seventeenth-Century*

a place among the founders of statistical demography, alongside his friend John Graunt; Graunt's seminal 1662 *Natural and Political Observations … upon the Bills of Mortality* is sometimes even attributed to Petty.[3] On any account, Petty played a major part in the 'pre-history' of social science.[4]

His role in the seventeenth-century revolution in natural philosophy and in the rise of experimental science is less well known but nevertheless significant.[5] Trained as a physician and skilled in mathematics, Petty became by turns an active member of Samuel Hartlib's circle of reform-minded inventors and philosophers, a Professor of Anatomy at the University of Oxford (where, besides participating in the 'Experimental Philosophy Club', he restored a hanged woman to life), and briefly of Music at Gresham College in London; after the Restoration, he was one of the founding Fellows of the Royal Society, and made substantial contributions to the Society's projected 'History of Trades', a wide-ranging study of manual crafts. An inveterate innovator—his most famous invention was a 'double-bottomed boat' designed to sail faster and with a smaller crew

England (Princeton: Princeton University Press, 1978); Tony Aspromourgos, 'Political Economy and the Social Division of Labour: The Economics of Sir William Petty', *Scottish Journal of Political Economy* 33:1 (1986), 28–45, 'The Life of William Petty in relation to His Economics: A Tercentenary Interpretation', *History of Political Economy* 20:3 (1988), 337–356, and 'New Light on the Economics of William Petty (1623–1687): Some Findings from Previously Undisclosed Manuscripts', *Contributions to Political Economy* 19 (2000), 53–70; Andrea W. Finkelstein, *Harmony and the Balance: An Intellectual History of Seventeenth-Century English Economic Thought* (Ann Arbor: University of Michigan Press, 2000). Explicitly Marxian appreciations of Petty include Alessandro Roncaglia, *Petty: The Origins of Political Economy* (Armonk: M. E. Sharpe, 1985) and Ellen Meiksins Wood, *The Origin of Capitalism: A Longer View* (London: Verso, 2000).

[3] See Chapter 4.

[4] Richard Olson, *The Emergence of the Social Sciences, 1642–1792* (New York: Twayne Publishers, 1993); Charles Emil Strangeland, *Pre-Malthusian Doctrines of Population: A Study in the History of Economic Theory* (1904; New York: Augustus M. Kelley, 1966); James Bonar, *Theories of Population from Raleigh to Arthur Young* (London: George Allen and Unwin, 1931); Karl Pearson and E. S. Pearson, *The History of Statistics in the 17th and 18th Centuries* (High Wycombe: Charles Griffin and Company, 1978); Alain Desrosières (trans. Camille Naish), *The Politics of Large Numbers: A History of Statistical Reasoning* (Cambridge, MA: Harvard University Press, 1998); Ian Hacking, *The Emergence of Probability: A Philosophical Study of Early Ideas About Probability, Induction and Statistical Inference* (2nd ed., Cambridge: Cambridge University Press, 2006). On the political implications of these developments, see Peter Buck, 'Seventeenth-Century Political Arithmetic: Civil Strife and Vital Statistics', *Isis* 68:1 (1977), 67–84; Edward Higgs, *The Information State in England: The Central Collection of Information on Citizens since 1500* (Basingstoke: Palgrave Macmillan, 2004); Paul Slack, *From Reformation to Improvement: Public Welfare in Early Modern England* (Oxford: Oxford University Press, 1999) and 'Government and Information in Seventeenth-Century England', *Past and Present* 184 (2004), 33–68.

[5] See Chapter 2.

than conventional ships of the same tonnage—Petty later helped organize the Dublin Philosophical Society, sister to the Royal Society of London, and served as President. Petty and his associates brought the Scientific Revolution to Ireland.

It is in Ireland that Petty is best known.[6] There he went in 1652 as Physician-General to the Cromwellian army, which had recently reconquered the country after ten years of war following the Ulster rebellion of 1641. Petty quickly found favour under Henry Cromwell (Oliver's younger son, effectively in charge of governing Ireland), and by 1654 he was charged with conducting a massive survey of lands confiscated from the 'rebel' Irish and slated for reallocation to English troops in Ireland and investors in London. The resulting 'Down Survey' was lauded then and since as the first scientific mapping of much of Ireland. It was also, perhaps more importantly, the central instrument in a series of land settlements—under Cromwell, after the Restoration, and, finally, after the Glorious Revolution—that shaped the politics of the Restoration in Ireland and ultimately anchored over a century of 'Protestant Ascendancy' in the country. It established Petty's reputation as both an expert on Irish land and population and a beneficiary of Irish suffering—a reputation that has endured.

Petty has not, then, been totally ignored. Far from it: whole books have been devoted to his contribution to economics and demography, and numerous articles to his scientific ideas and Irish adventures. Yet there have been few sustained attempts to connect these different parts of Petty with each other; the only book to do so on the strength of original archival research appeared in the late nineteenth century.[7] This neglect derives in part from the nature of the sources themselves: his sizeable manuscript archive was in private hands for much of the twentieth century. In its absence, scholars have largely depended on a small group of printed sources: an 1899 compilation of Petty's *Economic Writings*, a two-volume selection of miscellaneous manuscripts printed in 1927, and a 1928 edition of Petty's correspondence with his friend Robert Southwell.[8] These sources reflect

[6] See Chapter 3.

[7] Edmond Fitzmaurice, *The Life of Sir William Petty, 1623–1687* (London: John Murray, 1895); other biographies include Erich Strauss, *Sir William Petty: Portrait of a Genius* (Glencoe, IL: The Free Press, 1954) and Thomas E. Jordan, *A Copper Farthing: Sir William Petty and his Times, 1623–1687* (Sunderland: University of Sunderland Press, 2007). P. G. Dale's booklet, *Sir W.P. of Romsey* (Romsey: Lower Test Valley Archaeological Study Group, 1987), gives an interesting picture of seventeenth-century Romsey. An up-to-date summary is Toby Barnard, 'Petty, Sir William (1623–1687)', *Oxford DNB*<http://www.oxforddnb.com/view/article/22069>.

[8] *EW; PP; PSC.* See also Petty (ed. Thomas Aiskew Larcom), *The History of the Survey of Ireland, Commonly Called the 'Down Survey'* (Dublin: Irish Archaeological Society, 1851).

and reinforce another problem: the division of scholarly labour among a variety of fairly narrow historical subfields—the historiographies of Ireland and England, of science and politics, of natural and social science, even of economics, statistics, and demography. Economists can study Petty's economics, Irish historians his role in Ireland, and historians of science his contributions to the Royal Society; but connecting these things and assessing their relationships requires mastering literatures that have developed along separate lines, printed sources that come pre-packaged for subdisciplinary use, and manuscript sources that have, until recently, been hard to consult at all. Bringing in the still wider range of interests that Petty's manuscripts reveal is no easy task.

Yet even scholars working within well-defined disciplinary traditions have recently begun to pay more attention to Petty's wide range of interests and to the connections between them.[9] Precisely because of this range, a full-length study is worthwhile both for the light it can cast on an underexamined but important figure and for the unique window it can open onto the broader political and intellectual world in which he operated. At Petty's birth, in 1623, England was a small nation in the midst of economic depression and political crisis, sitting uneasily on the sidelines of an expanding Continental war it could hardly afford to enter. Its colonial career in the Atlantic was barely off the ground (even the Ulster plantation was just over a decade old). Francis Bacon had yet to publish his *New Atlantis*, with its scheme for 'Salomon's House'—a fictional scientific institution that, four decades later, the Royal Society would partially realize. By 1687, when Petty died, England's colonial empire had grown explosively, an expanding plantation system flooding the home market with new commodities, feeding a new consumer society and drawing ever more labour, free and enslaved, across the Atlantic. England itself, having been through rebellion, regicide, and Restoration, was on the verge of a revolution that would bring in its train the rise of Parliament and the growth of a

[9] Frances Harris, 'Ireland as a Laboratory: The Archive of Sir William Petty', in Michael Hunter (ed.), *Archives of the Scientific Revolution: The Formation and Exchange of Ideas in Seventeenth-Century Europe* (Woodbridge: Boydell Press, 1998), 73–90; Tony Aspromourgos, 'The Mind of the Oeconomist: An Overview of the "Petty Papers" Archive', *History of Economic Ideas* 9:1 (2001), 39–102. See also Sabine Reungoat, *William Petty: Observateur Des Îles Britanniques* (Paris: Institut National d'Études Démographiques, 2004). The most comprehensive prior attempt to study Petty's intellectual production is Lindsay G. Sharp's D.Phil. thesis, 'Sir William Petty and Some Aspects of Seventeenth-Century Natural Philosophy' (University of Oxford, 1976).

modern fiscal-military and bureaucratic state—not to mention renewed supremacy over Ireland, Union with Scotland and war with much of Europe. Newton's *Principia*—the foundation of physics for more than two centuries and as good a marker as any for the birth of modern science—appeared that same year. Once a political, economic, and intellectual backwater, England (after 1707, Britain) was a 'great power' in every sense.

Petty played a part in these transformations. His signal contribution to them, in the eyes of both contemporaries and successors, was something he called 'political arithmetic'. Differences arise, however, over just what political arithmetic was. For historians of economics, statistics, or demography, it was a 'pre-Smithian' economics, a proto-statistics or a first step towards demography; for historians of science it stood for the extension of empirical method to the social or political sphere; for political historians it signified the systematic gathering of quantitative demographic and economic data, or at least the aspiration to gather such data, in the service of the state.[10] There is broad agreement that political arithmetic was a seventeenth-century methodological innovation that brought the quantitative techniques and empirical spirit of the Scientific Revolution to practical questions of economy, society, and politics, paving the way for the recognizable social science of the Enlightenment. But little is known about how it did this, and still less about what political arithmetic meant at the time of its creation and how it came into being in the first place.

This book is about William Petty, but at its core is the problem of political arithmetic: how, when, and why did Petty create it? What did he understand by it? What did he want it to do? How did it work? How did he present it, and how did his audiences respond? And how, finally, did it come to be understood as a method somehow fundamental to later social science? Political arithmetic was the work of decades, both before and after Petty coined the phrase, and perhaps more than some other inventions, its fortunes were tied to those of its inventor, who remained, as long as he lived, its sole self-conscious practitioner. At the same time, it was by its very nature a social enterprise, provoked by Petty's engagement with his intellectual and political surroundings and dependent

[10] Phyllis Deane, *The State and the Economic System: An Introduction to the History of Political Economy* (Oxford: Oxford University Press, 1989), 23; Bonar, 84; Geoffrey Holmes, 'Gregory King and the Social Structure of Pre-Industrial England', in Holmes, *Politics, Religion and Society in England, 1679–1742* (London: Hambledon Press, 1986), 285.

for its effect on a network of contacts and potential exponents in England and Ireland. Answering these questions therefore requires delving deeply into Petty's life and the contexts in which he lived it. His education, his intellectual, personal, and political relationships, the places where he went, the groups he joined, the interests he served, the philosophers, courtiers and kings to whom he presented his ideas, and the problems these ideas were intended to solve are all part of the story. Conversely, grasping Petty's intellectual biography means understanding the ambitions of political arithmetic.

The Petty papers

This will become more evident if we turn from what political arithmetic meant to the material form that it took. Despite the neat appearance of Petty's edited *Economic Writings*, political arithmetic was neither summed up in a single work nor fully presented in print at all. It was, rather, strewn across scores of manuscripts—some of considerable length, some mere scraps of paper, a few destined for print, the vast majority not.[11] Of course, the authors of the most polished books leave masses of manuscript drafts and notes behind; one might still argue that the books should have the last word. But in the seventeenth century 'publication' was not yet synonymous with print. At a time when censorship and sedition laws were the norm and political power—at least, the power to frame policy—was concentrated in a relatively small elite, politically sensitive material could be more safely and often more effectively 'published' by being circulated in manuscript from hand to hand, copied and recopied, among select coteries of readers.[12] Petty printed comparatively little, but he circulated a very great deal. Doing so enabled him to address delicate questions frankly, to keep close track of his proposals, and to reach the people who mattered—and no one else. A full study of Petty both provides and necessitates, among other things, a close look at 'scribal publication' in action.

The manuscripts in Petty's archive take many forms. Some, like those that ultimately became his best-known printed works (in particular *Political Arithmetick* and *The Political Anatomy of Ireland*), are lengthy essays,

[11] Harris, 'Ireland as a Laboratory'; Aspromourgos, 'Mind'.

[12] Harold Love, *The Culture and Commerce of Texts: Scribal Publication in Seventeenth-Century England* (Amherst: University of Massachusetts Press, 1998).

organized as self-sufficient treatises on their chosen topics and divided into chapters covering different aspects of those topics; others discuss religious, political or economic questions more informally, through fictionalized dialogues; others are still rougher sketches of the pros and cons of a given proposal; many are mere lists (sets of 'heads') of Petty's current projects, ideas, or desiderata. Easily the largest group, however, are Petty's short tracts, or *tractiuncli*. These are usually between two and four folios in length, typically devoted to quite specific policy projects, and divided into separate sections, each containing a set of numbered or otherwise ordered points—laying out Petty's proposal, describing the problem it is designed to solve, how it is to work and what resources it requires, the probable costs of not adopting it, and the short- and long-term benefits of following it through. Their format reminds us that Petty was, to use a seventeenth-century term, a 'projector'. His papers, as he produced them, were designed not so much to reveal scientific or social-scientific truths to the wide world as to sell economic, political, or social projects to a carefully selected and assiduously pursued audience of powerful men. Political arithmetic, correspondingly, was not set forth wholesale in a treatise, but spun out little by little as a web of projects.

Taking these manuscripts into account does not simply mean supplementing the printed volumes with new material. It requires rereading many of the familiar printed texts *as* manuscripts themselves, since this was how they circulated, alongside other manuscripts, in Petty's time. This, in turn, means coming to grips with a new set of problems. Many of the papers were *ad hoc* responses to the challenges of the moment; while they often address specific problems—ranging from unemployment, to Irish land, to English sovereignty at sea, to church government, to theology and beyond—they rarely enunciate general principles. Because Petty addressed his tracts to a 'specialist' audience, they assume familiarity not only with the matter at hand but also, often, with Petty's own earlier proposals. Many of the papers make no sense by themselves, and seeing the bigger picture requires setting what can look like very different papers alongside each other. Beyond even this lies the problem of the archive's temporal structure. Petty's production palpably accelerates at certain periods of apparent crisis, and slackens at other times; even allowing for material that does not survive, the periodicity of the papers is yet another link between Petty's intellectual work and his political surroundings.

Understanding political arithmetic thus means reconstructing the complex relationships between papers of different genres and periods, as well

as between these papers and the world around them. Individual tracts may employ ideas developed in earlier dialogues; sets of heads may tell us which *tractiuncli* belong together, juxtaposing proposals that seem at first completely unrelated; correspondence may tell us which papers went where, how they were received, and how they changed. And reconnecting these papers allows, indeed compels, us to re-establish ties between ideas whose links would otherwise remain invisible. All this has serious implications for our understanding of political arithmetic and of Petty. It is not difficult to see in the carefully selected *Economic Writings* the makings of a proto-scientific approach to economic analysis or to discern precocious anticipations of modern theories. It is much harder to look at hundreds of papers on everything from the shortage of coin to Native American marriage practices to the duties of the parish priest and see the same thing. The application of quantitative methods to economic questions may be part of political arithmetic's legacy; but its meaning in its time was plainly something more rooted and complex. Until we grasp this richer meaning, it will be hard to see the legacy in a clear light.

Political arithmetic in context

We can get some idea of what is in store by considering Petty's introduction of political arithmetic, in a 1672 letter, as part of 'the Politicall Medicine' of Ireland.[13] At the time, the Irish land settlement, which Petty had helped to shape, was under attack by an increasingly powerful Irish Catholic lobby at the English court; Petty's addressee was Arthur Annesley, earl of Anglesey, who as Treasurer of Ireland after the Restoration had also worked on the settlement. Petty was shortly to circulate the manuscripts of both *Political Arithmetick* and *The Political Anatomy of Ireland*, which he evidently regarded as part of the settlement's defence.[14] From its inception, then, political arithmetic was not a neutral mode of economic analysis but part of an explicit political program: here, the protection of the Irish land settlement, in which Petty had both a personal and a professional stake. Yet it is more complicated and more interesting than that. What made the Irish settlement's Catholic critics particularly

[13] Petty to Anglesey, 17 December 1672, BL MS Add. 72858, f.73.

[14] On Anglesey, see Michael Perceval-Maxwell, 'Annesley, Arthur, first earl of Anglesey (1614–1686)', *Oxford DNB*<http://www.oxforddnb.com/view/article/562>.

menacing in late 1672 was that a combination of other events—England's unpopular alliance with Catholic France against the Protestant United Provinces; King Charles's recent Declaration of Indulgence for religious dissenters (spurred by a secret clause in the 1670 Treaty of Dover between England and France); widespread and justified suspicion that the heir to the throne, James, Duke of York, was Catholic—all seemed to portend a slide towards 'Popery' which would spell the end of the English church, English liberties, and English supremacy in Ireland. It might even open the road, as some feared, to the Universal Monarchy of the Most Christian King, Louis XIV.[15]

Petty does not seem to have worried much about the fate of true religion or the danger of Universal Monarchy.[16] However, he worried a great deal about English authority in Ireland, upon which the land settlement depended and which was bound up with the politics of religion throughout the Three Kingdoms and with English strength still further afield. It is these larger questions, rather than the narrower one of the land settlement, that political arithmetic came to increasingly embrace over the course of the 1670s and 1680s. In addressing them, Petty shifted from stop-gap defensive tactics specific to Ireland to a much more aggressive and inventive strategy which would create conditions of lasting stability in Church and State throughout the Three Kingdoms and the English Empire. This strategy certainly included the pursuit of economic improvement and the interest in systematic data gathering by the state about its resources with which Petty has been credited. But it also projected new administrative structures for governing both the Three Kingdoms and the English colonies around the world, a more comprehensive church settlement and toleration for religious dissent, and, underpinning all the rest, the systematic state manipulation of demography. Political arithmetic, in other words, was chiefly concerned with political stability. Economic 'development', to use an anachronism Petty invites, was a means to that end.

Petty's analysis of the threats to the Stuart monarchy gave more weight to internal than to external factors; like some recent historians, he

[15] Tim Harris, *Restoration: Charles II and His Kingdoms, 1660–1685* (London: Penguin, 2006), especially 8–135; Harris, Paul Seaward and Mark Goldie (eds), *The Politics of Religion in Restoration England* (Oxford: Oxford University Press, 1990); John Miller, *Popery and Politics in England, 1660–1688* (Cambridge: Cambridge University Press, 1973).

[16] As he wrote to Robert Southwell: 'I find, by looking far back upon the paucity of people in the Assyrian, Persian, and other first Monarchyes, how easy a Thing twas for a few resolute fellowes to conquer the World as then it was; and that (whatever the King of France may think) the Universall or Great Monarchy doth and will grow every Century more and more difficult by the Course of nature.' Petty to Southwell, 20 August 1681, *PSC*, 93.

attributed the vulnerability of the Crown to stresses inherent in multiple monarchy. There were, inevitably, problems involved in attempting to govern different nations separated by culture, custom and institutions simultaneously, and further problems attended the partial and ongoing colonization of one of the Stuart kingdoms, Ireland, by the other two.[17] In 1641 this friction helped ignite a rebellion in Ulster, which rapidly spread south through Ireland, spurring on, in turn, the outbreak of the Civil War between King and Parliament in England and, ultimately, a decade of sporadic war throughout the Three Kingdoms.[18] Ireland was at once a member of the Stuart multiple monarchy, causally linked to its overall instability, and an imperfect microcosm of it, wherein each national, religious, and political division was reproduced (though with local complications and variations, and not to scale). In trying to stabilize Ireland Petty confronted the instability of the Three Kingdoms as a whole, which he interpreted as the product of multiple, nationally and confessionally distinct populations whose identities, through a series of unfortunate events, had become vested with dangerous political significance. Political arithmetic was designed to solve this problem either by removing the political sting of these differences—through religious toleration, for instance—or by removing the differences altogether.

The tools it used to do this included many of the features which have earned political arithmetic its place in the historiography of the social sciences: the quantitative analysis of human and natural resources, the advocacy of economic and social policies based on empirical criteria, and numerous practical schemes for improving infrastructure, agriculture, manufactures, and trade. But it also relied on a set of altogether less familiar instruments: the planned, and if necessary coerced, 'transplantation' and 'counter-transplantation' of different national and confessional subpopulations and their 'mixture' and 'union' through intermarriage and generation—a programme initially directed toward 'the transmutation of the Irish into English' but ultimately applicable to the politics of religion in England and the challenges of colonization across the Atlantic. Political arithmetic emerges not as an early economics but as an ambitious art of government by demographic manipulation.

[17] J. G. A. Pocock, *The Discovery of Islands: Essays in British History* (Cambridge: Cambridge University Press, 2005); Nicholas Canny, *Making Ireland British, 1580–1650* (Oxford: Oxford University Press, 2001).

[18] Allan I. Macinnes, *The British Revolution, 1629–1660* (Basingstoke: Palgrave Macmillan, 2005).

This complicated art drew on an astonishing range of sources, from contemporary economic writing to the political thought of Hobbes and Harrington to the literature of Irish plantation from Spenser and Davies on. Above all, it relied on developments in natural philosophy and allied fields—not least, as 'transmutation' suggests, alchemy. Like alchemical transmutation, the demographic transmutation political arithmetic promised would produce natural results by artificial means. Forcibly transplanted to Irish households, thousands of English women might, Petty suggested, function as the natural objects of their Irish husbands' passions and the natural teachers of language and manners to the resulting children—cementing a 'natural and lasting' union between the English and Irish populations. Deploying natural processes to govern diverse populations, manipulating their cultural characteristics and thus their political allegiance, Petty offered an instrument of government tailor-made for a composite monarchy and a colonial empire.

If the practical empiricism of Bacon and his followers, the mechanistic worldview of Descartes and Hobbes, and the corpuscularian matter theory of Gassendi and Boyle made political arithmetic possible, the peculiar mutability of Restoration politics—when no national or confessional group's loyalty went unchallenged, and when the religious identity of the Crown itself was in flux—made it necessary. In order to work, it relied on an equally localized set of assumptions about human nature, the natural world, and, most importantly, the susceptibility of natural processes to human knowledge and manipulation, particularly through the medium of policy. Circulating his ideas and promoting his new brand of expertise led Petty to mobilize a carefully cultivated network of friends, contacts, and potential patrons in political and scientific circles on both sides of the Irish Sea. Only after 1688, finally, did a second generation of self-conscious political arithmeticians rearticulate Petty's creation as a method of social and economic analysis subsequently seen as fundamental to modern social science. All this is the subject of this book.

Overview

In one sense, this book has two distinct halves. Chapters 1–4 focus on Petty's life and intellectual world from his birth in 1623 to his invention of political arithmetic at the beginning of the 1670s. Chapters 5–8, by contrast, focus on the political arithmetic that Petty drew on this

background to create, which he applied successively to political challenges in Ireland, the American colonies, and finally the Three Kingdoms as a whole, and which was radically reinterpreted after his death as something more like the social science we recognize today. Chapter 1 looks at his youth in England, his Jesuit education in France, and his philosophical and medical training among Cartesian academics in the Low Countries and exiled English royalists—including Thomas Hobbes—and French physico-mathematicians in Paris. Chapter 2 follows Petty back to England and extensively examines his wide-ranging experimental and philosophical work with the neo-Baconian Hartlib Circle during the later 1640s—probably the most important phase of his intellectual development from the perspective of his later work—and ends with his brief academic career at Oxford and then Gresham College. Chapter 3 traces his career in Cromwellian Ireland, from his appointment as Physician-General for the army to his scramble to secure the extensive estates he had accrued after the collapse of the Protectorate, focusing on the Down Survey, considered both as a specimen of Baconian science and as Petty's real introduction to practical politics. Chapter 4 picks up at the Restoration and examines Petty's turn towards economics in light of his encounter with James Harrington, the demographic work of John Graunt, and his own continuing commitment to practical and experimental science, both within and beyond the Royal Society.

Although the focus of the last four chapters falls on Petty's political arithmetic rather than Petty, the division is in fact somewhat artificial: as will become clear, the man and his creation were always closely connected. Chapter 5 treats Petty's first major political-arithmetical manuscripts (*Political Arithmetick* and *The Political Anatomy of Ireland*) as responses to political, religious, and economic anxieties in Britain and Ireland that drew on both his own natural-philosophical background and certain strands of contemporary economic discourse, promoting peace and prosperity through social engineering, initially through 'the transmutation of the Irish into English'. Chapter 6 pursues Petty's 'instrument of government' through the later 1670s and 1680s, as he applied it first to the management of colonial population in the Americas and finally, under James, to balancing the demographic strength and political power of different confessions in the Three Kingdoms. Chapter 7 offers a synchronic reconstruction of the network of contacts that made Petty's 'scribal publication' of his manuscripts possible and upon which the political reach and force of his ideas depended. Chapter 8, finally, shows how Petty's

political arithmetic was reinvented by a second generation of political arithmeticians, who—drawing on his printed work, and in ignorance of his manuscripts—transformed his aggressive program of demographic manipulation into a putatively objective analytical tool, a 'computing faculty'. Even this final transformation, however, was in some ways more apparent than real.