

Notes for the Kenshur Prize Colloquium

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First let me say what a great honor it is to be selected for the Kenshur Prize this year. I was really surprised and delighted just to learn that I had made the shortlist, and even more so to learn that I had been selected from a fascinating and diverse collection of finalists. I'm thrilled to be here in Bloomington and enjoying the hospitality of the Center for Eighteenth-Century Studies and the Lilly Library. Thanks to Rebecca Spang and Barbara Truesdell for helping to make this visit happen, to Hannah Malcolm for serving as my sage guide this afternoon, and to Joel Silver and the team at the Lilly Library for hosting this event and for the wonderful tour this afternoon. Thanks also to the members of the Kenshur Prize committee for offering such a generous reading to a book about subjects—government accounting, fiscal policy, financial mathematics—that, looked at from one direction, might seem “a tad dry” (to quote from one of the book jacket quotes).

Of course, one of the central goals of *Calculated Values* is to demonstrate that numerical scribbles and technical calculations about tax yields and trade balances and annuity values should not be seen as a dry subject at all. I mean this in two ways. First, for people living in Britain and Anglophone North America they were not in fact a cold and dry matter, but a subject of heated political and moral concern—the subject of “warm and angry Contentions... as have very much disturbed the peace and quiet of the Neighborhood,” as one of the central characters in the book, William Pulteney, once put it in 1727. Second, for twenty-first century scholars of the long-eighteenth century, the pages of numbers that filled pamphlets and newspapers and books and manuscripts should not be overlooked as the detritus of various dry bean-counting activities. Nor should they be seen as simply repositories of numerical data for modern forms of statistical or econometric analysis (though they are often good for that too). Rather, these numerical vestiges constitute a vivid archive of eighteenth-century political and cultural life, which open new ways of thinking about big thematic questions—about partisanship and representation, truth and deception, knowledge and epistemology, secrecy and accountability, value and time, and so on.

So, in the limited time I have this afternoon I hope to convince you of this second point, by way of what I understand is a Center for Eighteenth Century Studies tradition: the Page 99 Test. When I learned from Rebecca about the Page 99 custom, amid my delighted delirium at having won, I checked the book and was very amused to find that Page 99 is actually a full-page image. In fact, it is the front and back of a page of manuscript calculations. (Of the 18 or so images in the book, they are almost all pictures of manuscript or printed texts, usually with a bunch of numbers on them—with the exception of a wonderful James Gillray graphic satire of Richard Price and Edmund Burke which comes at the very end). The manuscript itself is basically two pages of almost back-of-the-envelope calculations, which I found in the papers of Scottish mathematician David Gregory at the University of Edinburgh. Instead of trying to read from those calculations, I'll instead read the paragraph on pages 98-100 that breaks across page 99.

Page 99 comes in the middle of Chapter 2, which is entitled “The Great Project of the Equivalent: A Story of the Number 398,085½.” The focus of that chapter is a payment, and indeed a calculation, made during the negotiations between representatives of England and Scotland that would result in the 1707 Act of Union that created the nation of Great Britain. Plans for a union between the two had been mooted for decades but gained new energy with the

reign of Queen Anne in the early 18th century. One of the benefits of doing so, it was thought, was opening freer trade between the two nations; but deciding on the exact economic terms were a major sticking point in negotiations. A key problem was taxation: an open trade union required equalizing taxes across both countries; but English taxes at the time were much higher, in large part because of new taxes levied after the 1688 Revolution that were already dedicated to servicing public debts. So, the Scottish faced the prospect of having to pay substantially higher taxes after the Union, taxes that would persist well into the future, and having their new tax money go to pay off debts England had raised in the past.

One idea that emerged was that the English government would pay to Scotland a sum of money after the Union to pre-pay compensation for these future debts; this payment came to be known as The Equivalent. In the historiography of the Union, the Equivalent has long been seen as either a trivial peculiarity and a corrupt bribe—part of how Scotland was “bought and sold for English gold,” in the famous Robert Burns poem. But my goal was to tell a somewhat alternative history of the Equivalent—not just as a payment (or a bribe), but as a calculation. The “Great Project” of the Equivalent was a remarkable exercise in economic policymaking and in quantitative economic analysis. The sum that was ultimately decided upon was £398,085 and ten shillings, calculated down to the half-pound. What struck me about the Equivalent was that it was such a vivid example of an attempt to use mathematical calculation to solve a political problem.

So, the focus for me in this chapter was trying to understand the Equivalent as an episode in the political history of calculation. How did anyone come to think that this incredibly fraught point of dispute in this historic negotiation was best addressed through a highly technical mathematical calculation? What were the consequences of this calculation for the politics of the Union? How did English and Scottish publics read and react to the calculation itself? What does this reveal about the evolving place of quantitative reasoning within British political practice and political culture (or what I refer to in the book as *civic epistemology*, following the Science and Technology Studies scholar Sheila Jasanoff) in the early 18th century? Much of the first half of Chapter 2 is focused on reconstructing how the idea for the Equivalent came about and how the calculation itself was executed.

The Equivalent was formally calculated by a team of six, three each from England and Scotland; but the project really seems to have been the work of two individuals, who ended up being two of the three Scottish members on this committee. One was William Paterson, a merchant, financier, and all-around hustler who was closely involved with both the successful founding of the Bank of England and the spectacularly unsuccessful Darien venture (a scheme to establish a Scottish imperial trading company based in the isthmus of Panama). Paterson was the one who conceived the idea of calculating the so-called “present value” of the excess tax burden the Scottish would be taking on in the future, and the having England pay that money upfront to the Scottish through various institutional mechanisms. One of the key ideas Paterson had was to use this Equivalent money to essentially pay back or bail out Scottish investors who had lost money in the Darien Scheme – the logic being that it was the fault of the English (or really, King William) for failing to adequately support the venture. The other key figure involved was David Gregory, an esteemed Oxford mathematician, education reformer, and one of the era’s most influential promoters of Newtonianism.

On page 99, we pick up David Gregory as he was involved in the actual calculation of the Equivalent. The paragraph I’ll read involves the efforts of Gregory and the Equivalent

calculating committee, as evident in this page of manuscript calculations, to work through some of the complicated technical issues that were involved in doing this calculation.

The challenging part was determining the “present worth” of those new taxes for Scotland. If Scottish taxpayers agreed to accept a duty on coffee and pay an expected £2,605 per year through June 1710, how much money did that represent in 1706 as one lump sum? What difference did it make if the tax terminated in June 1710 or August 1710, or if it continued indefinitely? (These technical questions intersected with political ones. Just because these taxes were scheduled to expire in 1710, was it safe to assume that they would actually cease then, rather than to be renewed by Parliament?) As we saw, William Paterson had strong opinions about present value, contending that the strict mathematics of compound interest were superior to the conventional years-purchase approach. In his manuscript calculations, Gregory gave Paterson’s ideas on present value a heightened level of mathematical formality, as evidenced by an algebraic formula scrawled at the top left corner of the manuscript page: $1 / (r - 1) - 1 / (r^t \times r - 1)$. Mathematically, this represented the closed-form sum of a geometric series; financially, this was an algebraic formula for calculating the present value of an annuity using compound-interest discounting, with an interest rate r and time t . For at least one person, fraught questions about the constitutional future were best worked out algebraically.

(As it turns out, I think this is the only time in the entire book that I insert an algebraic formula in the book. So, lest I scare anyone off who hasn’t read it yet, rest assured that you’ve gotten all the formulas out of the way.)

I’ll just quickly point to four themes that emerge in this paragraph that are illustrative of broader issues in the book. First, what you can see going on in this paragraph is how certain characters—I usually call them “calculators” in the book—are trying to work through quite profound political and in this case *constitutional* issues through the act of calculating. In this case, Gregory and the other calculators were forced to work through issues relating to the mutual obligations between England and Scotland, questions about taxation and representation, about the fair distribution of national wealth *through the* process of calculating this number. Consequently, the calculation they produced was a kind of political document—it was an argument for how things ought to be, and a quantitative model that said something about the kind of (unified) nation they wished to live in. This is, in a sense, the big argument of *Calculated Values* as a whole: namely, that numerical calculation rose sharply in prominence and authority as a form of public reason in the century after the 1688 Revolution because certain politically engaged Britons found that calculation was a powerful tool for doing explicitly political things. Much of the scholarship on the history and sociology of quantification has argued that the “trust in numbers” that is so evident in many modern polities is driven by a sense that quantitative reasoning is inherently *anti-political* – that putting faith in the numbers is a way to escape from the partisan, personal, and subjective into the impartial, impersonal, and objective. *Calculated Values* offers a much different picture: I argue that calculation became a popular and powerful tool in British politics in this period precisely because it was seen as a good way to do political work—and often political *dirty work*: to formulate rhetorical arguments, interrogate and critique opponents, uncover political secrets, and so on. Calculation was an *instrument of dispute*. To some degree, the association of the mathematical and numerical with the impersonal and apolitical reflects a later Enlightenment vision of a politics of reason of the kind we might see in

the works of thinkers like Condorcet. But the way that numerical calculation first became a regular feature of political practice in the Anglophone world followed a very different script.

Second, as calculators were wrestling with political issues, they were also wrestling with epistemological issues. The calculation of the Equivalent was a large exercise in taking imperfect and incomplete data—particularly about tax receipts in the two countries, which was especially messy for Scotland—and producing a calculative conclusion that could earn some level of political assent. Behind each number in a calculation like the Equivalent—like the £2,605 in expected coffee duties that David Gregory was reckoning with—were difficult questions about how to make inferences from limited data, about the reliability of conclusions, the possibilities of forward-looking knowledge, of probability and certainty. The story of political calculation in Britain’s long eighteenth century offers an alternative historical epistemology of the eighteenth century, which bridges the work that has been done on that topic by intellectual historians and historians and philosophers of science like Barbara Shapiro, Lorraine Daston, Ian Hacking, and Mary Poovey with work on the political and cultural history of truth and deception, representation and misrepresentation that has been done by scholars like Mark Knights and Kate Loveman.

Third, one of the central stories in Chapter 2 is about how the two individuals who were responsible for designing and calculating the Equivalent were both strong believers in the political virtues of quantitative thinking—and thus the idea that this aspect of the Anglo-Scottish Union could be addressed through a sophisticated calculation—but that the sources of that commitment stemmed from different places for the two. For Paterson, his faith in calculative thinking came from his experience in commerce, and he saw calculation as the exemplification of a kind of practical rationality that was characteristic of businesspeople and which he thought ought to be better represented in British government. For Gregory, this stemmed from a faith in mathematics as exemplified by Newtonian natural philosophy, as inflected by his Anglican faith and Tory politics. For Paterson and Gregory, these quite different sources of mathematical interest converged in the Equivalent project. This is exemplary of a bigger argument in *Calculated Values*, which is that during the long eighteenth-century there were several different strands of enthusiasm for calculative thinking that came to coincide in the realm of public politics. There was an idea that numbers were plain spoken, a kind of “common sense” (this was often a kind of Whig idea), or that numbers were exemplary of the practical reason of merchants. There was also an idea that mathematical demonstration represented a high form of logical certainty. Within calculative disputes over political issues, these different ideas about the epistemic virtues of numerical thinking came together, sometime reinforcing a particular political position (as in the case of Gregory and Paterson) or often clashing, with different political positions embracing different ideas about what made quantitative knowledge valuable. Chapter 3, which is about a major Whig-Tory dispute over the balance of trade between England and France in 1713-14, is focused on a case where these different epistemological positions came into conflict within a political dispute. One of the big arguments in *Calculated Values* is that the fact that there was this array of different ideas about what made numbers epistemologically and politically virtuous, and that these different positions were braided together through the process of political dispute, that numbers came to take on new authority as a form of public reason in the eighteenth century.

Fourth, and finally, one of the striking things about the Equivalent calculation is that it is a calculation about the future. Specifically, it’s a calculation about trying to figure out what future transfers of wealth are worth in the present. One of the striking things I found in *Calculated*

Values was that a large proportion of the numerical debates that raged during the long eighteenth century in Britain were *forward-looking*: they were about the present political consequences of what was yet-to-come. A major driver of this—as it was in this paragraph in the Equivalent calculation—was public debt. The major public debts that Parliament had begun to rack up after 1688 transformed the temporality of British politics in a profound way. British politicians were constantly wrestling with debates about how much debt had accrued, whether it would keep growing, when it would be paid back, and so forth. Debt made the future enter politics in a profound new way in this period—a phenomenon that has been explored by other scholars of the eighteenth century, include John Pocock, Michael Sonenscher, and Rebecca Spang. One thing that you can see in this particular paragraph and the manuscript on page 99, is that it involved a very particular *technical* issue related to the future—this question of present worth. In calculating the Equivalent, Paterson and Gregory employed a very particularly technique to assign a precise mathematical value to the future taxes the Scottish were going to pay: a technique called *exponential discounting* or *compound-interest discounting*. That is the algebraic formula that's written out on the manuscript page from the Gregory papers, and which I describe in the text. It turns out that this question of present worth, and this technique of exponential discounting, showed up a lot in the calculative politics of the eighteenth century—it appears for example in debates around the 1720 South Sea Bubble and in Robert Walpole's "sinking fund" project for dealing with the national debt. I mention it because it is something that I'm spending a lot of time thinking about now.