

Newton's financial misadventures in the South Sea Bubble

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Abstract. One of the most popular investment anecdotes relates how Isaac Newton, after cashing in some large early gains, staked his fortune on the success of the South Sea Company of 1720 and lost heavily in the ensuing crash. However, this tale is based on only a few scraps of hard evidence, some of which are consistently misquoted and misinterpreted. Much of what has been published is embellished with questionable flourishes. A superficially plausible argument has even been made that he did not lose much in that period. This paper presents extensive new evidence that while Newton was a successful investor before the South Sea Bubble, the folk tale about his being drawn into that mania and suffering large losses is almost certainly correct, and that his actions in that episode were a great folly. Incidentally to the clarification of this prominent issue, a controversy between Dale et al. and Shea about an aspect of market rationality during that bubble is settled. The work reported here also suggests new research directions and perspectives on bubbles.

1 Introduction

The South Sea Bubble of 1720 is one of the earliest, largest, and most studied instances of investment manias and crashes. It is frequently cited as the prototypical case of irrational exuberance. Isaac Newton's role in it continues to fascinate the public. Tales abound of how he invested early, and cashed out with 100% profits as prices went to what seemed to him unjustified levels. But then, as prices continued to advance, he supposedly invested again at the peak and lost most of his fortune in the crash that followed. He is claimed to have said that "I can calculate the motions of the heavenly bodies, but not the madness of people," and supposedly could not bear to hear of the South Sea affair to the end of his life.

The interest in Newton's activities in the South Sea Bubble is surely due primarily to his fame as one of the handful of greatest scientists in the world, frequently named as the greatest. But this interest is also surely magnified by the fact that he was not an other-worldly researcher ignorant of finance. Aside from the effort he put into alchemy and theology as well as into astronomy, physics, and mathematics, he was an accomplished

technologist and engineer. As first Warden and then Master of the Royal Mint, his efficiency improvements were crucial to the success of the Great Recoinage of the 1690s and later operations. As an amusing side note that demonstrates his broad range of skills, his duties at the Mint even forced him into detective work, in pursuit of counterfeiters [20]. He was a member of the British governing elite, and his policy recommendations played what some scholars think was an important part in Britain's move, later followed by most of the world, from silver to gold as the monetary standard. Aside from the great scientific reputation he enjoyed during his life, he was paid well for his duties at the Mint, and in spite of any losses in the South Sea Bubble, died a very rich person. This paper provides evidence that before that mania, he was a shrewd and successful investor, too. That a person of such ability, knowledge, and connections could lose his head in a mania is therefore frequently cited as an example of the difficulty of recognizing bubbles.

Various versions of this tale of Newton's misadventures in the South Sea Bubble are presented uncritically in the press and on the Web, and sometimes even in more scholarly works (cf. [5], pp. 108, 165; [6], p. 88; [15], p. 13; [19], p. 41; [41], p. 119). However, deeper investigators of Newton's life and career, as well as some popular writers of books about Newton, do emphasize that this tale is based on extremely limited information about his investments, cf. [7,8,45]. The entirety of the evidence available until now in the literature, which is described in Section 6, consists of two anecdotes that we can only trace back to a generation or two after Newton's death in 1727, and seven reliable quantitative items. Of those seven, one is the inventory of his very sizable estate at death, and five are Newton's letters instructing his agents to carry out transactions with some of the securities he possessed. As will be shown, three of those seven pieces are consistently misinterpreted and misquoted.

The scarcity of comprehensive data about Newton's investments allows for varying views of what he did during the South Sea Bubble. In 1931, Richard de Villamil used the information that was then available about Newton's earnings at the Mint and the size of his estate, which he had uncovered, to suggest that Newton probably did not lose much [12]. However, de Villamil's arguments are not very persuasive, as they rely on extensive assumptions to fill in gaps in the evidence. This paper shows in addition that de Villamil misunderstood the nature of some of the securities that Newton was involved with and made some clear errors in his analysis. But even without that new contribution, Richard Westfall, in what is regarded as the most authoritative biography of Newton so far, concluded that the available facts "tend to support the story that [Newton] was among those who tasted of the Bubble's madness" ([45], p. 862).

This paper shows that Newton did not just taste of the Bubble's madness, but drank deeply of it. His losses, even by conservative accounting, almost surely exceeded £10,000, and plausible methods easily produce values that exceed the £20,000 figure that family lore claimed, and which is frequently cited today. By comparison with typical earnings, and making allowances for a very different society and economy, £20,000 in 1720 might be comparable to £20 million, \$20 million, or €20 million today. However, before the Bubble, in the 1710s, Newton's investments appear to have been those of a careful and shrewd person, and to have been very successful. He was one of the earliest to put money into the

South Sea securities. Those, contrary to most popular accounts, were very solid and were undervalued for some years before the Bubble of 1720. Newton had a diversified portfolio that did well, helped by a generally rising market. But then, during the Bubble, after initially taking out some large profits, he does appear to have put almost all of his funds into South Sea securities at high prices that collapsed. Had he managed to have perfect foresight and time the market well, he could have made, even without using leverage, over £200,000, which is close to what Thomas Guy did, and what financed Guy's Hospital. Even so, Newton died rich, with an estate valued at about £30,000.

The new evidence on which this paper is based includes a few published items that had been overlooked by previous Newton scholars. Most of the new information, though, consists of detailed and previously unpublished accounts of Newton's investments in various securities. The resulting picture is still incomplete, and is likely to remain so. The ideal source that would provide a definitive view would be something like Charles Darwin's investment account books. That sage was very modest about his scientific ability and accomplishment, even a dozen years after the publication of *The Origin of Species*, but claimed to be "investing money very well" [3]. Just how well he was investing remains to be determined, but that only requires a modest and routine effort, since from the mid-1840s on he maintained detailed records of his finances, and those account books survive. Unfortunately there is no sign of any such records by Newton. The next best thing would be a complete record of Newton's investments in the South Sea Company. However, those apparently were destroyed in the 1860s, as is explained in Section 7. Hence we have to rely on what little remains.

Fortunately, there are complete records of Newton's investments in some other securities, which have not been exploited before. This work relies on those of the Bank of England, the East India Company, and several government securities. These records are combined with the corrected versions of previously published items about Newton's finances, and some contextual information about the South Sea Bubble and the investment scene of that time. The complete long-term records of those holdings, even though they do not cover all of Newton's investments, do seem to provide a safer basis of judging what he did than the few episodic items that have been available until now.

The picture that emerges from this study is that of Newton as a shrewd investor who invested his money pre-Bubble in a conservative portfolio of government or quasi-government securities. As the Bubble began to inflate in the spring of 1720, he appears to have kept his other securities, but sold off much of his rapidly appreciating South Sea holdings, for a profit that likely exceeded £20,000, and not just the £7,000 that has often been surmised. But then, around mid-June 1720, as the Bubble was reaching its peak, he seems to have changed his mind, and put all that money back into South Sea securities at about double the price he had received earlier. He then followed this move over the next couple of months by shifting most of his other investments there. By 1721 Newton appears to have had practically all his money in the much-depreciated South Sea Stock. In late 1722 and early 1723, he then diversified by moving about half of his investments into Bank of England equity, and he continued with that mix until his death in 1727.

This article could be taken as simply providing more substance to an amusing instance of a genius succumbing to the reigning groupthink at the height of an investment mania. But it is probably much more than that. Larry Neal ([23], p. 90) discounted the importance of the South Sea Bubble by writing that it

appears to be a tale less about the perpetual folly of mankind and more about the continual difficulties of the adjustment of financial markets to an array of innovations.

It is probably more accurate to say, of this and many other bubbles, that:

It is a tale about the perpetual folly of mankind in gullibly trusting the arrays of innovations that the finance industry concocts.

In that sense the lessons of the South Sea Bubble continue to be relevant today. Yes, British investors of three centuries ago knew much less than we do, but the financial instruments they faced were much simpler than the ones we are tempted with. It is easy to laugh at some of the arguments that South Sea Bubble advocates were pushing. But future generations will likely also laugh at all the pre-2008 pronouncements by regulators and business leaders, as well as by finance and economics PhDs, about the stability-promoting wonders of CDO-squareds and the nirvana of the Great Moderation. One can even argue that many observers at the time of the South Sea affair understood better than modern ones the essentials of bubbles and of the dangers they pose. But this paper does not dwell on that issue, and concentrates primarily on Newton's participation in the South Sea Bubble.

This paper largely avoids one key question, namely the extent to which the South Sea Bubble was a bubble, meaning an episode in which the economic fundamentals guaranteed a collapse. That topic, and the large associated literature, will be treated separately [28]. But the final section discusses how the data used in this research could provide insights into the key element of bubble studies, namely the diffusion of financial information and the phenomenon that increasingly attracts attention in the modern post-fact world, of separate communities of seemingly smart and well-educated people viewing the same facts in wildly different ways.

The next section presents a plausible reconstruction of Newton's investments in the South Sea Bubble. It is based on the detailed analyses carried out later in the paper, and is just a rough suggestion of what might have happened. It thus provides a concise but slightly more detailed overview of the main financial results of the paper.

Section 3 sketches the basic information about the South Sea Company and the London financial scene early in the 18th century. This is followed by a section that presents the Ponzi-like nature of the South Sea Bubble, and considers the possibility that Newton may have been trying to "ride the bubble" in full knowledge it was bound to collapse. Then, in Section 5, various cautionary notes are sounded about projects of this nature, given the limited information that is accessible to us. Section 6 presents all the information that previous accounts of Newton's investments are based on. Section 7 discusses availability of various types of information about holdings in South Sea securities, as well as South Sea restructurings and operations on investors holdings. The following section presents some previously unknown but published information about Newton's South Sea investments.

Section 9 is the first of several that go into the new evidence about Newton's investments in various securities, such as those of the East India Company, the Bank of England, and his involvement with South Sea securities during the Bubble in 1720. Those sections also speculate about what Newton must have been thinking in order to justify his financial moves.

At the end of the paper, Section 14 settles a question about the nature of a particular financial operation of the South Sea Company, the Fourth Money Subscription. This was the last operation of this company before the rapid and spectacular deflation of the Bubble. The somewhat technical issue considered in that section is important in evaluating Newton's participation in that maneuver. It also serves to settle a recent controversy between Dale, Johnson, and Tang [9,10,11] on one side and Shea on the other [33,34] as to whether the pricing of some South Sea securities at the height of the Bubble was rational or not. The newly discovered evidence of this paper shows that the arguments of Dale, Johnson, and Tang for irrational pricing are not valid.

The next-to-last section discusses Dr. John Francis Fauquier. A little known figure, he turns up frequently in Newton's financial records as Newton's agent. But he was more than that, as he was a major financier, a director of the Bank of England, and Newton's deputy at the Mint. Little is known about him, but the contrasts and similarities that come out of comparing his investments to Newton's are intriguing.

Finally, the Conclusions section summarizes the results of this investigation. It also suggests some further investigations, involving social network analysis, of the account data this work relies on. Such investigations could provide valuable information about the dynamics of bubbles.

2 A brief and tentative summary

Previously known quantitative information about Newton's investments was exclusively in the form of occasional snippets of data that gave just the volume of his holdings in particular securities and only at certain points of time. The research of this paper adds to that long-term records of his investments in some securities. These show that Newton seldom made any changes to his long-term holdings outside the Bubble year of 1720. This is in contrast to Handel, say [16,17]. That means we do not obtain all the additional information about Newton's life and activities that Harris extracted from Handel's accounts. But it also means that the few episodic items we have for securities for which we don't have complete records, in particular the key South Sea Stock holdings, are likely to be representative for the relevant periods. But there are still huge gaps in our knowledge, and the many pitfalls in any attempt to reconstruct Newton's financial dealings are covered in some detail in Section 5.

The bulk of this paper considers in detail various individual securities. Here we sketch a plausible hypothetical scenario of Newton's investments, one that is consistent with available data and with the patterns of behavior we find in Newton's accounts. Some smaller sums (such as the one discussed in Section 13 which is important in trying to divine Newton's thinking) are ignored here. Only very rough estimates are given, all that

can be justified given the gaps in our knowledge. A key element in this reconstruction is the assumption that in mid-1722, Newton's long-term security holdings consisted almost entirely of slightly less than 22,000 South Sea Stock. (What that means is explained in the next section.) We do know he possessed that amount, and we can trace a path, many elements of which we have solid documentation for, by which this stake led, through a diversification move and some additional savings, to the entirety of the long-term holdings in his estate at death. Once we accept this assumption about Newton's possessions in mid-1722, the various operations documented later in this paper that he carried out during the 1720 Bubble year limit what he could have possessed even before 1720.

Keeping all these caveats in mind, it appears that at the start of 1720, before the South Sea Bubble started inflating to a serious extent, Newton probably had about 10,000 units of South Sea Stock, with market value of about £13,000, as well as government securities worth around £19,000, for total portfolio market value of £32,000. By mid-1722, it is overwhelmingly likely that his entire investment consisted of about 22,000 South Sea Stock, with market value of £21,000. This indicates a loss of about £11,000, and likely somewhat more, around £13,000, compared to what he would have had if he had not done anything in 1720 and just let his securities sit. (These figures do not include dividends, which were on the order of 5% per year on the market value, and almost surely dropped slightly as a result of Newton's shifts of his portfolio.)

It is easy to see how Newton may have told his family of even larger losses. It seems that early in 1720 he liquidated the bulk of his South Sea holdings for a profit of about £20,000. But a few weeks later he appears to have gone back into the market and spent all that money repurchasing that same security, obtaining about half of what he had sold. So he could have regarded this pair of transactions alone as producing losses of £20,000 or more.

In mid-1720, Newton also converted his government securities into South Sea Stock. Had he sold them in the market instead of converting, he would have made a profit of about £13,000 compared to what they had been worth half a year earlier, and also compared to what he most likely had paid for them some years earlier. As it was, the conversion led to a loss of around £5,000 compared to the value at the start of the year. So that operation could also easily be portrayed as involving a loss of £20,000.

Thus it is easy to see how Newton could have talked of losses of £20,000 or £30,000. Imaginative ways exist to create even larger loss figures, especially when compared to the best possible scenario. Had Newton put all his money into South Sea Stock in June 1719, and sold out close to the peak in June 1720, he would have ended up with around £250,000.

3 South Sea Bubble basics

This section presents some of the basic facts relevant to the South Sea Bubble. This subject is involved, so most of the detail and background information has to be omitted. For more information, see the numerous books on this topic, such as [2,5,9,13,30].

Comparing living standards and costs over a span of three centuries and tremendous changes in the living environment is very tricky. But, as was mentioned in the Introduction,

from the standpoint of an individual, it seems reasonable to take the figures from Newton's time, given in pounds sterling, and multiply them by 1,000 to get today's rough equivalents, since typical annual earnings grew by about that factor. Given the uncertainties in such an exercise, that same 1,000 factor applies to conversion into any of modern pounds sterling, US dollars, or euros. To show that this produces reasonable results, let us note that Newton's pay as Lucasian Professor at Cambridge was around £100 per year, while his total earnings from his job at the Mint were in the range of £2,000 per year ([12], pp. 32–4).

For comparisons at national level, a more appropriate multiplicative conversion factor might be 10,000 or even 100,000. The British national debt in 1720 was around £50 million, and the annual peacetime budget was under £5 million, with about half devoted to debt service, and most of the rest to the military.

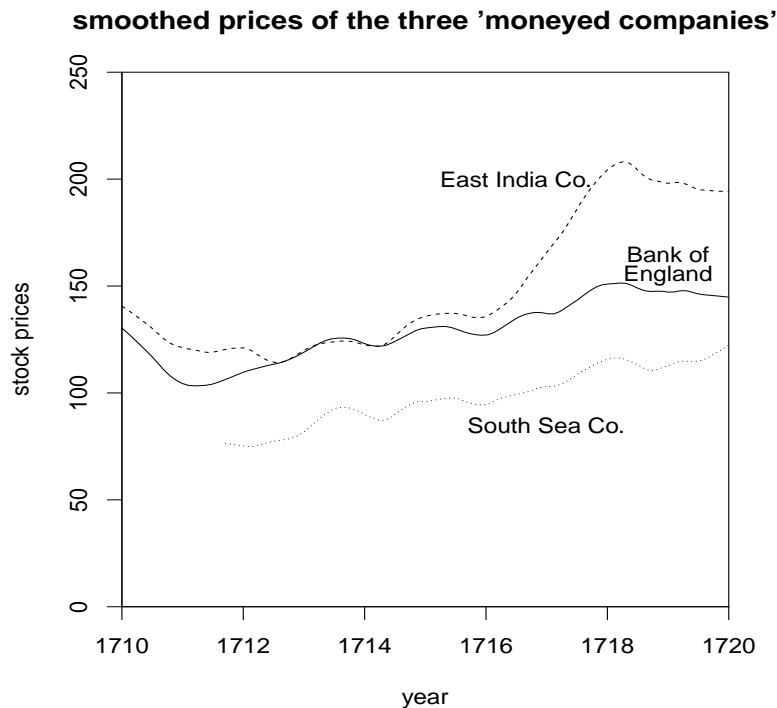


Fig. 1. Stock prices of the three dominant joint-stock companies on the London market, from start of 1710 to end of 1719. The South Sea Company stock started trading in late 1711. Source: *Course of the Exchange*, prices smoothed with the lowess function in the R statistical analysis package.

Of the national debt of approximately £50 million at the end of 1719, about £6.6 million was owed to the Bank of England and the East India Company, almost £12 million to the South Sea Company, and the rest, about £32 million, directly to the public¹. Of

¹ For more precise accounting, see [13], around p. 93.

that £32 million held by the public, about half was in the form of so-called Irredeemables. These were all administered by the Exchequer, and in modern terminology were terminable annuities. They paid fixed amounts per year until their termination, and nothing thereafter, with no return of principal. The terms were fixed, and the only way the government could do anything with them was to repurchase them in the market, or else (as happened in the South Sea Bubble) persuade holders to swap them for something else. They continued to be used in British government finance later on. However, by the 19th century they formed a tiny fraction of the national debt, although one that provides interesting information about market efficiency and cultural factors in finance [26]. Most of the capital of the Irredeemables that existed in 1720 was in the form of 99-year annuities issued between 1705 and 1709, which thus had around 80 years left to their lives at the time of the Bubble, and which were often called Long Annuities.

There were also the Redeemables. Some were administered directly by the government, and will be called Exchequer Redeemables here. Some were administered by the Bank of England, and will be referred to as Bank Redeemables. They were of the same form as the most famous British government securities, the Consols, which were created in mid-18th century and dominated British government finance until the end of the 19th century. They were ‘perpetual’ in the sense that they paid a fixed rate on the nominal (par) amount, and did not have a termination date, so investors could not cash them in other than by selling to others in the market. On the other hand, the government had the right to redeem them at the par value.

As we will see, just before the peak of the Bubble, Newton owned both the Irredeemables and the Bank Redeemables. It appears that he converted them all, either through market purchases or through the South Sea ‘subscriptions’ to be described later, into South Sea Stock at the height of the Bubble.

Equity investors in the three main joint-stock companies on the London market, the Bank of England, the East India Company, and the South Sea Company, held what was called ‘stock’ in them. This was similar to shares, but was strictly a book-entry security, and the general guideline was that 50 units of stock of a company corresponded to an initial investment of £50 in cash. Prices of stock were universally quoted for units of 100 stock, but stock could be, and was, traded in tiny units of $1/240$. When a dividend was listed as being at the 6% level, it meant that for each 100 units of stock, £6 was paid each year. If those 100 units were trading at 120, of course, this meant a dividend yield of 5%, but the listings were always on the par figure.

Until the Bubble of 1720, the South Sea Company was a very solid institution. In fact, as was mentioned above, it owned almost twice as much government debt as the Bank of England and the East India Company combined². Its creation in 1711 was motivated by several factors, such as desire to expand foreign trade, to allow the Tories to wrest control of British finance from the Whigs, and, most important, to solve an urgent problem of British government finance, namely the accumulation of a large volume of unsecured short-term debt. This debt consisted basically of promises by officials to suppliers as well as sailors that

² Commercial activities of the South Sea Company never amounted to much, cf. [14,29], although prospects of their flowering and producing bountiful profits were critical to the Bubble.

their claims would be paid by the government as soon as cash could be found. The South Sea Company converted this short-term debt into long-term one. Owners of the short-term unsecured paper were invited to ‘subscribe’ it into South Sea Stock, and most did so. The result was a great success for both the government and investors. As is shown by Fig. 1, investing in South Sea Stock was noticeably better than in the Bank of England Stock in the 1710s, although not as lucrative as in the East India Company Stock. Newton was an early investor in South Sea Stock, and generally appeared to be adding to his holdings in that security in the 1710s, as is shown in Section 8.

South Sea Stock was actually also an extremely successful investment for those who put in money early, before the Bubble, and did nothing during the Bubble. Someone who bought South Sea Stock in mid-1719 and went on a trip around the world, and only returned in mid-1723, would have been rewarded by an almost 50% capital gain, in addition to market rates of dividend, as is shown in Table 1³. The main reason for this was that the South Sea Bubble had a substantial element of a Ponzi scheme built into it, as is discussed in Section 4. Early investors benefited at the expense of later ones.

During the Bubble, investors could buy South Sea Stock in the market. In addition, there were four Money Subscriptions, discussed in Section 13, in which investors could sign up to purchase this stock, by putting down a deposit and paying the rest on an extended schedule. Further, there were two “subscriptions” for the Irredeemables, and two for the Redeemables, in which owners of those securities signed up to convert them into South Sea Stock.

Fig. 1 only covers the 1710s, and stops at the beginning of 1720, the fateful year of the Bubble. During that period, prices of all securities skyrocketed, with South Sea Stock reaching the vicinity of 1,000. Charts of stock prices during that year are widely available on the Web and in various publications.

Financial data expressed in pounds is converted into decimal format, from the pounds, shillings, and pence format of that time. Figures are almost always rounded.

Finally a word about the calendar. Until 1752, England relied on the Julian calendar, which in the early 18th century was 11 days behind the Gregorian one that had been adopted in most of Western Europe. Hence we find London papers of May 5, say, printing stories of what happened in Paris on May 11. In this paper, months and days are given in the Julian style that was used in England. However, years are altered somewhat. In England, the year started on 25 March until 1752. Hence Newton’s death, which by official dating took place on 20 March 1726, occurred on the day that was 31 March 1727 in France. In common with most modern works, in this paper New Year’s Day is taken to be 1 January, so that Newton’s death is taken to have occurred on 20 March 1727.

4 Ponzi schemes before Ponzi and the madness of people

Modern financial literature often invokes the term “rational bubble” that is rather misleading. What it means is not that the bubble itself is rational, but rather that rational

³ This table only shows a 36% gain from November 1719 to August 1723, but that reflects the runup in South Sea Stock prices in late 1719.

investors invest in that bubble in spite of expectations that it will collapse, based on hopes they will be able to get out before that collapse, selling to a “greater fool.” Could that have applied to Newton? If so, it would provide an unusual interpretation for his comment about not being able to “calculate the madness of the people.” It could have come from his attempting such a calculation, guessing how many more fools there were, and just how foolish they were, but not getting that measure right. But while this is a fascinating idea, it is unlikely to be true.

The vast majority of British investors did take part in the Bubble by converting their Irredeemables, Redeemables, as well as cash, into South Sea Stock. But there was a substantial minority who simply sat out the whole event, and thus did very well. Another substantial minority either sold out their South Sea Stock holdings, or bought and then sold, in a ‘rational bubble’ pattern of behavior. One of the most famous examples, frequently cited in the literature, is Thomas Guy, who is claimed to have liquidated his large holdings relatively early [21]. (It is shown in Section 7 that the published accounts are not completely accurate, as he continued to own large amounts of South Sea Stock at the end of 1720.) Another case of this kind, one that is even better documented, is that of the Canton of Berne. The published account of that case appears to imply that the Berne government did not have any firm view of how the Bubble would develop, and were simply being cautious [1]. The Hoare Bank, on the other hand, appears to be a case of an organization that understood the South Sea Bubble was unstable, but did not predict precisely when it would burst, and therefore carefully timed its transactions to minimize risks and produce large profits [40,41]. An even better example is that of Lord Londonderry. The fascinating account of his financial dealings in the Neal book *I Am Not Master of Events* [24] portrays an expert trader with an excellent sense for market psychology who managed to successively ride first the Paris bubble of John Law’s Mississippi scheme, then the South Sea Bubble in London, and then the Dutch bubble that followed. Not the least fascinating aspect of the Londonderry story is that he fell into financial difficulties, in spite of good market timing, through failures of his counterparties. Perhaps even more interesting is the fact that while he was acting to cash in his gains in the South Sea Bubble, his family forced him, as their financial agent, to invest their funds in South Sea Stock. (They then proceeded to blame him for the losses after the crash!) So apparently he was not able to convince his relatives that his views on the dim prospects of the South Sea Company were correct.

The South Sea Bubble had, in common with many generic features of bubbles, a large element of a Ponzi scheme. Each successive wave of investors brought in either cash or government securities at ever higher valuations of South Sea Stock. This was increasing the value of the stock owned by the previous waves. This was recognized by many contemporary observers, with the little piece by Archibald Hutcheson from 1720 cited as a masterpiece of simple exposition in ([2], vol. 2, pp. 302–303) and in later works, and has been covered by some modern writers, such as [18]. This could have been conducive to some investors realizing they were getting in at unrealistically high prices, but hoping enough “greater fools” would come in at even higher prices.

Could Newton have engaged in such thinking? This seems unlikely. He does appear to have cashed in most of his profits in April and May 1720, so he appears to have been skeptical of the prospects of the South Sea Company at that time. But once he got back in, in June, he appears to have simply continued putting in ever more of his financial resources into the South Sea venture. There is no sign of his trying to cash anything in after mid-June, as one would expect from a player trying to ride the bubble but taking some precautions. If Newton was counting on more “greater fools” showing up, he was counting on an unrealistic number of such.

5 Newton and his finances

There is extensive data about Newton’s income, first from Cambridge University, and then from the Mint, where most of his earnings came from fees based on the volume of business transacted, cf. [12,45]. By 1720, his Mint earnings were apparently in the range of £2,000 per year, although with large fluctuations, depending on the volume of business at the Mint. In addition, dividends on his investments were likely around £1,500 per year. But much less is known of what he did with his money. He did not have an account with the Bank of England, unlike Fauquier, cf. Section 15, nor with some of the few banks whose records from that period survive, such as Coutts, Goslings, or Hoare. His living expenses must have been considerable, likely higher than de Villamil [12] surmised, as he “adopt[ed] the style of the better circles of London society” ([45], p. 580). Still, those expenses were unlikely to exceed £1,000, given what we know of how the upper classes lived in those days, and that Newton was not among the ostentatious spenders. But then he also made many gifts, to the Royal Society as well as to his numerous relatives. This makes it very hard to reconstruct his finances. But he had money to spare, and the general pattern we can see among those of his investments for which we can find even fragmentary records is of general increase.

Long-range financial investments that were available in England were primarily in government securities and those of the three “moneyed companies,” the Bank of England, the East India Company, and the South Sea Company. So if Newton’s investments were in any way similar to those of a capitalization-weighted index for London, they would have been concentrated in those securities. Most of those securities were covered by the investigation for this paper. But there are some more that can be looked at. In particular, some of the records of the Exchequer Redeemables and Irredeemables which have not been looked into survive in the National Archives [13], and might clarify some of the issues left open by this paper. Further, more insight into Newton’s level of attention to the markets and his interactions with agents such as Fauquier could be obtained by studying the transfer books for the securities administered by the Bank of England, in the way that was done by Harris for Handel [16,17].

Records of some other joint-stock companies from that period that Newton might have invested in do exist, such as those of the Million Bank, which by the 1710s was the equivalent of a mutual fund investing in government securities, and of some insurance companies. What would be most interesting to learn, but appears impossible to obtain any information on, is whether Newton was involved in any of the new projects which were springing up

like the proverbial mushrooms during the South Sea Bubble. A particularly interesting example is that of Richard Steele. He is known best for his illustrious political, journalistic, and literary career. He was also one of the most vociferous and convincing debunkers of the South Sea Bubble. However, from the mid-1710s through the Bubble he devoted much of his time and money to his Fish Pool project, for bringing fresh fish to central London. He noted that he had discussed this venture with Newton ([39], p. 342), and it would be fascinating to learn what Newton’s reaction was, and whether he was tempted to put any of his money into it.

The main point of this discussion is to emphasize that an investigation like this one cannot ever be conclusive. There were just too many possible investments outside those covered here that Newton could have been involved in. We can only obtain circumstantial evidence. But with enough such evidence, if it is consistent, one can obtain moderate confidence in the picture that emerges, and that is the hope for this work.

One major potential pitfall in any investigation of Newton’s finances has to be discussed in detail. Hall and Tilling, the editors of vol. 7 of Newton’s *Correspondence* ([25], vol. 7, pp. 96–7) are incorrect in some of their commentary on Newton’s 27 July 1720 letter, as is discussed in Section 6, point E, and in Section 12, primarily because of inadequate knowledge of the nature of the investments of the South Sea Bubble era and because of reliance on the faulty discussion of de Villamil [12]. However, they do make a very valid and important point “as a caution against any one attempting to reconstruct Newtons’ income, or the magnitude of his estate.” This was that Newton often had large Mint funds in his possession. This was completely legal and common in those days, with civil servants commingling private and official funds in the same accounts, and making personal profits by investing the taxpayers’ money. Surviving Mint records show that before 1720, Newton often held large amounts of such funds⁴. At the end of 1720, Newton’s Mint balance was down to £11, but afterwards grew again, so that the last surviving account, for year-end 1726, had a balance of over £22,000. As Hall and Tilling write, “[p]resumably Newton did not hide this sum in his mattress but invested it securely; it is impossible to say what fraction of his holding of, say, South Sea Stock, at any time was ‘really’ his own.”

Investing running balances of public funds in long-term securities would generally be considered not just risky, but foolhardy. But manias often lure people into investments that look very foolish afterwards. A notorious South Sea Bubble case involved masters of Chancery. These were officials of the Court of Chancery who had custody of funds that belonged to parties engaged in lawsuits in that court, or else to minors who were wards of that court. They invested large sums of this nature in South Sea Stock, resulting in huge losses. The scandal was of such magnitude that Parliament ended up creating the position of the Accountant-General of the Court of Chancery. This person was not an accountant in modern terms, and instead was charged with custody of funds held by that Court, and had to follow rigid procedures for handling such funds to prevent a recurrence of this debacle [42].

⁴ All data about Mint funds that is cited here is drawn from the Hall and Tilling commentary in [25], vol. 7, pp. 96–7.

In Newton's case, the safe course of action with Mint funds would have been to invest them in secure short-term instruments, such as the bonds of either the South Sea or the East India Company. These were bonds in the modern terminology, with capital repaid at the end of their term, which was typically a year or less. They paid about 4% per year around 1720, and were very secure, since both of these companies large volumes of government securities. Those were bearer instruments, so no records have survived of who held them.

It seems most likely that Newton did buy securities such as those bonds, rather than put Mint money into South Sea Stock. Hall and Tilling sketch a hypothetical scenario in which the known liquidation of part of Newton's South Sea Stock in April 1720 (point D of the next section) might have been for the purposes of reducing his Mint balance. But that does not appear to fit well the pattern of his other investment moves at that time, which were not known to Hall and Tilling, as they are presented here for the first time. They are discussed in Section 11. Further, Hall and Tilling cite the transfer of Newton's Mint balance on his death of £22,278 to his successor John Conduitt on 13 May 1727, and suggest that it may have come from his estate. That is not impossible when we consider just the magnitude of his 'sworn estate,' which came to £30,333 ([12], p. 34). But it is impossible when we look at the precise timing and at what that 'sworn estate' contained. Almost all of it consisted of holdings of Bank Stock, South Sea Stock, and South Sea Old Annuity. Disposal of Bank Stock is recorded in ledger AC27/444:1105, and of South Sea Old Annuity in ledger AC27/6447:169. (These are references to Bank of England Archive collections, and are explained in Section 7. Records of South Sea Stock transactions have not survived, as is explained in the same section.) In both cases the entire balance in Newton's account was divided up among his heirs on 18 May 1727. So it seems safe to conclude that Mint funds were taken out of Newton's estate before it was 'sworn to,' and so were not part of the £30,333 that was reported to the probate court. Mint balances were likely held in separate accounts. These records of the 18 May 1727 distribution to heirs also help clarify the questions about the fate of Newton's estate that are presented as somewhat doubtful in ([45], pp. 871–72).

For the rest of this paper it will be assumed that the long-term securities that are visible in Newton's accounts were his personal property. But it is wise to keep the Hall and Tilling warning in mind, as it might be the source of a fundamental misunderstanding of Newton's finances.

6 Data sources

The published accounts of Newton's involvement with the South Sea Company are all based on just nine items:

- A. Spence's collection of anecdotes contains many items about Newton. One of them cites Lord Radnor as reporting that "[w]hen Sir Isaac Newton was asked about the continuance of the rising of South Sea Stock," he responded "that he could not calculate the madness of the people" ([37], p. 368). This is the earliest known version of the "madness of the people" story, and appears to have inspired all others. It does not

have the extra flourish about computing “the motions of the heavenly bodies” that is common. Apparently that was added later by other writers. The phrasing as reported by Spence appears to imply this incident occurred in an early phase of the Bubble, and not during its aftermath.

This “madness of the people” quote, the earliest that has been found, was published in 1820. However, that volume was based on notes collected much earlier by the literary scholar Joseph Spence, who lived from 1699 to 1768 [21], and this particular item was taken from Spence’s “Second memorandum book, 1756.” Spence was very well-connected in British society, and his *Anecdotes* are frequently cited by modern scholars⁵. They are Spence’s “chief claim to fame,” and “[reflect Spence’s nature]: self-effacing, conscientious, discriminating, knowledgeable, and kindly” [21]. However, while there is no reason to doubt that Spence reported this item as he heard it, he was occasionally not very “discriminating” in his collection. For example, he also reported that according to Alexander Pope, his most important source, “Sir Isaac Newton, though so deep in Algebra and Fluxions, could not readily make up a common account: and, when he was Master of the Mint, used to get somebody to make up his account for him” ([37], p. 175). To anyone acquainted with Newton, this is preposterous. While it is likely that he did have assistants prepare most of his accounts at the Mint, as he was the Master, and had a substantial staff, he was more than capable of preparing accounts himself. In any event, this item comes from a generation after Newton’s death.

The latest edition of Spence’s *Anecdotes* [38] contains extensive additional material from Spence’s collections that has been found since 1820. However, it does not shed substantial new light on Newton’s finances. James Osborn, the editor of [38], identifies Spence’s informant “Lord Radnor” as John Robartes, the fourth Earl or Radnor. This person lived from 1686 to 1757, and so may have been reporting to Spence his personal interaction with Newton, as opposed to a second-hand story.

- B. In 1797, William Seward wrote, in a longer passage about Newton, that “Sir Isaac, indeed, was in one respect but too like the common race of mortals: his desire of gain induced him to have some concern in the fatal bubble of the South Sea; by which (as his Niece used to say) he lost twenty thousand pounds. Of this, however, he never much liked to hear; ...” ([31], p. 99).

William Seward, who lived from 1747 to 1799 [21], is known primarily for his collection of anecdotes, just like Spence. The quote above does not appear in the 3rd edition of 1796 of his *Anecdotes*, but does in the 4th and 5th editions of 1798 and 1804 [32] which incorporate material from the 1797 supplementary volume [31] that first presents the quote. Seward appears to have taken care to obtain confirmation for what he publicized. *The European Magazine* in 1791 carried an anonymous piece about Newton, which surely was by Seward⁶. That item stated that “Sir Isaac Newton lost a considerable sum of money in the famous South Sea Bubble of 1720” without mentioning any figure, and then went on to talk of “one of his nieces.” In the 1797

⁵ An extensive discussion of the importance and reliability of Spence’s accounts is presented by Osborn, the editor of [38], in that version of Spence’s *Anecdotes*.

⁶ *The European Magazine*, May 1791, p. 340. Seward published many of his anecdotes in that serial, as well as in other ones, before publishing them in book format.

Supplement [31] he was more specific, and not only stated the £20,000 figure, but referred to “his Niece,” which reflects knowledge that there was only one niece that could realistically have been involved. This was Catherine Barton/Conduitt, Newton’s half-niece. She was Newton’s closest and favorite relative, kept his house for him for many years, and stayed in frequent contact with him. Her husband, John Conduitt, was a deputy to Newton at the Mint and later his successor in that position [21]. So it is likely that sometime around 1796, Seward received some additional information to supplement the initial bit he had acquired. But this was two generations after Newton’s death.

- C. A letter dated 1 September 1713 instructing the South Sea Company to pay Fauquier the dividend due to Newton at the end of June on 2,500 South Sea Stock he owned at that time ([25], vol. 6, p. 27).
- D. A letter of 19 April 1720 authorizing and instructing Fauquier to sell 3,000 South Sea Stock that Newton owned, stating explicitly that this was only part of his holdings (cited in [25], vol. 7, p. 96).
- E. A letter of 27 July 1720 authorizing and instructing Fauquier to subscribe various Irredeemables Newton held that brought in £650 per year into South Sea Stock ([25], vol. 7, p. 96). The clear implication of that letter is that this was the totality of such annuities that he then had. This letter has been misinterpreted (cf. [22], p. 653; [12], p. 25) by authors who did not understand what securities were involved, as will be discussed in Section 12.
- F. An undated letter instructing the South Sea Company to transfer to John Read all the South Sea Stock that was due to Newton for his payment of £1,000 in the 4th Money Subscription ([25], vol. 7, pp. 358–359). The editorial note to this letter misdates that subscription, and says that it “took place at the beginning of June 1720.” This appears to have led to reports that Newton had invested £1,000 in South Sea Stock in June 1720 (e.g., [45], p. 861). As is explained later, that investment must have occurred on 24 August 1720, and the transfer to Read must have taken place no earlier than the end of February 1721.
- G. A letter dated 8 August 1722 instructing the South Sea Company to pay Fauquier the dividend due to Newton at the end of June on 21,696.32 of South Sea Stock ([25], vol. 7, p. 210).
- H. A report in Dickson’s book ([13], p. 279) that at some point in 1723–24, Newton possessed 11,000 of Bank of England Stock. The relevant passage in Dickson is slightly ambiguous, as it takes some effort to decide where his discussion of large owners of East India Stock moves on to large investors in Bank Stock. This has led to the misreading (cf. [45], p. 862) that Newton held 11,000 of East India Stock at that time. However, this is a mistake, the 11,000 of stock was in the Bank of England. Newton’s investments in both the Bank and the EIC are discussed in detail later.
- I. Inventory of Newton’s estate at death, which contained (in addition to some cash, real estate, and various sundries, none of which were long-term marketable securities) 14,000 of Bank of England Stock (worth then approximately £17,500), 5,000 of South

Sea Stock (worth about £4,900), and 5,000 of Old South Sea Annuities (worth about £4,800) ([12], p. 34)⁷.

7 South Sea records and South Sea Stock splits

Contrary to popular opinion, the South Sea Company did not perish in the crash that followed the Bubble. In fact, by early 1722 it controlled over 80% of the British government debt. Although that declined somewhat in the next few years, as restructuring shifted some of that debt to the Bank of England, the South Sea Company continued to be the dominant administrator for the national debt through mid-18th century. The imposing new South Sea House, completed in 1727, was a prominent landmark in the City, the financial and commercial hub of London. It preceded the first purpose-build facility of the Bank of England, which was only completed in 1734.

Eventually the South Sea Company did dwindle into insignificance. By mid-18th century it gave up its feeble and unsuccessful attempts at commerce and whaling, and became just a financial operation, administering a fraction of the national debt. This fraction kept declining because of the growth of the debt processed by the Bank of England and by market repurchases of South Sea annuities by the government. The company was finally dissolved in the 1850s, and its last few decades provide an illuminating picture of the evolution of British finance in the 19th century [27]. Unfortunately that dissolution appears to have led to the destruction of the ledgers containing records of investments in South Sea Stock. What has been left are some corporate records (minutes of the meetings of the board of directors and the like, but not the financial reports), which were donated to the British Museum, and are now at the British Library, and ledgers of the several kinds of South Sea annuities.

In early 1723, South Sea Stock still made up over 70% of the British national debt. It was then split in half. Effective 25 June 1723, an owner of 100 of South Sea Stock became the owner of 50 South Sea Stock and 50 Old South Sea Annuities⁸. These annuities were now the direct obligation of the British government, with the South Sea Company just the administrator. Any profits or losses from commercial operations of this enterprise belonged to owners of South Sea Stock. Upon dissolution of the South Sea Company in the 1850s, South Sea Stock ledgers were retained by the trustees who for some years had custody of money held in case some claimants showed up. When even this residual operation was wound up in the 1860s, those ledgers were presumably discarded, as they were not among the papers transmitted to the British Museum. On the other hand, the ledgers of Old South Sea Annuities were moved in the mid-1850s for safekeeping to the Bank of England, where they are available for study.

⁷ Valuations presented here are taken from prices in the *Course of the Exchange* on the day of Newton's death, and include accrued dividends. Hence they are slightly different from those in de Villamil's book, which are based on the sworn valuation presented by the executors at a later date.

⁸ They were called just South Sea Annuities then. However, in 1733, South Sea Stock was split further with the creation of the New South Sea Annuities, so in this paper the term that only came into use a decade later is used for consistency with other literature. At the time of the split in 1723, the dividend on South Sea Stock was 6% per year, while Old South Sea Annuities were paying 5%. Both declined by 1% a year in 1727, as expected, due to contracts with the government.

Old South Sea Annuities ledgers, items AC27/6437 through AC27/6452 in the Bank of England Archive, contain complete information about holdings of these annuities from their inception in 1723 to 1728. In particular, the initial entries, for 25 June 1723, also provide us with a complete record of holdings of South Sea Stock at that time, the only complete record of South Sea Stock that exists. As an example, Newton appears in AC27/6447:169 (meaning on p. 169 of ledger AC27/6447) with a starting balance on 25 June 1723 of 5,000 of Old South Sea Annuities, coming from “Joynt Stock” of the South Sea Company. This means that on the preceding day he must have had 10,000 of South Sea Stock, and as of 25 June he had 5,000 of South Sea Stock and 5,000 of the Old Annuity. This same ledger shows that Newton did not touch his Old Annuity holdings until his death, aside from collecting dividends, and they were divided among his heirs two months later, on 18 May 1728. Since Newton possessed 5,000 of South Sea Stock both on 25 June 1723 and on his death, and had at least 5,000 at the end of 1723 (as is shown in the next section), it seems a safe assumption (especially given how seldom he made changes to his long-term investments) that he did not touch his South Sea Stock during the intervening period.

Handel’s holdings of Old South Sea Annuities are contained in AC27/6443:[122, 124] (meaning pages 122 and 124 of ledger AC27/6443) and show that he must have had 300 of South Sea Stock on 24 June 1723, cf. [16,17]. Thomas Guy, who has been widely credited with wisely selling out all his South Sea holdings at great profit by mid-1720, has his starting entry in AC27/6442:640. It shows that on 24 June 1723 he still had 34,440 of South Sea Stock⁹.

We can make some further deductions about Newton’s and Handel’s investments in South Sea Stock from the scarce records that survive by utilizing the information about stock dividends. Those need to be discussed in any case since they are crucial to any general evaluation of investment strategies involving South Sea securities¹⁰.

The 25 June 1720 dividend on South Sea Stock was replaced by a 10% stock dividend, which meant that a holder of 200 South Sea Stock had his or her holdings increased to 220¹¹. Next, in September 1721, as part of the mop-up after the Bubble, investors received another 1/3 stock dividend, so a holding of 300 South Sea Stock was increased to 400. Finally, in yet another step in the restructuring, in April 1723, investors received 1/16 stock dividend, so a holding of 320 South Sea Stock became one of 340. Now Newton’s holdings of 10,000 of South Sea Stock on 24 June 1723, and Handel’s of 300, are not 17/16 of any nice round figures. It appears almost certain that both Handel and Newton engaged in some small transactions between April and June in order to end up with the round figures that they apparently preferred. A similar preference can be found in many other accounts, while a small fraction show starting balances that were exactly 17/16 of a round figure. This appears to be a reflection of the dominant cultural attitude among British

⁹ The South Sea Company voter records for 25 December 1720, explained in the next section, show that at that time he owned at least 10,000 of South Sea Stock. So it seems very likely he did not sell out all his South Sea holdings by the reputed mid-1720 date, although we cannot exclude the possibility that he did sell out completely and only got back in later, at the much lower prices available after the crash.

¹⁰ Information about the various stock dividends is presented in ([2], vol. 2, p. 301), for example.

¹¹ The skipped mid-1720 cash dividend was largely made up by a larger than normal 5% cash dividend at year-end 1720.

investors of that era that long-term financial holdings were meant to be stable, with the dividend income being consumed, and not reinvested.

The stock dividend of September 1720 means that the 21,696 of South Sea Stock in Newton's account in June 1722 (Section 6, point G) likely came from 16,300 or so of South Sea Stock in mid-1721. If he had kept all of it, he would have had just about 23,000 by mid-1723 as a result of the April 1723 stock dividend.

8 Additional published information about Newton's South Sea holdings

In this section we consider some obscure and rare but published information about South Sea Stock holdings that involve Newton and that has not been considered by previous scholars looking into his finances. The South Sea Company printed lists of stockholders who were eligible to vote at the regular tri-annual elections of management, which were held at the beginning of 1715, 1718, 1721, and so on. There was also a similar list for the very first election held in August 1712. It was out of the tri-annual cycle because the company was set up late in 1711 and the initial management team was appointed by Queen Anne. These lists do not give exact figures for sizes of investments, but do show how many votes each stockholder had, and that provides some information about sizes of investments. The South Sea Company charter specified that an investor had to have at least 1,000 of stock to get 1 vote, at least 3,000 to get 2 votes, at least 5,000 to get 3 votes, and at least 10,000 to get the maximum allowed 4 votes¹². Copies of the eligible voter lists for 24 June 1712 [36] and for 25 December of 1714, 1717, 1720, and 1723 have been preserved. Those for 1712, 1714, and 1723 are in various libraries and in the Making of the Modern World and the Eighteenth Century Online databases. The list for 1717 has only been located in the University of Minnesota Library, while that for 1720 is available at Yale University, Toronto Public Library, National Library of Scotland, and Oxford University. These lists show Newton with 1 vote in 1712, 3 in 1714, 4 in 1717 and 1720, and 3 in 1723. Together with the items in Section 6 and the information about Newton's Old South Sea Annuities investments presented in the previous section, this provides us with the following solid data about his South Sea Stock holdings:

- 24 June 1712: at least 1,000 and under 3,000
- 25 June 1713: 2,500
- 25 December 1714: at least 5,000 and under 10,000
- 25 December 1717: at least 10,000
- 19 April 1720: over 3,000
- 25 December 1720: at least 10,000
- 25 June 1722: 21,696.32
- 24 June 1723: 10,000
- 25 June 1723: 5,000
- 25 December 1723: at least 5,000 and under 10,000

¹² [35]. These qualifications were lowered in 1733 by 6 Geo. II, c. 28, which created New South Sea Annuities.

– 20 March 1727: 5,000

But these are the only firm figures available at this moment for Newton's investments in South Sea Stock. To obtain a more complete picture we have to rely on inference from information about his other investments.

9 Newton and the East India Company

As was mentioned in Section 6, point H, there are some published claims that Newton had a large investment in the East India Company around 1723. However, they are based on a misreading of Dickson ([13], p. 279). That Dickson meant an investment by Newton in the Bank of England and not in the East India Company is confirmed by the data about Newton's holdings of Bank Stock, Section 10, which agree in value with the figure in Dickson, and also by inspection of East India Stock records. Ledgers IOR/L/AG/14/5/1 through IOR/L/AG/14/5/5, available at the British Library, cover all holdings of that security from 1709 through 1728. They were examined and did not show any investments by Isaac Newton. (There were other Newtons who were stockholders, though.)

As an aside, the printed list of large investors on 4 April 1702 in the English Company Trading to the East-Indies includes Newton. This was the venture set up in 1698 to compete with the original East India Company, and merged with it in 1708. The ledgers in the British Library collections should enable a determination of the timing and extent of Newton's involvement in that enterprise, but this has not been done, as the focus was on investments after the founding of the South Sea Company in 1711.

10 Newton and the Bank of England

The Bank of England Archive contains complete records of holdings in Bank Stock from the founding of the Bank in 1694 onwards. The stock ledgers and their indices for 1694 through 1732 were examined. (One can obtain more information about who was carrying out the actual transactions by examining the transfer books, some of which have been preserved in the Bank of England Archive. This was not done in this project.) The relevant ledgers are AC27/414 through AC27/444, and the entries for Newton are on pages AC27/418:1442, AC27/422:3182, AC27/425:4777, AC27/436:7140, and AC27/444:1105, where, as before and throughout this paper, AC27/418:1442 means page 1442 in ledger AC27/418. They show that Newton started investing in Bank Stock on 28 June 1709 by purchasing from another investor partially paid-up stock in a new subscription for enlarging the Bank's capital. He then put in the required remaining cash. He had 1,500 Bank Stock at the end of 1711, when the South Sea Company was set up. He continued adding to his Bank holdings until they reached 6,000 stock on 14 October 1715. He then sold 4,000 of that on 11 December 1716, and the remaining 2,000 on 19 November 1719. He made nice profits on his Bank investments, but he would have done even better by putting those funds into South Sea Stock. This was true from the perspective of the end of 1719 as well as of mid-1723, provided, in the latter case, that he did not touch his investments during the Bubble year of 1720.

Table 1. Stock prices of the “moneyed companies” on selected dates.Prices in pounds sterling for 100 stock, taken from *Course of the Exchange*.

date	Bank of England	East India Co.	South Sea Co. nominal	South Sea Co. adjusted for stock dividends and annuity split
31 Dec. 1711	108.50	123.00	75.00	75.00
14 Oct. 1715	125.25	134.25	93.75	93.75
11 Dec. 1716	135.50	174.00	103.50	103.50
19 Nov. 1719	142.85	196.50	119.25	119.25
31 Aug. 1723	121.50	131.50	104.00	162.07

Table 1 shows the market value of stock in the largest joint-stock companies on the London market on some dates. The South Sea adjusted prices include the effect of the stock dividends in June 1720, September 1721, and April 1723. The 31 Aug. 1723 price is the arithmetical average of the prices of South Sea Stock (108.625) and the South Sea Old Annuities (99.375) on that day, since the 50-50 split took place on 25 June of that year. That reflects the experience of a passive investor. No account is taken of the effect of potentially reinvesting dividends (rates of which differed slightly among these companies), or of the 10% dividend that the Bank of England paid out of its capital in mid-1719.

Table 1 shows that from the standpoint of mid-1723, South Sea Company was by far the best investment to make on any of the pre-1720 dates shown, provided the investments were made on those dates, and nothing else was done in between, especially not during the turbulent year 1720. In particular, if Newton reinvested the proceeds of his sales of Bank Stock in October 1715 and December 1716 in South Sea Stock, and left that untouched, he would have done extremely well by mid-1723, better than sticking with Bank Stock. That he did carry out such a reinvestment in South Sea Stock is plausible, and consistent with the data we have on his South Sea holdings, as discussed in the previous section, which appear to have been growing consistently. But all we can say for certain is that he did do well in his pre-1720 ventures in Bank of England Stock, and most likely even better in South Sea Stock.

Newton again became a stockholder in the Bank on 27 January 1724 when he acquired 11,000 stock through a new stock subscription. In 1722, as part of the final financial cleanup of the South Sea Bubble, the Bank of England agreed to effectively purchase 4,000,000 of South Sea Stock¹³. To pay for the purchase, the Bank issued 3,400,000 of its own stock at 118, meaning that subscribers to this issue had to pay £118 for each 100 Bank Stock. This reflected the market price of Bank Stock at that time. The 11 payments of that subscription were spread out between mid-1722 and 24 February 1724, so that Newton completed paying up his allotment a month early¹⁴. The details of subscriber payments are covered by Bank of England Archive files AC27/397 through AC27/403. An inspection of

¹³ The Bank actually paid for £200,000 per year of the government annuity the South Sea Company was receiving, which was scheduled to be reduced to £160,000 per year in mid-1727. The Bank did not receive South Sea Stock.

¹⁴ It appears to have been universal practice to offer discounts for early payments of instalments, so it was often profitable for investors to take advantage of this feature.

these documents shows that Fauquier, who was a director of the Bank in mid-1722, was given an allotment of 80,000 stock to distribute. He took 6,000 stock of that allotment for himself (AC27/400:341), and gave Newton 2,000 (AC27/400:356). Newton then bought the additional 9,000 of stock allotments from others (AC27/401:52), although surviving records do not tell us exactly when. This gave him the 11,000 stock that is cited in Dickson ([13], p. 279) and that shows up in Newton's Bank Stock account (AC27/436:7140) in January 1724. Although we do not know when and at what prices he bought the partly-paid stock, prices of Bank Stock did not vary too much during that period, so it is likely that he had to provide around £13,000 in cash. That £13,000 is approximately the value of the precisely known reduction in his holdings of South Sea Stock between August 1722 (Section 6, point G) and June 1723 (Section 7). So this supports the theory that he had practically all his funds in South Sea Stock from the end of 1720 to late in 1722, and then diversified, by moving about half into Bank Stock.

Newton later acquired additional 1,000 Bank Stock on each of 9 October 1724, 25 February 1725, and 7 October 1726, to reach the final balance of 14,000 that was the largest part of his estate.

How well did this second move into Bank Stock after 1721 do? To be concrete, suppose that on 31 January 1723, Newton sold South Sea Stock and reinvested the proceeds in Bank Stock. Let us neglect brokerage commissions and dealers' bid-ask spread, and assume the transaction was carried out at the final prices of that day listed in the *Course of the Exchange*. Bank Stock that day closed at 117, South Sea Stock at 95.125. On 31 January 1727, two months before Newton's death, Bank Stock was at 124.25, while the combination of South Sea Stock and Old South Sea Annuities that a passive holder of 100 of that stock four years earlier would have had was worth 103.59¹⁵. So the capital gain on Bank Stock over those four years was 6.2%, and on South Sea Stock 8.9%. In addition, 6% annual dividends on Bank Stock and South Sea Stock, and 5% on South Sea annuities (all on par values) during that period meant that the dividend yield on Bank Stock was about 1% per year lower (on the purchase price) than it would have been in South Sea securities. So it appears that this surmised diversification move by Newton carried a modest but not negligible cost. In purely financial terms, he would have done better by sticking with his South Sea holdings¹⁶.

11 Newton and the Bank Redeemables

Starting in the mid-1710s, the Bank of England began to administer government debt, meaning recording transfers and paying interest to individual investors. Only some of the "redeemable" or "perpetual" annuities were handled by the Bank, and, as was noted before, they are called the Bank Redeemables in this paper¹⁷. Several securities were involved, all paying (through the 1720s) either 4% or 5% on the par (nominal) value. Newton's investments in them started on a very small scale at the end of 1717, became significant

¹⁵ Average of 100.875 for stock and 94.125 for annuities, multiplied by 17/16 to reflect the April 1723 stock dividend.

¹⁶ Investing in East India Stock would have produced results intermediate between Bank and South Sea Stock. Million Bank Stock would have produced even better capital gain, 9.9%.

¹⁷ For a listing and description of the large number of Redeemables and Irredeemables, see [43,44].

only at the end of 1719, and ended in 1720. To keep things simple, they will be lumped together in this section, without listing their names and properties. This does not cause much of a problem, since from late 1719 on, all these Redeemables were trading close to par, usually within $\pm 2\%$ of par, as there seemed to be a clear expectation that the 5% ones would be reduced.

All of Newton's investments in these annuities that were found are covered by Bank of England ledger entries in AC27/215:523, AC27/217:187, AC27/326:157, AC27/329:283, and AC27/341:3135. He bought 2,000 (par value) in October 1717. This was followed by two years with no activity, and then another purchase of 2,000 in November 1719, and yet another 2,000 in February 1720. Then there followed a rapid series of purchases starting on 29 April 1720, and ending 23 May 1720, totaling 26,000. The grand total, 32,000 par value (and approximately that in market value) was disposed of as follows:

- 6,000 was subscribed into South Sea Stock. In the Bank of England ledger, AC27/341:3135, the date of transfer is listed at 15 October 1720, but this was the date listed for all such transfers by all investors, presumably the date the transfers were officially effected. The subscription for conversion of the Redeemables was opened on 14 July, with another one started on 4 August. It is likely that Newton submitted these Redeemables on or soon after 14 July.
- 26,000 was sold¹⁸ in one day, 14 June 1720, to various parties, including 3,000 to Thomas Guy and 500 to Fauquier.

The sale of his South Sea Stock that Newton directed Fauquier to carry out on 19 April, described in Section 6, point D, should have produced about £10,000. So to allow for the expenditure of about £26,000 in the month starting 29 April, Newton had to have other sources of funds, and the obvious source for them would have been further sales of South Sea Stock. This security only moved decisively above £350 around 19 May, so it is likely that the prices obtained by Newton were around that range, and if so, he must have sold around 8,000 of South Sea Stock in total in this period. Note that he had at least 10,000 of South Sea Stock at the end of 1717, so this appears very plausible. If he used the proceeds of his 14 June sales of Bank Redeemables to repurchase South Sea Stock, which at that time was around £700, he would have obtained less than half of what he appears to have sold, or under 4,000.

The most likely reading of this scanty evidence is that in late April Newton decided to realize a large fraction of the large paper profits he had in South Sea Stock. The price was around 350, and he appears to have acquired much and probably most of it at well under 100, so his profits were likely over £20,000.

But as the bubble took continued inflating, it appears that he panicked, and plowed all those profits back into South Sea Stock. If he paid £26,000 on 14 June for that security, which traded that day around 700¹⁹, then by the end of August 1723 he would have been looking at a loss (cf. Table 1) of 77% in capital value, just about £20,000.

¹⁸ To be precise, the 26,000 was transferred on that single day. They could have been sold shortly before, and they could also have been gifts or other non-monetary transfers.

¹⁹ *Course of the Exchange* lists transaction prices for that day of 710, 685, and 700, while *Freke's Prices of Stocks* gives 715, 690, and 700.

Newton likely lost proportionately less on the 6,000 of Bank Redeemables that he subscribed into South Sea Stock. If he held onto that South Sea Stock, as seems likely, then by August 1723 he owned South Sea Stock and South Sea Old Annuities worth about £3,240²⁰. So in this case the loss was ‘only’ 46%.

On 14 June, it was universally expected that an offer to convert the Redeemables into South Sea Stock would be made, but not when nor what the terms would be. (Nor, of course, what would happen afterwards, as the terms of the conversion were modified by both the South Sea stockholders and Parliament after the crash.) It appears that the haste that Newton appears to have exhibited in rushing back into the market on 14 June with the 26,000 of Redeemables as opposed to waiting, as he did with the remaining 6,000, cost him in the end about £8,000.

If the suggested reading of the Bank Redeemables evidence is correct, and Newton did rush back into South Sea Stock on 14 June and converted the remaining 6,000 in July, then his losses just on that part of his dealings, compared to sticking to the Redeemables, was by itself over £20,000. But he almost surely suffered additional losses from later transactions involving the Irredeemables and cash, discussed in the next two sections.

Newton’s transactions in the Bank Redeemables do not fit the hypothetical scenario of Hall and Tilling discussed in Section 5. Money obtained in order to pay down Mint balances would surely not have been invested in these securities. Newton’s actions through the end of May resemble those of Thomas Guy. His accounts in Bank Redeemables show steady accumulation (including 3,000 from Newton on 14 June), almost surely from his liquidation of South Sea Stock holdings.

The scenario in which Newton started out 1720 with 10,000 of South Sea Stock, sold 8,000 in April and May, and then repurchased 4,000 in June fits in with other parts of the picture of his activities. It would mean that Newton ended up with 6,000 of South Sea Stock out of the original 10,000. Together with the South Sea Stock that came from the conversions of the Irredeemables and the Bank Redeemables that are discussed here and in the next section, that would have produced, after the stock splits, just about the 21,700 South Sea Stock that he had in mid-1722, Section 6, point G. The information about his Bank of England Stock acquisition in Section 10, as well as about his South Sea Stock and Old South Sea Annuities holdings in Section 7, strongly supports the theory that all his investments were in South Sea Stock in mid-1722.

12 Newton and the Irredeemables

The letter of 27 July 1720 to Fauquier cited in Section 6, point E reads ([12], pp. 19–20; [25], vol. 7, p. 96):

I desire you to subscribe for me & in my name the several Annuities you have in your hands belonging to me amounting in the whole to six hundred & fifty pounds per an for which this shall be your warrant.

As de Villamil notes ([12], p. 24), “Newton’s note is very elliptical and has all the appearance of being a confirmation in writing of a previous conversation.” It was probably

²⁰ Table 1 and the final results of conversion in [2], vol. 2, p. 300.

that, as well as additional confirmation in case any questions were raised about Fauquier's exercising what was likely his powers of attorney over Newton's holdings.

The language of Newton's note makes it very clear that he was referring to Irredeemables, as those were the ones that were referred to in those days in terms of their annual yield. The phrase "several Annuities" likely means that Newton did possess more than one type (out of many) of Irredeemables. However, most of the market value and most of what was tendered for conversion was in the several issues of the so-called Long Annuities, and so let us assume that is what Newton owned. (That is also what de Villamil assumes [12], but he lists incorrect prices and conversion terms. Those mistakes carry over to other publications, such as [25], vol. 7, pp. 96–7.)

The first subscription of the Irredeemables opened at the end of April, with the terms announced on 19 May. Investors were given a week to decide whether to accept or not. At that time Newton was apparently still selling his South Sea Stock, so he would clearly not have been interested in participating in this conversion. But his attitude was completely different in July.

The conversion terms that were offered by the South Sea Company for Long Annuities in the second subscription in August ([2], vol. 2, p. 288) meant that for each £100 per year of Long Annuities, investors were being offered 400 of South Sea Stock and £400 of cash or South Sea bonds (which were as solid as cash, unlike the stock). So Newton most likely was being promised 2600 of South Sea Stock and £2,600 in cash. The market value of that package was close to the market value of his £650 per year of Long Annuities, which during that period were selling for about £35 for an annual payment of £1, so that Newton's holdings were worth about £22,750.

In the end, as a consequence of the alteration of the conversion terms by the South Sea Company and Parliament after the crash, investors who signed up in the second subscription in August received by mid-1723 no cash or bonds, but 1545.71 South Sea Stock for every £100 per year of Long Annuities ([2], vol. 2, p. 300). On 31 August 1723, that was worth £1,603, so Newton's £650 per year of Irredeemables was worth about £10,400. Compared to simply selling his Long Annuities for cash on 27 July 1720, he thereby lost £12,350, or about 54%.

Next, for another perspective, let us consider the fact that the prices of Long Annuities in mid-1720 were elevated by the Bubble. In mid-1719, and also in mid-1721, they were selling for about £20 for each £1 per year of annuity, so Newton's stake was worth about £13,000 at those times. From that perspective one could say he lost only £2,600, or about 20%, on this switch into South Sea Stock.

Finally, it is worth mentioning several features of this second conversion of Irredeemables that point to Newton's eagerness to participate. Newton's instructions to Fauquier are dated 27 July. That is the day that the South Sea directors authorized this "subscription," to open 4 August. So, unless he was acting based on rumors of such a move to come, Newton must have learned of the decision the same day and reacted positively to the news right away.

Those who applied for conversion on 4 August or the next few days were doing so on blind faith, for the South Sea directors did not announce the terms of the conversion until

12 August. Further, when they did announce the terms, there was extensive grumbling, for two reasons [5]. The terms were nowhere near as favorable to holders of Irredeemables and Redeemables as during the first conversion of April and May. Further, while investors in that first conversion had a week in which to decide whether to participate or not, this time their subscriptions were taken as binding contracts. But these facts, which might make some observers suspicious, did not cool Newton's ardor for the prospects of the South Sea venture, as two weeks later he participated in the next and last phase of this company's extraction of money from the public.

13 Newton and South Sea money subscriptions

The 14 June 1720 date for the sale of the bulk of Newton's holdings of Bank Redeemables is suggestive, since the 3rd Money Subscription for South Sea Stock opened soon afterwards, on 17 June. But he is not on the list of participants in it, which suggests he used the proceeds from the sale to repurchase South Sea Stock. But he did participate in a later money subscription, and that investment implies that he continued to expect a positive outcome from the Bubble until very late in the game.

The South Sea Company had four so-called Money Subscriptions, in which investors were invited to purchase South Sea Stock for cash, with an immediate down payment, and the rest spread out over extended periods of time. The first of these was opened on 14 April 1720, at a price of £300 for 100 South Sea Stock, the second at £400 on 28 April 1720, the third at £1,000 on 17 June, and the fourth one at £1,000 on 24 August. Records of investors in those subscriptions are available in Parliamentary Archives, HL/PO/JO/10/5/57 through HL/PO/JO/10/5/63. There was some fraud in those stock issues and in the associated records, but that involved bribery of highly placed persons, and so was not likely to affect records of Newton's activities. He is not listed in the first three subscriptions, but is on the list for the 4th subscription, for 500 South Sea Stock (HL/PO/JO/10/5/63, p. 66). This meant that he was signing up to pay £5,000 for that stock, with a down payment of £1,000 on signing, and the next payment, also of £1,000, due 25 March 1721. The transfer of his investment to John Read, Section 6, point F, must refer to this action²¹.

When did the sale to Read take place? Newton's letter is not dated, but it is addressed to Conrade de Gols as the Treasurer of the South Sea Company. De Gols was only appointed to that post (officially "Cashier") on 21 February 1721²², after the flight to the Continent a month earlier of Robert Knight, his notorious predecessor who was the central figure in the Bubble. De Gols could not have been acting in that capacity prior to his official

²¹ The subscription and its rules were approved by the South Sea directors on 23 August, to open the next day, and it was completed on that first day, 24 August, as shown by the minutes of the Court of Directors for those days. The down payment did not have to be in cash itself, the bonds of the South Sea, East India, and Sword Blade companies, which were regarded as solid short-term instruments and usually traded slightly over par, were also accepted. The 500 South Sea Stock that Newton subscribed for was the maximum allowed, most likely in order to stoke public interest.

²² Minutes of the Court of Directors of the South Sea Company for that day, British Library Add MSS 25500.

appointment, since he was working at the Bank of England²³. So the deal with Read must have taken place after 21 February 1721.

How much Read paid is not known. By the end of February 1721, all the discussions among management and stockholders of the South Sea Company seemed to assume that no more cash would be asked from the participants in the four money subscriptions beyond what they had already paid. But there was a vigorous debate concerning how much stock to give to those subscribers for their payments up to that point. In the end, for every £100 in cash, they received (by mid-1723) just a bit under 52 of Stock ([2], p. 300), which on 31 August 1723 was worth about £54, if we apply the valuation method of Table 1. So if Newton had held onto his subscription, his £1000 would have turned into £540 (plus the dividends over that period). He may have received that much from Read. On the other hand, he may very well have sold to Read for quite a bit less. Some of the proposals called for harsher treatment for participants in the money subscriptions than the ones that were imposed in the end.

So the after-the-fact analysis shows that Newton lost at last close to half and possibly a lot more of his investment in the Fourth Money Subscription. Since the money at stake was just £1000, it did not affect his overall wealth much. Furthermore, as is shown in the next section, he was only venturing £1000, as he was not obligated to pay any further instalments, and the next payment was not due for more than half a year.

Still, the fact that Newton was willing to put any money at all into the Fourth Money Subscription provides some insight into his thinking. It is quite possible that Newton was willing to invest much more than he did in that venture, since the amount of South Sea Stock he signed up for was the maximum allowed in that case²⁴. But what could have motivated him to invest in the first place? The Fourth Money Subscription was carried out on Wednesday, 24 August. Transfers of South Sea Stock had started up again just two days earlier, on Monday, 22 August, and so they led to the first regular transactions ‘for money’ in two months²⁵. Prices of South Sea Stock by that time were down substantially from the levels they had reached earlier that summer. Even on 4 August, when the second Irredeemables and Redeemables subscription was opened, the price (without the 10% stock dividend) was around 800, down from well over 900 at the peak²⁶. On 22 and 23 August the

²³ Minutes of the Court of Directors of the Bank show de Gols being reappointed to his position at the Bank just below that of Cashier in the standard annual process on 7 April 1720. Minutes for 16 February 1721 show that he was given permission that day to apply for the Cashier position at the South Sea Company, and those of 23 February record acceptance of his resignation from the post at the Bank. He continued as the Cashier of the South Sea Company for over a decade.

²⁴ It is rather speculative, but the fact that Newton was second on the list of subscribers with last name starting with N may indicate that he was very eager to participate and, perhaps through an agent, showed up at South Sea House early. The entries are organized by first letter of last name, but for each letter there does not seem to be any particular order, either alphabetical or by size of subscription. So the given order may reflect the order in which entries were made in the subscription journal.

²⁵ This was one of the regular ‘shuttings’ of the books for the preparation of dividends. During that period trades were taking place, but they were in effect futures trading, to be executed on or after 22 August, and so subject to counterparty risk as well as discounting for the value of delayed payment.

²⁶ *Course of the Exchange* for that day gives prices of 800, 790, and 820, while *Freke’s Prices of Stocks* lists 870 and 890. While this is not stated in either publication, it is clear from comparing them that in this period the former was giving prices ex-dividend, and the latter with the stock dividend.

price was down to around 750²⁷. The real crash would come a couple of weeks later, with prices below 300 by the end of September, and many sales below 200 just before that. But the trend was already down at the end of August, and there was substantial and growing unease among the investing public [5]. Paying 200 for the option to buy later at a price of 1,000 something that is selling at that moment for 750 is not necessarily crazy in the case of a volatile security, but it does require substantial faith that this security has a good chance to skyrocket way past 1,000. The evidence shows that Newton did have such faith. As he was soon to learn, this faith was sadly misplaced.

14 South Sea money subscriptions: Options or futures?

The four money subscriptions of the South Sea Company were at the center of a recent spirited debate about market rationality. Richard Dale in his book [9], and then Dale, Johnson, and Tang [10] in their paper in more detail, argued that over several months in 1720, the partly-paid receipts for these subscriptions were significantly mispriced relative to each other and relative to the fully-paid South Sea Stock. Their conclusions that the market was irrational were disputed by Shea [33,34]. However, Dale et al. did not accept Shea's arguments, and responded with an article that maintained that their earlier work was correct [11]. While there were many technical points of contention between the two sides, the heart of the issue in modern language was essentially whether the 1720 South Sea money subscriptions were futures or options; that is, whether subscribers were obliged to pay all the instalments, or whether they could walk away from their commitment at any time. In particular, once Newton paid the initial deposit of £1,000 on 24 August 1720, was he legally obligated to pay the next £1,000 that was due on 25 March 1721?

Dale et al. in effect argued that Newton was obliged to make all four additional £1,000 payments due on his subscription, while Shea maintained that Newton was not. The arguments of the two sides are long and involved, concerning the degree to which various laws and precedents applied to the South Sea money subscriptions. Neither side, however, presented any data about the actual South Sea subscriptions contracts. It turns out that copies of those contracts do exist, in Parliamentary Archives file HL/PO/JO/10/2/157²⁸. Among many items in that box, there is a folder marked both as document no. 10 and as no. 14, which contains the "preambles" to each of the four money subscriptions. These were the actual forms signed by subscribers, and they all have almost identical language about what was to happen in case of default. In case a subscriber makes some payments but defaults on the next one, to quote from the Preamble to the first subscription,

the Said first payment So paid ... shall be forfeited to the Said Governour and Company ... and the respective persons making Such Default shall be Entitled to no Greater Summ or Summs in the Said Stock (By Vertue of Such Subscription

²⁷ *Course of the Exchange* gives prices of 770 and 750 for Monday and 750 and 740 to Tuesday, while *Freke's Prices of Stocks* lists 850, 815, and 820 for Monday and 820 for Tuesday, the latter again surely with the dividend.

²⁸ This set is actually referenced by Dale et al. ([10], p. 241, footnote 40), using the older designation "House of Lord's Record Office Parchment Collection, Box 157, 1720." It is one of two large boxes full of miscellaneous documents relating to the Bubble. They were collected by Parliament during the investigations into that event.

on which Such Default Shall be made) than the money which they Shall pay on or before the respective days and times for Payment thereof, as aforesaid Over and above what the Said first payment Shall amount to at the [price of South Sea Stock in that subscription].

This clearly appears to settle the debate in favor of Shea. Investors could walk away from their subscriptions. In fact, aside from the ambiguity introduced by the phrase “no Greater Summ or Summs,” which could be interpreted as giving the South Sea Company the leeway to give less, this language clearly implies that subscribers were getting an enhanced option. If Newton, in addition to his downpayment of £1,000, also paid the next instalment of £1,000 on 25 March 1725 but then stopped, he would have been entitled to 100 of South Sea Stock.

The evidence of this paragraph does not prove that the financial markets at the time of the South Sea Bubble were rational. But the argument for irrationality based on pricing of money subscriptions that is presented by Dale [9] and Dale, Johnson, and Tang [10] is flawed, and has to be rejected.

15 Dr. John Francis Fauquier

Very little is known about Fauquier (whose name was sometimes written Fauquiere, Fouquier, or Ffouquier, in those days when spelling was very variable). His son Francis (1703–1768) is far better known, with an entry in [21], based largely on his career as a British colonial administrator in North America. The father was already a deputy to the Master of the Mint when Newton was appointed Warden, and Newton retained him in that post when he became Master [8]. Fauquier served in that position until his death in September 1726, half a year before Newton passed away. It is rather puzzling that Fauquier would continue in that post, as it was not very lucrative, and he was one of the many French Huguenots who attained prominence and wealth in English commerce and finance around 1700. He was a director of the Bank of England for most of the years between 1716 and his death²⁹. He also engaged in substantial financial operations, far more extensive than those of Newton. Yet he was not only Newton’s poorly paid deputy at the Mint, but apparently also his broker, and his surety (providing a guarantee against financial misconduct, required of all officials in similar positions) ([25], vol. 4, p. 392).

Fauquier shows up in many stockholding records. He had at least 5,000 South Sea Stock already in mid-1712, and at least 10,000 at the end of 1714, 1717, 1720, and 1723³⁰. On 24 June 1723, he had 51,480 South Sea Stock (AC27/6441:272), and on 29 September 1725, he had 20,000 Bank of England Stock (AC27/435:6528). Newton did not simply follow what Fauquier was doing, as their investments did have noticeable differences. For example, Fauquier had substantial investments in East India Stock in this period, whereas Newton had none. But Fauquier did appear to share Newton’s enthusiasm for the South Sea Company at the height of the Bubble, as we find him subscribing much of his holdings of Bank Redeemables, as in the 10,600 par value in AC27/328:19. We also find him converting

²⁹ However, he was never Governor, as claimed in some sources, e.g. [45], p. 578.

³⁰ Lists of South Sea voters, described in Section 8, such as [35].

the 500 of Bank Redeemables that Newton sold to him on 14 June into South Sea Stock³¹. In that case he seemed more cautious than Newton, and was rewarded for this caution, as by waiting to convert he did better than he would have by going into the market to buy, as Newton apparently did. On the other hand, he apparently did not share Newton misgivings about the South Sea project in April and May, as no sign had yet been found of his liquidating his South Sea Stock holdings during that period.

Much more can undoubtedly be learned about Fauquier, and possibly thereby also about Newton, by more intensive study of Fauquier's financial records. In addition to his accounts in various government securities and in Bank of England, East India Company, and South Sea Company, he had a regular drawing account at the Bank, with complete records available. That account shows numerous transactions, including some with Newton.

16 Conclusions

This paper provides new evidence that substantiates the popular story about Newton initially being skeptical about the South Sea Bubble but then embracing it enthusiastically. The resulting picture is still not complete, but it is much more detailed than before and it helps illuminate that very popular investment anecdote. But it is more than just another example of a genius succumbing to the prevailing groupthink of an investment mania. It suggests further directions for research. The detailed records of investments in various securities can be used to study the dynamics of bubbles. Some studies of the social, ethnic, and religious backgrounds of investors in various securities were already carried out by Dickson in his seminal work [13]. Other studies have been carried out since, for example on gender effects, cf. [4]. What seems worthwhile is to apply the rapidly improving tools of social network analysis to the study of the South Sea Bubble (as well as other bubbles). This paper showed some patterns of financial transactions by Newton that indicate his changing evaluations of the prospects of the South Sea Company. Other investors, in particular Fauquier and Guy, show different patterns. By digitizing more records, we could study the variety and distribution of types of behavior. Ideally this could then be applied to study diffusion of information. Clearly wildly different views on the Bubble co-existed, corresponding, as is increasingly being discussed in today's post-truth world, to different groups evaluating the same facts in diametrically opposed ways. Such studies would hopefully lead to more insights into the dynamics of bubbles.

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<http://www.dtc.umn.edu/~odlyzko/doc/mania-ack.html>

³¹ Newton's transfer to Fauquier is in AC27/326:157, and Fauquier's conversion is in AC27/326:229.

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