Arbitrage and Simple Financial Market Efficiency during the South Sea Bubble: A Comparative Study of the Royal African and South Sea Companies Subscription Share Issues[1]

by

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ABSTRACT

In 1720, subscription finance and its attendant financial policies were highly successful for the Royal African Company, but were unmitigated disasters for the South Sea Company. Early 18th century subscription shares would today be called innovated securities and were quiet different in design for the two companies. This difference in design and the different financial and investment policies followed by the two companies account for the comparative success of the Royal African scheme. It is remarkable that in the financial markets of 1720 the values of subscription shares are easily understandable using standard financial theory.

Keywords: Royal African Company; South Sea Company; Financial Revolution; subscription shares; call options; derivatives; instalment receipts; innovated securities

JEL Classifications: N23, G13

Introduction

Financial market efficiency can be impaired by a combination of irrational pricing behaviour and limits upon arbitrageurs' ability to eliminate the resulting mis-pricings of financial assets. In the critique of financial market efficiency that has come to be called behavioural finance, a rigorously defined example of irrational behaviour is noise trading – trading that is highly correlated with what can only be called noise-like movements in security prices. The explanations for hypothesised noise trading are varied; misperceptions of correct prices can arise from a number of psychological biases in perceptions of risk and return or arise from a utility of risk and return that is heavily biased towards loss aversion. Arbitrageurs can, however, overcome the risk attendant in facing noise-traders if arbitrage is sufficiently well financed or if there is sufficient time to deliver the required returns to arbitrageurs. Instances of successful arbitrage arise therefore in markets in which a simple form (at least) of market efficiency arises.[2]

The literature on the South Sea Bubble has emphasised irrational behaviour as the dominant behaviour in financial markets, at least as far as explaining the spectacular rise in South Sea equity values, in 1720. The literature largely predates, however, the usage of the term 'irrational' as it appears in the writings on behavioural finance discussed in the paragraph above. The literature moreover says nothing about the limits on arbitrage that could have limited irrational pricing of South Sea and other shares. The literature does present us with individual cases of successful and unsuccessful speculation, but the evidence does not clearly point to any instance of what the modern economist would call arbitrage. There are stories of famous winners (the Duchess of Marlborough and Sir Thomas Guy) and losers (Sir Isaac Newton and the Duke of Chandos) in the South Sea. To these old stories we must add the cases

[2] Shleifer (2000), Introduction and Chapter 2.

that come from more recent studies, which describe the successes and failures in trade by Sir Thomas Pitt, John Law, Richard Cantillon, Hoare's Bank and the Canton of Berne. As tantalising as the evidence is that some individuals, such as Law and Cantillon in particular, were engaged in what we would now call international risk arbitrage, the evidence is not conclusive. There also appears in the literature stories of individuals and institutions that made money in the South Sea Bubble simply by selling steadily into the rising market of 1720.

In the next section of this paper, we review in brief this literature with regards to speculative, and possible arbitrage, activities of certain institutions and individuals. The summary conclusion that we take from this literature is that individuals and institutions did not succeed or fail as investors by trying to exploit mis-pricings between very similar securities. That would have been arbitrage. They either succeeded or failed, by luck or design, in the way they viewed the intertemporal movement in the market fundamental for shares. Further archival researches might yet find direct evidence of individual attempts at profitable arbitrage, but we do not think that such evidence is likely to be found.

Better evidence for arbitrage in 1720 is found in the market data we have for equity shares and closely-related subscription shares. Subscription shares were the products of subscription contracts. They were share purchase agreements that required a down-payment and subsequent payments to follow in scheduled instalments. Events in 1720 and in later years suggest, however, that the general investing public did not necessarily see these contracts as simple instalment purchase contracts for shares. There is good evidence to suggest that the investing public viewed the South Sea subscription contracts as complex packages of call options on shares. In this paper we demonstrate that the Royal African Company’s subscription shares were not viewed in the same way. We can demonstrate that much of what happened in the markets for

Royal African Company shares was a product of good financial design and subsequent prudent financial management. Indeed, the policies followed by the Royal African Company revived the finances and real business activities of the Company for years beyond the collapse of the South Sea scheme itself. An option to default on subscription instalments was embedded in both South Sea and Royal African subscription shares, but because of the terms of their issue, maturity and the companies' respective management policies, the default option was practically worthless in the Royal African subscription shares, whereas it obtained high values in the South Sea subscription shares. The Royal African subscription scheme was thus subsequently successful, whereas the South Sea subscription schemes' failures were practically foreordained.

Literature regarding speculation and arbitrage in 1720

In this section we review what little recent literature there is that reflects upon individual (or institutional) speculation and arbitrage in 1720. In the course of the review, it will become clear why it is so unlikely that archives will produce clear cases of arbitrage by individuals and institutions. Evidence of arbitrage will have to be discovered in other ways than by looking at investor case histories.

It has now been confirmed that John Law wrote a series of very large call options on East India shares for Lord Londonderry (Thomas Pitt). The exercise of these options were variously due in the middle to early autumn of 1720 and Neal (2000) writes of the difficulties that Law's agents had in honouring the calls. These difficulties strongly suggest that Law did not construct hedges against the risks he faced in writing these calls. In today's terms he was writing "naked" calls, which exposed him to liabilities that could only be capped by the limited extent to which East India shares could rise in value. Although we have few details, it also appears that by early 1720 Law was the author of some very large naked calls in South Sea

shares as well. The correspondence with his London banker suggests that these calls were very strongly in the money and about to expire to the great financial embarrassment of their author. Londonderry, for his part, appeared to be in a position in which he had to receive the settlement of the calls directly from Law's agents or receive nothing at all. Whether by design or necessity, Londonderry was to receive settlement of the calls by paying the exercise price and by taking possession of the shares. We know that Londonderry had earlier sold pieces of the call options he held to others, but he was still left in possession of a large quantity of these options. Londonderry obviously felt that he faced a very specific risk that Law would not be able to deliver on his calls and he even found it in his own interests to aid Law's agents in placing the shares at advantageous prices. Neal shows how Londonderry took appreciable steps to reduce the risks he faced, but these risks were quite unique risks because he was in possession of such a large number of in-the-money calls written by just one very wealthy and politically-powerful individual.

Richard Cantillon’s financial contracts were extensive and varied, but it is impossible here too to place them within the context of arbitrage strategies. To take just one of the examples analysed by Murphy (1986), between March and May 1720 Cantillon concentrated on the exchange rate policies being followed by John Law in his administration of the Mississippi Scheme. He made substantial loans to a number of individuals, but primarily to various members of the Powis family, Lady Mary Herbert and her father, Lord Montgomery. The value of these loans to Cantillon would have appreciated in the event of devaluation of French banknotes relative to specie, yet the collateral he accepted for these loans were in the form of Mississippi Company shares. Cantillon clearly expected that, because of the system being followed by Law, the value of Mississippi shares would rise or fall *pari passu* with the exchange rate between banknotes and specie, yet there is no apparent evidence

that he was concerned with risk that the collateral value for his loans would fall in the very circumstances in which he would likely have to retain the collateral.

Sir Thomas Guy built the fortune that lay behind the charitable foundation of Sir Thomas Guy's Hospital by simply selling South Sea shares steadily into the rising market of early 1720. The largest known investor in English funds, the Canton of Berne, also did very well in 1720 by steadily selling South Sea shares that it had purchased in 1719. In the latter case there was a clear statement that the motive behind the strategy was simply to hold a low-risk portfolio. The financial directorate of the Canton viewed the rapid rise in South Sea share prices in early 1720 as a signal that the riskiness of South Sea shares was suddenly much higher than it had heretofore expected and the shares were peremptorily dumped (Altorfer, 2004). On a comparatively smaller scale, Hoare's Bank purchased shares before the steepest run-up in prices and managed to sell a good portion of these shares before the market collapsed. Temin and Voth (2003) present a case that this was the result of a precocious trading strategy of "riding the bubble".

Pure arbitrage requires the arbitrageur to take opposite positions in two assets that are precisely alike. Perhaps a bit easier to find are two assets, nearly alike in all respects except in their riskinesses. If there is a reward towards bearing risk that is easier for arbitrageurs to carry than for other persons in the markets to carry, another type of arbitrage – risk arbitrage might be detectable. Most likely this is the arbitrage in which Richard Cantillon and John Law were engaged, if they were engaged in arbitrage at all.

The other way to discover arbitrage is to analyse values for financial instruments that are very close substitutes for each other in order to look for mis-pricings or successful arbitrage that prevents such mis-pricings. In this paper we consider the arbitrage relationship between fully-paid equity shares and subscription

shares. They were issued variously by many companies in the 18th and 19th centuries. It was common in the late 18th and early 19th centuries that canal, railway and insurance companies would issue new equity shares on a subscription basis. This practice was followed by a number of new and existing companies in 1720 as well. What we shall examine in this paper are the unique arbitrage possibilities when subscription shares were issued and traded in parallel with fully-paid shares.[3]

This paper is the third in a series that concerns the special role of subscription finance during the South Sea Bubble. The first paper (Shea (2007a)) was a correction to an analysis of South Sea Company subscription share values presented by Dale, Johnson and Tang (2005). After assuming that South Sea subscription shares were simply packages of fractional fully-paid South Sea shares and promised instalment payments to the firm, these authors then embarked upon an extensive econometric analysis to show that the required *linear* relationships between fully-paid and subscription share values could not be found in the data. They followed their analysis then with conclusions about irrationality, hysteria, gambling mania, behaviour heuristics and the inevitable call for financial market regulation. But the results of their econometric analyses were simply predestined by their mistaken historical assumption about the nature of the South Sea subscription shares.

In the second paper (Shea (2007b)) was developed and tested an explicit pricing theory for the South Sea subscription shares. With an option to default upon subscriptions that was widely perceived to be exercisable, the South Sea subscription shares would theoretically have been priced as compound call options on the South Sea Company's fully-paid shares. A computational model closely mimicked the nonlinear theoretical relationship between the fully-paid and subscription share values

[3] A deep mystery in early British financial history is the prevalence of subscription finance in initial public offerings of shares. Equally mysterious is the gradual disappearance of the practice, which started in the later 19th century.

and demonstrated the existence of efficient arbitrage between the markets for these shares.

The technical objectives of this, the third paper, are several. The first explicit analysis of subscription share values in 1720 concerned the Royal African Company's subscription shares and did not concern those belonging to the South Sea Company. Carlos, Moyen and Hill (2002) conducted econometric analyses which established the existence of a close *linear* cointegrating relationship between the values for Royal African subscription shares and their fully-paid counterparts. The objective in that paper was to explore the possible fundamental that was jointly driving the pair of Royal African share prices through time. Our objective here is wholly different. We wish to describe in sufficient detail the mechanics of the Royal African subscription so as to make clear why the linear cointegration discovered by Carlos, Moyen and Hill (2002) simply had to appear in the data. The Royal African subscription shares had some features in common with the South Sea subscriptions shares, but they were different in very important ways and this will only become clear if a comparative study of the two Companies' shares is undertaken. We shall see that it was also the different financial management policies followed by the two companies that determined why in one set of markets the Royal African share values followed a joint linear process and in other markets the South Sea share values followed a distinctly joint nonlinear process.

Royal African Company Subscription Shares

The Royal African Company subscription share issue of 1720 arose from a capital enlargement scheme that was called an "engraftment". The engraftment was first described very briefly, but quite accurately by DuBois (1938).[4] Our description

[4] DuBois (1938), n.68, page 394.

of the details of the engraftment is more extensive than that given by DuBois, but we base our description on the two most important sources he used. The first is an indenture agreement between the Company and a group of trustees who would administer the engraftment. The scheme is completely described in this indenture agreement and, for citation purposes, we have reproduced it in full in Appendix A.[5] The second important source is a 1724 report by the trustees to the Company on the effects and management of the engraftment up to that point. For citation purposes again, this document is reproduced in full in Appendix B.[6]

The engraftment was devised by Joseph Taylor and several officers of the Royal African Company who are named in the indenture. The indenture agreement states that a new cash infusion was needed to remove a burden of debt and to reinvigorate the Company's trade (App. B, lines 5-10). The Royal African Company had an old, but vulnerable, position in the legally sanctioned transatlantic slave trade. After years of losses and deteriorating trading conditions caused by competitors and war (see Carlos and Kruse, 1996), it sought to refinance and revive its trade in the buoyant stock markets of late 1719 and early 1720. The new capital was to be in the form of equity to be offered to the public. The Company was seeking to more than quadruple the number of shares issued and outstanding; the new subscribers would end up owning more than 3 shares for every original share outstanding. This is a very important respect in which the Royal African subscription share issue was different from the South Sea subscription share issues; subscribers to the Royal African shares would end up owning more than 75 p.c. of the firm's equity, whereas South Sea

[5] The indenture is found in the minutes of the General Court for the 8 April, 1720. T70/101 *Minutes of the General Court,* 1678-1720 [page 196 verso].

[6] T70/115/199, *Report of the Trustees of the Proprietors of the Old Stock, Submitted to the Committee of Accounts of the Royal African Company, April 30, 1724.*

subscribers could never expect to own more than 15 p.c. of South Sea equity.[7] Everywhere in the Royal African indenture and in its execution, we shall see that the company took the utmost care in protecting original shareholder rights and wealth - in glaring contrast to the haphazard management exercised by the South Sea Company of its subscription issues.

The Engraftment Defined

The indenture makes the usual 18th-Century distinction between assets ("stock") and equity claims on assets ("shares"). It first declares that the present stock is £430,000, which the Company would like to make up to £2 million. Original shares in stock number 4,304, to which they would like to add 15,696 new shares - making 20,000 shares in all (App. B, lines 13-18). The original and newly engrafted capital will be assigned a new book value of £500,000. That is, each of the 20,000 shares will be rated at a value of £25 per share (p.s.) (App. B, lines 21-26). The subscribers will pay £25 p.s. for their 15,696 shares, making £392,400 the total new cash to be received by the Company (App. B, lines 49-51).[8] The indenture states that the best estimated value for all original assets is £240,000 (App. B, lines 38-39), but original shareholders will own only £107,600 of the £500,000 new book value, so they must be compensated £132,400 (= £240,000 - £107,600) out of the £392,400 paid by newly subscribing shareholders (App. B, lines 43-49).

The uses to which this £132,400 are to be put are also described. It is to be split into two basic funds - £80,000 and £52,400. The £80,000 is for the discharge of a long list of enumerated debts amounting to as much as £75,696. This sum is to be delivered

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[7] Shea (2007b), Supplementary Appendix B, presents an analysis of the size of the South Sea Company's subscription share issues.

[8] By 1726 £387,967 had indeed been collected from subscribers (see T70/1186, *Rough Drafts and Copy Book A* [contra 142], *"London April 1726, An account of the several sums of money paid in originally and since the Company's establishment by subscriptions, calls or otherwise"*).

by Joseph Taylor to a group of the Company's officers within 21 days of the indenture agreement [7 April, 1720] who will settle and discharge the debts (App. B, lines 55-70). The residual £4,304 from the £80,000 is intended to be Joseph Taylor's reward for devising and executing the scheme (App. B, lines 71-75). The other fund of £52,400 is to be delivered by Joseph Taylor to the Company by 1 December 1720 and it is to be put to two uses. If more debts are discovered or are undertaken by the original proprietors than can be paid for out of the £75,696 previously delivered to the Company, these debts will be paid out of the £52,400-fund. Secondly, once all such debts are satisfied, the residual of the £52,400 shall be distributed to the original proprietors in the form of a cash dividend up to £10 p.s. (App. B, lines 76-101). If the £52,400 are sufficient to pay all debts and to pay the maximum cash dividend of £10 p.s., then the residual can be used to compensate other Company officers for their efforts in administering the engraftment (App. B, lines 188-194).

We know how some of the terms of indenture agreement worked out. At least we know how they worked out till the end of April 1724. Joseph Taylor got his £4,304 fee (App. C, lines 23-24), but the eventual debts of the Company were higher than at first expected and they were still awaiting payments on some subscription instalments (App. C, lines 21-22). The maximum £10 p.s. cash dividend was not realised and what original shareholders actually got was a little over £8 p.s. (App. C, lines 12-16). But the Royal African engraftment worked just about as planned: nearly the whole sums of monies projected to be raised, were raised; the costs of administering the engraftment were contained within the amounts budgeted and all old creditors to the company had been paid in full. This was all accomplished in the difficult financial conditions that followed with the collapse of the South Sea scheme.

Provisions for Protecting Original Shareholder Wealth

A primary reason that the Royal African subscription was successful was the care taken in protecting the wealth of existing shareholders. New shareholders had the chance to subscribe for new shares at a subscription price of £25 p.s. and these shares would eventually stand equal to fully-paid shares. At the time the indenture was drawn up (early April 1720), Royal African fully-paid shares were valued at about £63 p.s. That would have made original shareholder wealth (gross) 4,304×£63 ≅ £271,200 at that time. To this would be added £392,400 from new shareholders, making total value of Royal African equity equal to £271,200 + £392,400 = £663,600. Spread over 20,000 shares this would make the expected value of equity about £33 p.s.[9] We thus conclude that if there were no mechanisms in the engraftment scheme for the protection of original shareholders' wealth, their wealth would have declined by about £30 (= £63 - £33) p.s.

The potential loss of £30 p.s. in shareholder wealth was precisely prevented by the terms of the indenture agreement. We do not know enough about the negotiations between Joseph Taylor and the Company's representatives to know how the mechanics of the scheme were determined, but we can surmise that two numbers, i) the adjusted book value of assets and ii) the assignment of £240,000 to the value of original assets, were numbers jointly chosen to avoid wealth losses to original shareholders. The resulting protection against wealth losses was manifested in two ways. First, new shareholders directly relieved original shareholders of £75,696 in debts. This relief was worth about £18 p.s. Secondly, original shareholders were also given the fund of £52,400 (or about £12 p.s.) that could be used to either relieve them of any further debts or to pay a cash dividend up to £10 p.s. So, altogether these two

[9] To be precise, the expected diluted share value would be calculated simply as, $\frac{4{,}304 \times £63}{20{,}000} + \frac{15{,}696 \times £25}{20{,}000} = £33.2$ p.s.

funds did deliver the approximate £30 p.s. compensation to original shareholders. The indenture agreement, of course, also had to work well and completely or else original shareholders would lose. For example, Joseph Taylor was responsible for delivering funds to the Company's officers in full and in a timely fashion. If for any reason he failed in these tasks, the original shareholders would be the losers. We shall now look at some more features of the indenture agreement to see how these problems were overcome.

Making the Indenture Work – the Role of Underpricing

The indenture agreement was clearly designed to maximise the chances that all its terms would be fulfilled. Joseph Taylor was allowed to collect subscriptions for new shares (App. B, lines 142-150). We do not know how he allocated new shares, but the offer terms were clearly designed to make sure the subscription would be filled. The task facing Mr. Taylor was to define a group of people who could subscribe for shares which, we have already calculated, would have an expected market value of about £33 p.s. These persons would have rights to these shares by paying the special price (call it a rights price) defined in the indenture agreement. By setting the rights price (£25 p.s.) to a number well below the expected value of shares, the writers of the indenture made sure that Mr. Taylor’s solicitation of subscriptions would be easy. The second set of features of the subscription shares that would have made them popular is that they were issued in small denominations and in large numbers.

The indenture stated that the original tranche of £75,696 along with another sum of £45,568 had to be delivered quickly after the indenture was agreed. These payments would together amount to £8 per new share. In other words, the indenture stipulated that a £8 per new share deposit would very quickly be made to the

Company (App. B, lines 102-116). Further instalments collected by Mr. Taylor would be due on or before 1 June (£5 per new share), 1 September (£5 per new share) and 1 December (£7 per new share) (App. B, lines 117-131). Relatively small instalments due from Mr. Taylor put relatively little pressure on the numerous subscribers in paying their instalments. Finally, the indenture tried to define the company's rights to reclaim subscription shares and instalments already paid in the event of default on subsequent instalments (App. B, lines 162-171).

For a chartered company such as the Royal African, there was always the question of what actions and relations were legal if they were not explicitly mentioned in the Company's charter. The passage of the Bubble Act (6 Geo.1, c.18) in May 1720 made this problem more acute. The Royal African Company was chartered before 1718 and would have thus have been relieved of many of the strictures of the Bubble Act, but the Act stated, with strong emphasis, that chartered companies had to operate strictly within the confines of their charters. Given the hostility that the South Sea Company displayed towards other competing enterprises that were raising capital via subscriptions in 1720, it is not surprising that the Royal African was as careful as it was in defining its relations with its subscribers.[10]

Analysing the Market Values for Royal African Subscription Shares

How can we assume that subscribers to subscription shares did not value the possible right to defaulting upon promised subscription instalments? It is apparent that such rights had substantial value in the case of South Sea subscription shares.[11] In

[10] Again, the contrast with the South Sea Company is instructive. The Bubble Act itself on silent on most of the important aspects of the South Sea Company's relations with subscribers. Whilst it allowed for an easy transfer of subscription receipts, it said nothing about the Company’s duties in facilitating that trade or what would happen if either subscribers or the Company did not fulfil their obligations under the subscriptions.

[11] Shea (2007a) makes the historical argument for the existence of these rights and Shea (2007b) explicitly models their values.

November 1720 the Royal African Company even altered the terms of the instalment schedule on its subscription shares in order to forestall defaults. [12] It thus would have been reasonable to wonder if there was some default option value embedded in the subscription share values. The fact that the new shares were being issued at below book value should have been of no concern to original shareholders as long as their original wealth was preserved. This at least was done by the arrangements we have described. But this still leaves open the question as to how the value of the subscription shares should subsequently have been related to the value of original shares.

Our analytical approach to understanding the prices of Royal African subscription shares uses a simple graphical device, which provides a direct measure of the value of an option to default upon subscription instalments. It is a graphical depiction of what can be called an arbitrage bound and it is complicated only by the existence of the uncertain dividend that was promised to original shareholders in the indenture agreement. We first pose a counterfactual situation in which the subscription shares were simply fractional claims upon ex-dividend fully-paid shares. To take an example, compare the value of subscription shares and fully-paid shares on 1 June, 1720. On that date a £5 instalment was due on the subscription shares, but there were still to be paid another £5 (due 1 September) and a final £7 (due 1 December). We suppose therefore that on 2 June a subscription share would represent a fractional (£13/£25) claim on a fully-paid share that was shorn of its expected dividend; the value of that would be $(£13/£25)\times(P_{\text{fully-paid}} - PV[£10])$.[13] From this quantity we can construct an arbitrage lower bound on subscription share values and will argue that this bound would have to be obeyed, thus

[12] T70/90, *Minute Book of the Court of Assistants*, 18 Nov 1720, pages 131-2.
[13] We here assume momentarily that the promised £10 dividend was also the expected dividend.

$$(£13/£25)\times(P_{\text{fully-paid}} - PV[£10]) + PV(\text{instalments}) \geq P_{\text{fully-paid}}\,. \qquad (1)$$

If the bound was not obeyed, anyone who could buy a subscription share and borrow the present value of the remaining instalments would be able to obtain the equivalent of a fully-paid share at a cost smaller than that demanded in the market for such shares. If the bound appeared to be exactly binding, then we would have to conclude there was no possible value in the subscription shares attributable to a default option on instalments. In Figure 1 we depict the value quotations for African ex-dividend original shares and subscription shares plus the present value of the remaining instalments.[14] The figure illustrates a very close adherence to the arbitrage bound. The eye might detect that later in 1720 the bound is not strictly binding, but that impression would be changed if the expected dividend was lowered

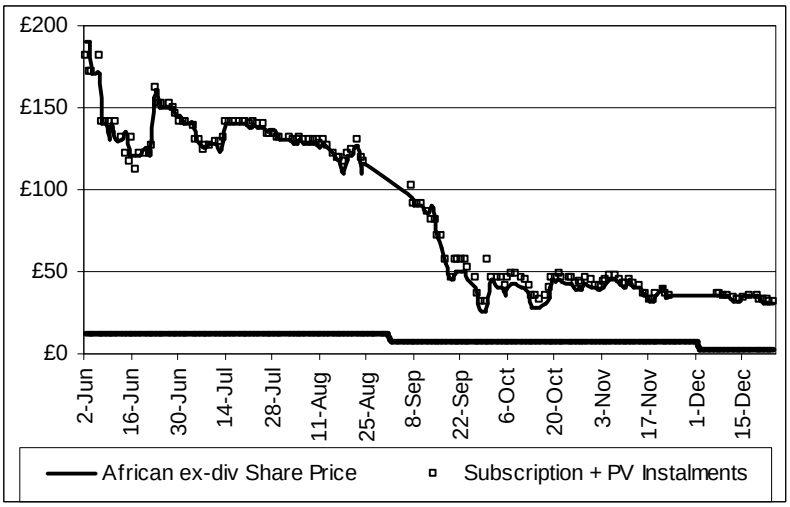

FIG. 1 Royal African Company Original & Subscription Share Values, 1720

[14] The present value of the instalments takes a slight step on 18 November (not perceptible in the graph) when the Company announced that only £4 would be due 1 December and not £7. The present value of the remaining £3 was calculated upon the assumption that it would not be due until 21 March 1721, which was the assumption made by Carlos, Moyen and Hill (2002), page 79.

slightly. Because the arbitrage bound is so strongly obeyed, it is difficult to see a difference between the two sides of the Inequality (1) above. To aid the interested reader, in Appendix E we provide our original data and two interactive graphs with which visual experiments can be performed that allow for changes in the expected dividend. In such experiments for 1721, for example, smaller expected dividends, closer to £8 p.s., will be found to suit the arbitrage bound well.

In contemporary minds there was likely to be some confusion as to what an ex-dividend original African share would actually turn out to be. The expected dividend payout to original shareholders may well have been different from the promised £10 and was likely to be lower. This could happen because the Company could discover or incur additional debt obligations (this did happen) or because the subscription issue itself would fail to collect sufficient instalment payments to sufficiently fill the £52,400-trust fund out of which cash dividends would be paid (this did not happen). In one way or another, the definition of an ex-dividend share was uncertain. The actual ex-post dividend paid to shareholders in May 1721 was an approximate £8 dividend. It is striking that such an expected dividend makes the arbitrage bound hold quite well; it is strong visual evidence that the markets were well informed as to how well the engraftment scheme was working.[15]

In summary of our analysis, there is no suggestion of a noticeable default option value component to the subscription share values. Unlike the South Sea subscription shares, as we shall see, any options to default on instalments in the Royal African shares were far out of the money and therefore worthless. There was no likely future collapse in Royal African asset or share values that would make such defaults attractive. Our analysis also suggests that subscription share prices contained within them a very accurate forecast of the size that the promised dividend of 1721 would

[15] We again refer the interested reader to the interactive graphs in Appendix E, which support our conclusions.

take. Finally, the arbitrage bound makes clear why there was a near perfect linear cointegration between fully-paid and subscription share values found in the study by Carlos, Moyen and Hill (2002).

Financial Aftermath of the Royal African Company Subscription

The capital restructuring of the Royal African Company during the South Sea Bubble and afterwards was a financial success in a period whose history is told largely as a chronicle of financial failure. The few years after 1720, however, were but an Indian-summer in the longer history of the Company's equity values and returns. Under Charles II and James II, the Company's equity yielded average 6 p.c. p.a. returns and about 60 p.c. of those returns were in the form of cash payouts. After the Glorious Revolution and in the subsequent 24 years until 1713, payouts practically ceased and equity declined in value roughly 10 p.c. p.a. From 1713 to 1719, the Company's trade was moribund, there were no payouts to shareholders and returns were on average neither positive nor negative. The pre-Bubble low-point in the Company's equity values occurred in 1718.[16]

In the buoyant stock markets of late 1719, the Royal African Company's share values rose by as much or more than other firm's share values; they had more than doubled over the levels seen at the end of 1718. Historians have noted before that the year 1720 was actually a year of high returns for shareholders who owned shares prior to the late spring or early summer of 1720. Even South Sea Company share values ended 1720 about 50 p.c. higher than they were at the end of 1719, but Royal African share values were four times higher than they were at the end of 1719 and were more than six times than what they were in 1718. Even through most of 1721 they remained at more than four times that level.

[16] This analysis is based upon the equity capital history and data developed in Appendix C.

For much of the decade after 1720 the Company was capable of attracting enough equity investment in the firm to keep total equity values at about the same level (£200,000) they had been during the years of its greatest prosperity, as depicted in Figure 2.[17] The Company was able to achieve this even when values of shares started to slide after 1722. On the back of these equity values, the Company was able to revive its credit and thereby financed an ambitious programme of fitting out new ships, rebuilding its Gold Coast establishments and entering upon contracts for the delivery of slaves. After the South Sea Bubble and despite the financial challenges posed by the resulting restrictions on credit supplies, the Company meant business and it was apparent that the financial markets also believed that the Company remained fixed upon a business plan to which the markets apparently assigned a real chance of success.

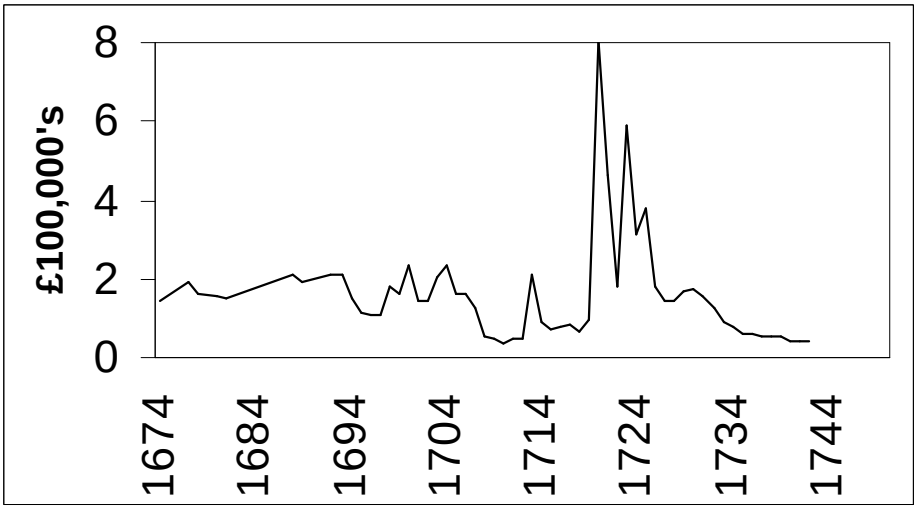

FIG. 2 Royal African Company Total Equity Value

[17] Equity value in Figure 2 is defined as the total number of standard 1674-shares (defined in Appendix C) times the value of each standard share.

South Sea Company Subscription Shares[18]

In this section we analyse the structure of the South Sea Company's subscription scheme in juxtaposition with that of the Royal African Company. The two companies' schemes were quite different in purpose, design and execution. These differences had predictable effects on their success and on share values. At the probable height of equity values in late June 1720, subscription shares accounted for at least 10 percent of all South Sea Company equity value and could have eventually accounted for 15 percent of all South Sea equity. They were issued to meet the immediate cash needs of the firm. Some of the cash would have had to be used in the exchange packages the Company was offering to government annuitants, but by far the largest use of the cash was in the form of loans to shareholders who were pledging their shares as collateral for loans.[19]

The subscription shares were shares issued to the public and they could be purchased in instalments. The 1st Subscription series started 14th April 1720 and the 2nd series started soon thereafter. The 1st Subscription, for example, was for shares priced at £300 per share (p.s.). A £60 deposit was required and thereafter every two months a £30 instalment would be required. The 1st Subscription shares had a £30 instalment due to be paid on 14th June. On that date the possession of a subscription share would represent 30 p.c. of an original share and the obligation or right to make seven more bi-monthly instalments of £30 each until ownership in one full original share resulted. The 2nd Subscription required a 10 p.c. deposit on a share priced at £400. After the first £40 deposit, a further nine £40 quarterly instalments would

[18] This section is brief in comparison to our analysis of the Royal African subscription shares because much of the history of the South Sea subscriptions is found elsewhere (Shea, 2007a) and all of the formal modelling of subscription values is contained in another paper (Shea, 2007b).

[19] In Add. Ms. 25,499, *South Sea Company. Court Minutes No. 6*, page 104, for 21 April 1720 we have one of the more remarkable statements from the directors of the Company concerning their intended financial

follow. The 3rd Subscription did not commence until 17 June and required a £100 deposit on a share that was to be priced at £1000. Nine further semi-annual instalments of £100 each would be required before a fully-paid share was credited to the owner.[20] The 4th subscription did not commence until 12 August and it too was priced at £1000 p.s.

The issue prices for subscription shares were at the level or slightly above the values for fully-paid shares at their respective dates of issue. The consequence of this is that, throughout most of the subscription shares' subsequent trading lives, South Sea fully-paid share prices were actually very low relative to the subscription prices. This was quite different from the situation for the Royal African subscription shares, whose issue price was set much lower than the fully-paid shares' price at the time of issue. Another significant way in which the South Sea subscriptions differed from those of the Royal African Company was in their rights to dividends. Nearly from the beginning of their issue, the South Sea Company declared that subscription shares

Table 1 Some Comparative Features of Royal African and South Sea Subscription Shares in 1720

	Royal African Subscription	South Sea Subscription 1	South Sea Subscription 2	South Sea Subscription 3	South Sea Subscription 4
Date of Issue	21 April 1720	14 April 1720	17 April 1720	17 June 1720	12 August 1720
Issue Price	£25 p.s.	£300 p.s.	£400 p.s.	£1000 p.s.	£1000 p.s.
Fully-Paid Share Price at Time of Issue	£64 p.s.	£334 p.s.	£348 p.s.	£806 p.s.	£950 p.s.*
Lowest Fully-Paid Share Price after Subscription Issue	£27 p.s.	£154 p.s.			
Average Fully-Paid Share Price after Subscription Issue	£64 p.s.	£551 p.s.	£551 p.s.	£566 p.s.	£412 p.s
Maximum possible share in equity ownership of the firm	75 p.c.	15 p.c.			
Rights to Dividends?	No.	Yes.			

* No spot values for South Sea fully-paid shares are actually available for this date. We report here a forward delivery value instead.

management of the firm. The disposition of cash from the sale of subscription shares figures prominently in their statements.

[20] A history of the instalment schedules for these shares is found in Supplementary Appendix 3 (Shea, 2007a).

would share in any dividends equally with fully-paid shares. Table 1 summarises the salient differences between the South Sea Company's and the Royal African Company's subscription shares that we have noted so far.

An arbitrage bound on South Sea share values can be constructed much as we have done for the Royal African Company shares. The present value of the subscription shares' instalments, when added to the market price of subscription shares themselves, should clearly exceed the value of fully-paid shares. The arbitrage argument follows as before; if the fully-paid share values exceed this sum, then profitable arbitrage would exist and persons could obtain fully-paid shares at a lower than market cost by simply purchasing a subscription share and by paying the present value of all the remaining instalments. We have derived and discussed this bound in our previous two papers, so it will suffice here to illustrate it in the context of only one of the South Sea subscription share issues – the 1st issue. The bound $P_{\text{subscription share}} + PV_{\text{instalments}} \geq P_{\text{fully-paid}}$ should not be breached and Figure 3 clearly shows that it is not. It shows as well the substantial option value of default that was built into the subscription shares' value, especially in the late summer and autumn of 1720.

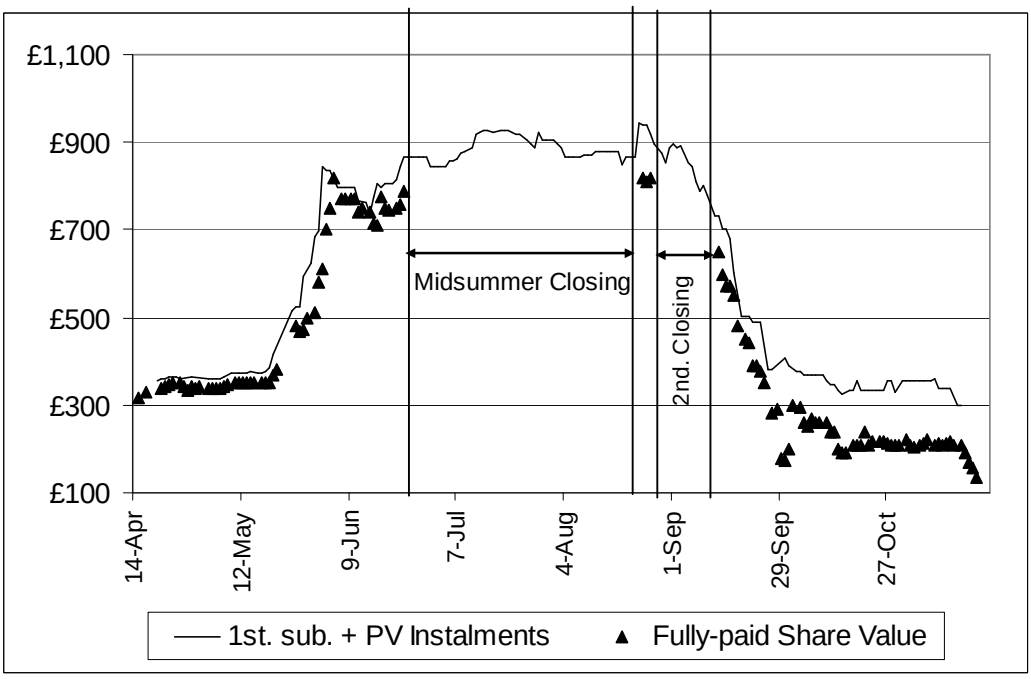

FIG. 3 South Sea Fully-Paid Share Values versus 1st Subscription Share Values, 1720

The option to default is a put option, but the principle of put-call parity states that when we have a put option, we can define a corresponding call option that has the same exercise price as the put and whose value is directly calculable from the value of the put. It is that corresponding call option whose values we have successfully modelled and estimated in our previous work (Shea, 2007b). It is on the basis of the success we have had in modelling the values of the South Sea subscription shares with the compound call option model that allows us to conclude that we have also successfully explained the value of the default/put option possessed by South Sea subscription shares. The values of the default option we have modelled fits very well, like a wedge, between the values of fully-paid shares and the values of subscription shares in Figure 3.

It is not surprising that the subsequent history of the South Sea subscription shares was largely one of default. In time even the legality of the subscriptions became an issue of debate. The subscriptions were eventually wound up and folded into the reorganised share equity of the firm in 1721 after having raised only a small

portion of the cash they were intended to raise. Most of the cash itself appears to have disappeared not into real investments, but into the Company's own schemes to support the market values for its shares in 1720. More differently contrasting histories of the two subscription schemes, in terms of intelligence in design, execution and honesty of purpose, cannot be imagined than the two separate histories of the Royal African and the South Sea companies' schemes.

Conclusions

Textbook exercises in corporate finance show the student the many ways in which new equity can be raised in efficient markets without any adverse effects upon original shareholders' wealth. A good example is the issue of shares by rights to original shareholders. It makes no difference what the rights price is, whether it is above market value or book value of shares, the effects of the rights issue are always wealth-neutral because the firm's equity remains 100 percent-owned by the original shareholders. The problem of the refinancing of the Royal African Company in 1720 was that its original owners were not numerous enough nor wealthy enough to provide the four-fold expansion in equity that was required by the firm's management. The Royal African's solution to this problem was the issue of an innovated security that was priced and managed in ways that allowed it to be sold to such large numbers of new capitalists so that it could raise a fund to compensate original shareholders for the foreseeable declines in the value of their shares. The new equity raised was transparently applied to extinguish debts and to make a cash payout to original shareholders so that their wealth was unaffected and, most importantly, could be foreseen to be unaffected. The result was that an easy-to-understand arbitrage relationship between original shares and the innovated subscription shares was established. The evidence shows that any profitable arbitrage opportunities were

efficiently extinguished in the stock markets of 1720. A close modern parallel to the Royal African case is the efficient arbitrage between fully-paid shares and instalment receipts found in many Commonwealth countries today (see Pinder, 1998 and Charupat and Prisman, 2004).

In the South Sea Company's case the innovated securities, the subscription shares, had a different design and were certainly applied to very different uses than were the Royal African subscription shares. Yet the evidence shows that these securities were also the objects of no less efficient arbitrage than were the Royal African subscription shares. The South Sea subscription shares fall somewhere between modern instalment receipts and the shares of modern no-liability (NL) mining companies (Morris, 1997). In the pricing of modern instalment receipts there is a detectable cost to preventing default, but it is very small. The largest component of any premium that is commanded by modern instalment receipts stems from the access to investment opportunities they provide to any investor who might be credit-constrained (Charupat and Prisman 2004). It appears that South Sea subscription shares were similarly attractive to credit-constrained investors (Shea 2007a). But unlike modern instalment receipts, the costs of preventing instalment defaults on South Sea subscription shares were huge. In this way they were more like instalment shares in NL mining companies, for which there is no provision for the prevention of default (Morris 1997). Because the South Sea Company set issue prices so very high relative to the market value of fully-paid shares, the default option contained within their subscription shares became quite valuable. Yet it appears that these options too were adequately valued so that no profitable arbitrage opportunities arose between South Sea subscription shares and fully-paid shares.

We conclude then that the best evidence collectible on arbitrage in 1720 suggests that, upon a comparison of two distinct, but related markets for innovated

securities, the stock markets were efficient. This does not say that we have identified an intertemporal fundamental that was driving the South Sea Bubble, nor does it say that we have indirect evidence that such a fundamental was being efficiently priced. But it does say that at least a simple form of market efficiency was present and made sure that the *relative* prices of identifiable, but not perfect, security substitutes were efficiently determined.

We close now with some more widely ranging observations on the aftermath of the South Sea Bubble for British finance in the 1720's. It is indisputable that in 1720 and 1721 there was a crisis in payments systems and the provision of credit, at least in the short term. What becomes increasingly questionable, however, is the longer-term impact of the crisis upon provision of credit. Some of the traditionally-cited evidences on the economy-wide impact of the South Sea crisis may themselves be suspect; Hoppit (2002), for example, argued that petitions to Parliament after the South Sea crash bear all the marks of a centrally-organised political campaign rather than being reflections of economic conditions in the provinces. Here and there are evidences of robust credit conditions in the 1720's. Carlos and Neal (2007) have analysed the remarkable resilience of the network that provided equity finance to the Bank of England after the South Sea crash. Bogart (2009) has recently shown that the 1720's contains one of the significant spikes in turnpike investment activity. A closer study of the credit conditions surrounding this particular investment spike would be of great interest. And finally the case of the Royal African Company in the 1720's should be added to these observations. Here was a company whose finances were not only revived in 1720, but also survived the collapse of the South Sea scheme. The few years after 1720 in which this firm was able to maintain its equity base, access to credit and to carry on in a very risky (and ultimately doomed) line of business hardly argues that the South Sea Bubble was disruptive to credit in the long term.

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Appendix A

T70/101 Minutes of the General Court 1678-1720

[page 196 verso]

Gen.l Court of y.e 8.th of Aprill 1720 Continued

Then the Indenture of Agreement was read under the Common Seal of this Company made the Seventh day of this Instant Aprill between the Company of one part and the said Joseph Taylor of the other part as follows. Viz.t.

This Indenture made the Seventh day of Aprill in the Sixth Year of the Reign of Our Sovereign Lord George by the Grace of God of Great Britain - France and Ireland King Defender of the faith cr(?) Anno. Dom. 1720. Between the Royall African Company of England of the one part and Joseph Taylor of London Gent.n of the other part Whereas by reason of many Losses sustained by the said Company during the late Warrs and other Casualtys the Stock of the said Company hath been so Impaired that after payment of their just Debts there would not remaine Sufficient for carrying on the Trade to Africa And Whereas the said Company are greatly desirous that all their Debts may be speedily and fully satisfied and that there may be a sufficient clear Stock made up for carrying on the said Trade in its utmost Extent the said Company Have for that purpose Agreed with the said Joseph Taylor And it is by these presents agreed by and between the said Company and the said Joseph Taylor as follows viz. That the present Capitall Stock of the said Company being Four hundred Thirty Thousand and four hundred pounds [page 197] or Four Thousand three hundred and four Shares shall be made up two Millions or Twenty Thousand Shares by Ingraftm.t or addition of the sume of One Million five hundred Sixty nine Thousand Six hundred pounds new Stock or Fifteen Thousand Six hundred and ninety Six new Shares which

said new Stock or fifteen Thousand Six hundred and ninety Six new Shares is and are hereby Created and Added to the said present Capitall Stock or four thousand three hundred and four Old Shares and make up the said two Millions or Twenty Thousand Shares And That upon the said Ingraftment the Dead and Quick Stock to be used and imployed in and for the immediate carrying on of the said Trade shall be made up Five hundred thousand pounds in such manner as is hereafter sett forth which is after the rate of Twenty Five pounds for and in respect of each Share or one hundred pound Stock of and in the said Capitall Stock of Two Millions and according to that rate the proportion to be Continued in the said Trade for and in Respect of the said Four thousand Three hundred and four Old Shares amounts to One hundred Seven thousand Six hundred pounds and the proportion to be made good for and in Respect of the said fifteen thousand Six hundred and Ninety Six new Shares amounts to Three hundred ninety two thousand and four hundred pounds [page 197 verso] And that the propriety of all the Countrys Dominions Lands Franchises Privileges and other things granted by Charter to the said Company w.th all Forts Factorys and Settlements and all Stores Aminition furniture Castle Slaves and other materialls and things commonly reported or called the Dead Stock of the said Company shall be Estimated at Two Hundred Thousand pounds and the present Quick Stock of the said Company consisting of Goods Merchandize Shipping & Debts oweing to the said Company in England Africa and the plantations and elsewhere shall be Estimated at Forty Thousand pounds making together two hundred and forty thousand which is hereby agreed to be the Value of the present Quick and Dead Stock belonging to the Proprietors of the said four Thousand three hundred and four Old Shares and is agreed from henceforth to belong to the Proprietors of the said Two Millions or Twenty thousand shares which said Sume of Two hundred and forty thousand pounds being One hundred Thirty two Thousand four hundred pounds above the said Sume of One

hundred Seven Thousand and Six hundred pounds the proportion to be continued in the said Trade for and in [page 198] respect of the said Four thousand three hundred and four Old Shares as aforesaid the sume of One hundred Thirty two thousand four hundred pounds is to be paid or satisfied in such manner as is hereinafter mentioned to or for y.e Use or benefit of the said Proprietors of the said four thousand three hundred and four Old Shares by and out of the said Sume of Three hundred ninety two thousand four hundred pounds which is to be paid for and in respect of the said Fifteen thousand Six hundred & ninety Six new Shares as is also hereinafter mentioned **And That** the Sume of Eighty Thousand pounds part of the said Sume of One hundred thirty two Thousand four hundred pounds to be paid or made good to or for the Use or benefit of the said proprietors of the said Old Shares as aforesaid shall be paid or satisfied as followeth (that is to say) the Sume of Seventy five thousand Six hundred and ninety Six pounds part of the said Sume of Eighty Thousand pounds shall be paid by the said Joseph Taylor to Henry Neale James Blake Andrews Hopegood & Rich.d Lockwood of London Esq.s and Jacob Watchter of London Merchant within one and twenty daies next after the day of the date of the presents upon **Trust** [page 198 verso] That the said to Henry Neale James Blake Andrews Hopegood Richard Lockwood and Jacob Watchter and the Survivor & Survivors of them & the Exec.s and Administ.s of such Survivors shall forthwith pay over and apply the same towards discharge of the debts now due from the said Company in England and particularly mentioned in a Schedule hereunto Annexed & procure Sufficient Releases or discharges of the said Debts and deliver the same to the Court of Assistants of the said Company and the said Henry Neale James Blake Andrews Hopegood Richard Lockwood and Jacob Watchter and the Survivors & Survivor of them and the Exec.s and Administ.s of such Survivor is and are hereby impower'd to settle and adjust such of the said Debts as are not yet adjusted and thereupon to pay

the Same and take Releases or Discharges and deliver over the same as aforesaid And the Sume of £4,,304,, residue of the s.d Sume of £80,,000,, shall be deducted and retained by the said Joseph Taylor for his own Use and benefitt in full Satisfaction as well of all the Costs Charges and Expences the said Joseph Taylor has been put to as in [page 199] Recompense for the Great Pains and trouble he hath taken and undergone in Setting on foot carrying on and perfecting this Agreement **And That** the sume of Fifty Two Thousand four hundred pounds residue of the said sume of One hundred Thirty Two Thousand four hundred pounds shall be paid by the Court of Assist.s of the said Company for the time being to the said Henry Neale James Blake Andrews Hopegood Rich.d Lockwood and Jacob Watchter or the Survivors or Survivor of them or the Exec.s or Administ.s of such Survivor out of the Sume of £109,,872 hereinafter mentioned to be paid to the Court of Assistants on the 1.st day of Dec.r next Ensueing the date of these Presents **Upon Trust** That if any further debts now due from the said Company in England and not mentioned in the said Schedule shall within the Space of One Year from the day of the date of these presents appear to remain unsatisfied then the said Henry Neale James Blake Andrews Hopegood Richard Lockwood and Jacob Watchter and the Survivors and Survivor of them and the Executors and Administrators of such Survivor shall pay and Satisfie such debts out of the said Sume of £52,400 and take sufficient Releases [page 199 verso] or discharges for the same and deliver such Releases and discharges to the Court of Assistants of the said Company which s.d further Debts the said Henry Neale James Blake Andrews Hopegood Richard Lockwood and Jacob Watchter and the Survivors and Survivor of them and the Executors and Administrators of such Survivor is and are hereby also impower'd to Settle and adjust and after Satisfaction of all such Debts as aforesaid shall pay and devide of the Surplus of the s.d Sume of £52,400 for the said intire Sume of £52,400 in case no such further Debts shall appear

together with the Surplus of the said Sume of £75,,696 if any Surplus there shall be after payment of the said Debts to and amongst such as at the Closing of the Companys Bookes in Order to the Next Election of Sub Gov.r Dep.t Gov.r or assistants shall appear to be ?? Proprietors of the said £430,400 Old Stock or 4,304 Old Shares or their respective Exec.s Adm.s or Assignes ratable and in proportion to their Severall and Respective Interests of and in the said Old Stock or Shares **And it is** further agreed that the said sume of £392,,400 [page 200] New Shares as afores.d shall be paid or Satisfied by af.d Jos Taylor or his Ass.s in manner following that is to Say the said sume of £4304 being the proportion to be made good for and in Respect of the said £15,,696 part of the said Sume of £80,,000 being deducted and retained to himselfe as aforesaid and the Sume of £75,,696 pounds residue of the said Sume of £80,,000 being paid by the said Joseph Taylor to the said Henry Neale James Blake Andrews Hopegood Richard Lockwood and Jacob Watchter **In Trust** as aforesaid the further Sume of £45,,568 pounds shall be also paid by the said Joseph Taylor within Three dayes next after a New Choice of Sub Gov.r Dep.t Gov.r and Assistants shall be made as is hereinafter mentioned unto Such Court of Assistants to and for the Use of the said Company and to be Imployed towards carrying on of the said Trade w.ch said Two Sumes of £80,000 and forty five Thousand five Hundred Sixty Eight pounds make the Sume of One Hundred Twenty five Thousand five hundred Sixty Eight pounds which is after the rate of Eight pounds part of the said Twenty five pounds to be paid for and in respect of each Share, or one hundred pounds Stock of the s.d 15,696 new Shares or £1,569,600 new Stock and the Sume of [page 200 verso] £266,832,, residue of the said Sume of £392,400 shall be paid by the said Joseph Taylor or his respective Assignes in Proportion to Each of their respective Shares or Interests in the said New Stock of £1,569,600, or 15,,696 new Shares to the Court of Assistants of the said Company for the time being in manner following (that is to say)

the Sume of £78,480 part thereof being after the rate of five pounds for and in Respect of each Share of the said 15,696 new Shares on or before the first day of June now next ensuing £78,480 more thereof (being also after the rate of £5 p Share) on or before the first day of Septemb.r now next ensuing and £109,872, residue of the said £266,832, (being after the rate of Seven pounds per Share) to make up the said Twenty five pounds per Share on or before the first day of Decemb.r now next ensuing out of which said last mentioned Sume of £109,872 the Court of the Assistants of the said Company shall pay the said Sume of £52,400 to the said Henry Neale James Blake [page 201] Andrews Hopegood Richard Lockwood and Jacob Watchter or the Survivors or Survivor of them or the Executors or Administrators of such Survivor **In Trust** as aforesaid and in full Satisfaction of the said Sume of £132,400 to be made good to the said Proprietors of the said 4,304 Old Shares as aforesaid And the s.d Sume of £132,400 being so paid and made good to or for the Use or benefitt of the said Proprietors of the said 4,304 Old Shares out of the said Sume of £392,400 as aforesaid and being deducted from the said Sume of £39,400 there will remain the Sume of £260,000 to and for the use of the said Company which being added to the said Sume of £240,000 the Value of the present Dead and Quick Stock of the s.d Company as aforesaid makes up the said Sume of £500,000 intended to be Used and Imployed in and for the imediate carrying on of the said Trade as aforesaid **And** it is hereby further agreed by and between the said Company and the said Joseph Taylor That upon Payment of the said Sume of £75,696 by y.e s.d [page 201 verso] Joseph Taylor to the said Henry Neale James Blake [page 201] Andrews Hopegood Richard Lockwood and Jacob Watchter within One and Twenty days now next Ensuing as aforesaid The said £1,569,600 new Stock or fifteen Thousand Six hundred & Ninety Six New Shares hereby Created as aforesaid shall be and the Same is and are hereby agreed to be from henceforth vested in the s.d Joseph Taylor and the

said Joseph Taylor shall have Creditt for the Same in the said Company Books the better to Enable him to transfer the same in Books to be prepared for that Purpose to Such person and persons and in such proportions as he shall think fitt Subject and Lyable to such further paym.t in respect of each Share as aforesaid or in default of such Payments to such forfeiture as is hereinafter mentioned for which Transfers so to be made by the said Joseph Taylor the Cost of the Stamps only shall be paid by y.e person who shall Accept the said Stock [page 202] **And That** y.e person or persons to whome the s.d Joseph Taylor shall Assigne or Transfer any of the said £1,569,600 new Stock or 15,696 new Shares as aforesaid shall upon their respective acceptance thereof be admitted into the freedome of the said Company (taking the usual Oath) and from the time of such admission shall have the Privilege of Voating in any Gen.ll Court of the said Company and shall be capable of being Elected Sub Gov.r Dep.t Gov.r or Assistant if qualified by having Creditt for so much Stock as is Requisite for those respective purposes according to the By Laws of the said Company **Provided** nevertheless and it is hereby agreed that of default shall happen to be made of or in payment of any of the s.d Subsequent Payments of £5, £5, & £7 per Share as aforesaid or any part thereof at any of the respective times herein before Limited for Paym.t thereof Then and in such case the respective Share and Shares only wherein or in respect of which such default shall happen to be made and all such moneys as shall have been paid to y.e s.d Company upon Account of such Share and Shares [page 202 verso] Respectively shall be and remain forfeited to and for the benefitt of the said Company And the person & persons so making default shall from henceforth forfeit and Loose the said privilege of Voting and be disabled from being Elected or Continuing Sub Gov.r Dep.t Gov.r and Each Member of the present Court of Assistants shall at any time or times after payment of the said Sume of Seventy five thousand Six hundred ninety Six pounds by the said Joseph Taylor to the said Henry

Neale James Blake Andrews Hopegood Richard Lockwood and Jacob Watchter as aforesaid upon the request of the said Joseph Taylor disqualify themselves respectively to hold the s.d Respective Offices so as that new Elections may form time to time be made by the Gen.l Court of the Proprietors of the said Capitall Stock of £2,000,000 or Twenty Thousand Shares according to the method prescribed by the said Companys Charter to Supply such Vacancys as shall be made by such disqualifications and [page 203] fill up the said Court of Assistants **In Witness** whereof to one part of these presents The said Royal African Company of England have caused their Comon Seale to be put and to the other part of these presents the said Joseph Taylor hath sett his hand and Seal the day and year first above written.

{There then follows a schedule of the Company's debts to the end of page 204. Then on page 204 verso the concluding text resumes.}

Whereupon It is ordered Nemine Contradicente that the Thanks of this Court be given to the Court of Assistants for their care and trouble in negotiating the said Agreement with M.r Joseph Taylor and bring the Same to a happy Conclusion.

And it is Order'd that the said Sume of £9,360 residue of the said Sume of £52,400 or so much thereof as shall remain after Satisfaction of the said Sume of £43,040, as aforesaid shall be paid by the said Trustees to the said Henry Neale Esq.r Andrew Hopegood Esq.r and Robert Wood D.L.L. as a Compensation for their pains and Trouble in Negotiating and perfecting the Agreement with the said M.r Joseph Taylor and to Enable them to gratifye such Persons as in their Judjment have been servicable to the Company in such manner as they in their discretions shall think fitt.

Appendix B

T70/115/199, *Report of the Trustees of the Proprietors of the Old Stock, Submitted to the Committee of Accounts of the Royal African Company, April 30, 1724*

[page 119]

At a Committee of Accounts Thursday April 30 1724

Pursuant to an Order of the Court of Assistants of the 27 day of June last to Us the Committee of Accounts to Examine the accounts of the Trustees for the Old Proprietors and to Report how far we find the said Trust has been perform'd, and what remains to be done to Compleat the Performance thereof------

{A lengthy précis of the Indenture Agreement described in Appendix 1 then follows to the bottom of page 121 verso, which is then followed by}

And We have examined the accounts of the Trustees which they have laid before us in a Book mark'd **A** containing forty Pages and Intitled
[page 122]

The Account of Henry Neale, James Blake, Andrew Hopegood, Richard Lockwood of London Esq.rs and Jacob Wachter Merch.t , of their application and payment, and also of what remains unpaid of the moneys received by them; in pursuance of an Indenture dated 7th April 1720, made between the Royal African Company of England, and Joseph Taylor of London Gentleman upon the trust therein mention'd…….

Whereby We find they have charged themselves with the said Sum of £75,696 in account of Cash received of the said Mr. Taylor pursuant to the said Indenture of Agreement £„75,696

33,080„15„8		
1,555„18„3	And with the sum of £35,595„7„11 for Dividend Warrants	
653„14	Paid by the Company to Sundry Proprietors of Old Stock, the	
105	Particulars whereof are set forth in the said Book **A** page 14	
35,595„7„11	to page 40 inclusive……..£35,595„7„11	
	And Cash received of the Company…..……10,000„-„-	
		45,395„7„11
	So that the whole sum receiv'd by the said Trustees is…..	121,091„7„11
	And there remains unpaid by the Company to compleat the	
	said £52,400 the sum of…..	7,004„12„1
	Which with the sum retain'd by Mr. Taylor pursuant to	
	the said Indenture of Agreement being	4,304
	Makes up the Sum mentioned in the said Agreement to	
	Be paid for the Benefit of the Proprietors of Old Stock….	132,400„…„…
	And in Discharge of the said Sum of £121,091„7„11 so received by the said Trustees as aforesaid Wee find by their said accounts that towards satisfaction of the said Debts mentioned in the Schedule annex'd to the said Indenture of Agreement which with Interest amounted to £75,359„…„10 3/4	

They have paid several sums the Particulars whereof are set forth in the said Book

Mark'd **A** page 1 to 4 inclusive….	£71,427„9„2 3/4	
And for charges in the Execution of the Trust….	30„11…	
		71,458„…„2 3/4

And to several Proprietors of the said 4,304 old shares for their Dividend of £10 p Cent thereon, the Particulars whereof are set forth in the said Book Mark'd **A**

[page 123] page 14 to page 40 inclusive	£35,395„7„11	
and to Mr Neale, Mr Hopegood, and Dr Wood pursuant to the said Order of the General Court	9,360	
		44,755„7„11
The several Sums so paid by the Trustees amount to…		116,213„8„1 3/4

And they are to pay the company for Balance of their Account..		4,877„19„9 1/4
And that makes up the sum wherewith the Trustees stand charged being…		£121,091„7„11
Which sum to be paid by the Trustees to the Co. vizt. the sum of		£4,877„19„9 1/4
being added to the Sum the Co. have paid short of the		
£52,400 to the Trustees which is….		£7,004„12„1
Will make the Sum in the Company's hands…		£11,882„11„10 1/4

Which is for the following accounts vizt.

Of the Debts mentioned in the Schedule annexed to the said Indenture of Agreement computed at £73,463„1„10 and amounting with Interest to £75,359„…„10 3/4 there are several which have not been called for and it is doubtful whether all of them are due, but if they should be demanded and made out, the Company is answerable for 'em the Particulars whereof appear in the said Book Mark'd **A** Page 1 to pa: 4 Inclusive & amount to….. £3,481„11„8

And there are three Sums amounting to £450 charged as Debts which upon Examination were found to be owing vizt.

Lent ni 1718 to be paid in Guinea…	£200	
Borrowed of Mr. Richard Mead ni 1719	200	
Due to Several Persons on the Loan £50,000 wch. was but £49,950 so there is overcharged	50	£450„…..
And the forementioned Sums amounting to	£3,931„11„8	
And what the Trustees paid on Account of the Debts in the said Schedule being	71,427„9„2 3/4	
and for Charges in Execution of the Trust….	30„11	
making together…….	75,389„11„10 3/4	
fall short by……	306„8„1 1/4	
of making up…….	75,696„….„….	
Which the Trustees receiv'd of Mr Taylor, and therefore there remains for the use of the Company that Sum of ……		£306„8„1 1/4
And as the Trustees have charged the Sum of	£43,040	
the Amount of the Dividend of £10 p. Cent on the Old Stock no more paid than…….	35,395„7„11	
there remaining	7,644„12„1 which	£4,237„19„9 1/4

[page 124]

Which the Company is to pay when demanded the particulars whereof are
in the s^{d}. Book Mark'd **A** page 1 to 40 inclusive…. } 7,644„12„1
& this makes up the before mention'd Sums in the Company's hands… £11,882„11„10 1/4

And upon Examination **Wee** find that Discharges as well for the said Debts paid
By the Trustees amounting to £71,427„9„2 3/4 as also for the s^{d}. Dividend of £10
p Cent. Amounting to…….£35,395„7„11 are Lodged with the Company's Accountant
or Cashier --- And We do not find, that any further Debts due from the Company in
England at the time of the said Agreement have appear'd to remain unsatisfied,
Except the three following Debts vizt.

To Duncan M'Laughn late Sailor in the Dorothy as p Warrant No. 2205 of 8 August 1723……..	17„11
Thomas Brown Att^{o}. to Robt. Aylmer Adm^{r}. to Ger^{d}. Aylmer late Surgeon of the Union deceas'd as p Warrant No. 2331 of the 3^{d}. October	55„15„5
Eliz^{a}. Bennet Exexcu^{x}. to John Bennet who was Adm^{r}. to Tho: Bennet late Factor at Accra	71„18
	£145„4„5

Which are to be paid by the Company out of the beforemention'd monys in their
hands. **And** therefore, **Wee** are of the **Opinion** that the said Trustees have so far
perform'd their said Trust, that there remains only the said Sum of £4,877„17„9 1/4 to
be paid by them to the Company, for the Uses and purposes afores^{d}. to compleat the
Performance thereof: **All** which is nevertheless submitted to the Judgement of the
Court.

Appendix C: A Brief History of the Equity Capital of the Royal African Company, 1674-1750

The Royal African Company was a limited prototype of the great moneyed company of the early 18th Century. As it was formed in 1671 this company was a reorganised monopoly on the English African trade. This meant that the firm had monopoly rights to trade from certain West African trading posts (factories) with England. The trade was practically carried on as a triangular trade between West Africa, the Caribbean and South America and England. The firm had occasional dealings with various holders of the *Asiento*, the Spanish grant of monopoly rights to bring slaves into Spain's South American and Caribbean possessions.

The Company lacked one significant feature of the later moneyed companies, such as the East India Company; it never held loans to the government or Crown as a large portion of its assets. The Restoration Crown's finances were certainly embarrassed when the Royal African Company was reorganised, but the Crown never looked to the Company as a means of restoring its credit except through limited participation by courtiers in the share equity and the revenues that would be generated via taxation on the African trade. In other significant respects, however, the Company bears comparison with its most notorious moneyed successor, the South Sea Company. The Company was reformed after a potentially lucrative trade with Africa had been destroyed in the Second Dutch War. It was in anticipation of the restoration of peaceful trade, with newly-secured trade rights associated with a share in the *Asiento* contract, that the Company was reformed. It was founded upon hopes and anticipations very similar to those on which the South Sea Company's trade was to be founded in 1713.

Kenneth G. Davies used the extensive collection of Royal African Company records (class T70) at the National Archives (NA), Kew, to research his book, *The*

Royal African Company. It is that book and those NA records that are the sources for the following capital history.

The original share equity in the Company came from the reorganised share equity in the earlier Company of Royal Adventurers Trading to Africa. Further share equity was issued to former creditors to that Company and shareholders from the once competitive Gambia Adventurers. We can start tracing the value and size of this capital from 1674. At that time there were 1100 shares on which £100 had been paid. These shares we take as our standard shares.

We need to define standard shares so that we can understand share values and payouts over long periods in which there were changes in the definition of nominal shares in the Company's stock. We keep track of these changes with the use of an adjustment factor. One way to think of what the adjustment factor achieves is that it corrects for changes in the definition of nominal shares when such changes have, at least in part, no effect on the wealth of a shareholder. There are a large number of possible changes in shares that require new adjustment factors. Share splits, share bonuses and share amalgamations are the obvious cases. But rights issues or share repurchases at rights prices or repurchase prices different from the current market values of shares also require changes in the adjustment factor. Share prices and dividends on what we call standard shares are simply values and payouts for nominal shares multiplied by the adjustment factor. The number of standard shares issued and outstanding is the number of nominal shares divided by the adjustment factor. The Royal African Company's equity capital underwent a number of definitional changes that we have to take account for using such adjustment factors.

After first setting our adjustment factor to 1 in 1674, we have to account in 1691 for the effects of a 300% stock bonus. This is just the same as a four-for-one stock split. It of course takes the nominal shares from 1100 in number to 4400 and cuts the

price of nominal shares by three quarters, but exercises no influence on shareholder wealth. This event requires us to make the adjustment factor 4 in order to correct fully for the wealth-neutral effects of this event.

In March 1693 there was 1-for-2 rights issue at £40 per nominal share when market prices were slightly higher than that.[21] Only about 2/3's of the issue was taken up. Then there was a 1-for-1 rights issue in 1697 at £12 per share that could be paid for in instalments that stretched to early October 1698. Using a series of share prices from Houghton's *A Collection of Letters for Improvement of Husbandry and Trade,* and from some of the earliest issues of *The Course* we can observe that the rights prices implied by these instalments were just a bit below nominal share prices. Therefore the measured adjustment factor drifted above 4 by the end of the 17th Century.

In December 1702 the Company started to make calls upon shareholders.[22] The first, of £6 per share, was due in March 1703. In June 1704 there was another call of £7 per share that could be paid in three instalments, the last of which was not due for payment until March 1705. In April 1707 there was a further call of £4 per share. When matched with prices of shares closest to the dates on which all these calls were due, the resulting alteration in the adjustment factor brings it back down to a value just below 2.

In September 1712 the Company was poised for what was hoped was to be a revival of its fortunes in anticipation of the peace to follow the War of the Spanish Succession. The parlous state of its finances, however, made a wholesale reorganisation of its capital necessary. In December 1712 there was a £3-per share call. With the substantial concessions granted for early payment of the call it appears

[21] Scott (1912), Vol. 2, p. 26.

that the actual call amounted to about £2.3 per nominal share. The price of nominal shares at the time was about £3.5. At the same time (January 1713), nominal shares were amalgamated on a 1-for-10 basis. This reduced the number of nominal shares back to something like the number of original shares (1009) in 1674. To make matters no less complicated, the Company then declared a 50% stock bonus upon which £100 (per bonus share) was immediately called. All these machinations greatly deflated the adjustment factor, but in the end there was no substantial change in the number of original shares issued and outstanding. The only substantial change in that regard in 1713 came with a conversion of about 3000 Company bonds into shares.

The next major change in the Company's capital came during the South Sea Bubble. In April 1720, when there were 4304 nominal shares, it was proposed that 15,696 new shares were to be publicly issued at £25 per share. As it was, about 15,519 such new shares were issued. Prices for nominal shares were currently between £60 and £65 per share. The reason why original shareholders could agree to such a public issue was that a portion of the proceeds (£52,400) coming from it was to be used mostly to pay them a cash dividend that could amount to as much as £10 per nominal share. Another portion (£75,696) was to relieve proprietors of liabilities they had incurred in support of the firm.[23] So, even though their original shares were to be eventually treated equal with new shares that were being publicly offered at £25 per share, they would have cash in pocket and their original shares that had a total value of a bit more than £60. This was just about the market value for original shares before the public offer was made. The offer was made during the course of the South Sea

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[22] It was quite common in company charters that shareholders' liabilities were not strictly limited. Companies could demand, from time to time, payments from shareholders. These were termed "calls".

[23] DuBois (1938), p.394. DuBois somewhat misleading attributes the payment of £75,696 to the firm's creditors. This is only strictly true in the sense that the Company could and did compel shareholders to lend money to the firm as well as making further calls on shares. Many shareholders were also active as licensed traders and would undertake personal liabilities to advance the interests of the firm.

Bubble and Royal African share prices were as buoyant as prices of many other shares. The effect on the adjustment factor of the public share offer at below-market prices was quite substantial. The adjustment factor was slightly less than 0.06 in the years 1713-19, but had more than doubled to 0.142 by EoY 1720 and stood at 0.146 by EoY 1721.

In November 1722 there was a 5 percent call upon shares. It was to be paid in two instalments; one 2 percent instalment to be paid by 20 December 1722 and the other 3 percent instalment to be paid by 1 March 1723.[24] Just prior to these dates we have nominal share prices around £7.5 and £7.6 respectively, which we use to deflate our adjustment factor. By the end of 1723 there was a 1-for-2 amalgamation of shares[25] that cuts the adjustment factor in half. At the same time there was a rights issue that resulted in about 1920 new nominal shares. Since the rights terms were very close to market terms, there was no effect on the adjustment factor.

In March 1727 there was a further 1-for-8 amalgamation of shares and then a further 5 percent call on shares in April. Even after the March amalgamation of shares the April price of shares was only about £8.75 so that by this time the adjustment factor that creates standard shares of 1674 has become practically microscopic. The final equity-capital event for the firm before its dissolution in 1750 is a 10 percent stock bonus in 1733.

The graphs below depict end-of-year (EoY) values for our calculated adjustment factor and the resulting numbers of standard shares. EoY share value data are taken variously from Houghton, Freke or Castaing. EoY payouts are constructed from several sources; the early payout history for the Company (1672-1702) is found in the General Court Minutes (T70/100 and 101). Records of subsequent payouts are to be

[24] T70/180, front cover.
[25] T70/1180.

found in T70/1186, *Rough Drafts and Copy Book A*.[26] The graphic depictions below for values of payouts and shares pertain to standard shares of 1674.

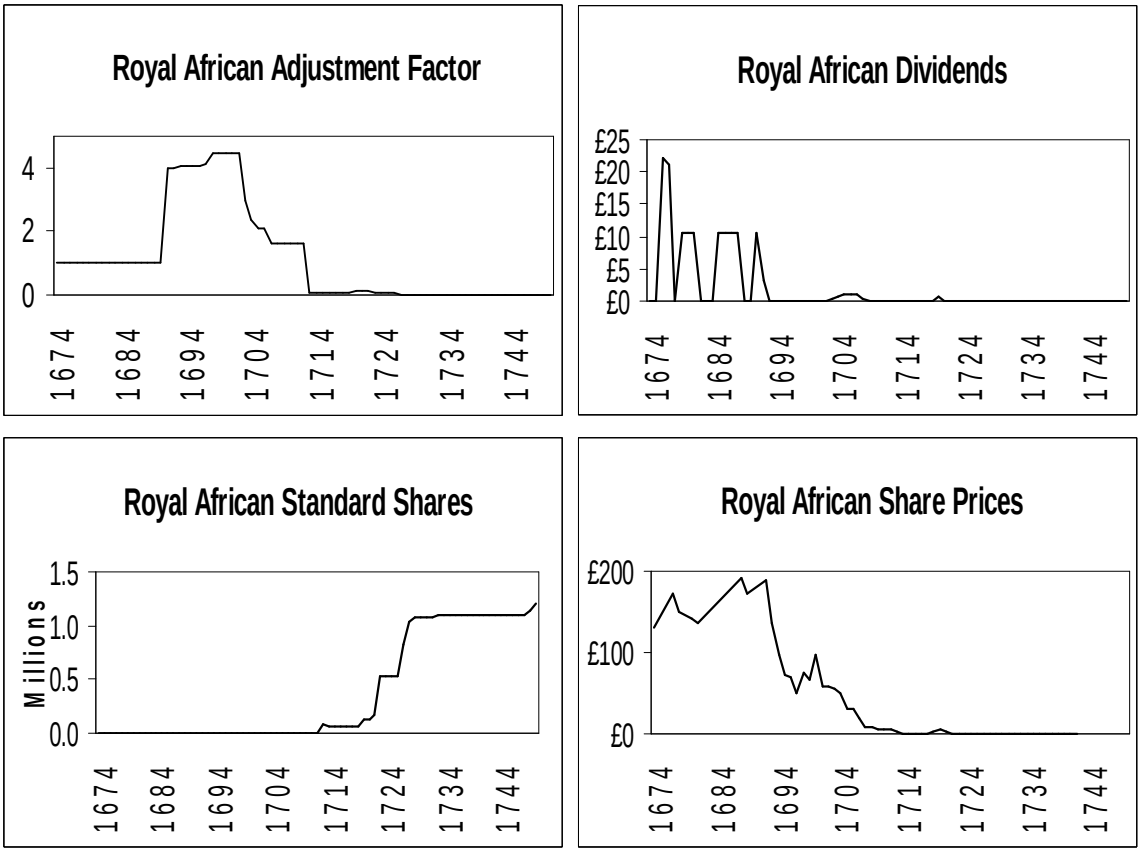

FIG. D.1 Adjustment Factors, Total Numbers, Dividends and Values of Royal African Company Standard Shares

[26] 'Dividends made', p.132.

Appendix E: Royal African Company Data and Interactive Graphs, 1720-1

The Excel workbook associated with this Appendix contains two worksheets. One worksheet contains two graphs, one for 1720 and one for 1721, which are interactive in the sense that they have hot-buttons with which the graphic data can be changed. The other worksheet contains the actual data that the graphs employ.

The hot-buttons control: i) the size of the expected dividend on original, fully-paid Royal African shares; ii) the data source (either Freke (1720-1) or Castaing (1720-1) and iii) whether the value used was the first value printed for a particular day ("early") or was the last value printed for a particular day ("late"). Neither of the price courants define clearly what different quotations for any particular day meant. They could be associated with their timings during the day. Or the different quotations could have been associated "highs" and "lows" without regard to when they appeared in the day. We make available these different values, however, because we do believe they reflect in someway the range of intraday variation in the data. Present-value calculations use the yield on the shortest-term East India Bonds that could be found, which we take as the best proxy available for a low-risk required rate of return.

The graphs are primarily intended to illustrate the influence of expected dividend on the arbitrage bound discussed in the main body of this paper. We believe they are a far more powerful and direct means of supporting our arguments than are any econometric analyses that could be undertaken.