The Cost Of Transporting Slaves to the Caribbean, 1683 - 1686

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The number of slaves carried off from Africa to the Americas increased fivefold between the middle third of the seventeenth century and the last third of the eighteenth century – the point at which the transatlantic slave traffic reached its all time high. In this one hundred and thirty year period captive Africans became by far the most important stream of migrants in the re-peopling of the Americas. Slaves went from less than half the transatlantic movement of people in the late sixteenth century to over eighty percent in the late eighteenth century. This dramatic shift made the sub-tropical plantations Americas the high-income core of the New World. The demand for slaves derived from the demand in Europe for sugar, sugar- related products, coffee, rice, tobacco, and indigo which increased between four and five times in the first seventy years of the eighteenth century. Historians and economists have filled out the picture of the demand side of this expanding market for slave labor quite well. Economic growth in England over the period 1700 to 1770 was modest in both aggregate and per capita terms. In this period Gross Domestic Product grew by 60 percent and population by 30 percent.[1] At the same time the consumption of sugar (by far most important plantation crop) increased 350 percent.[2] A high income elasticity of demand for plantation produce may be assumed. That, combined with secular improvements in the productivity of plantation agriculture contributed to a major expansion of the slave economy in the Americas.[3]

The supply side of the transatlantic market for slaves has received much less attention than the demand side - especially in the second half of the seventeenth century when the dramatic growth got underway. What exactly was the cost structure of the transatlantic slave market in the late seventeenth century? The issue of costs has entered the debate on the profitability of the slave trade with the more recent literature suggesting that excess profits, at least in the long run,

were unlikely because of competition.[4] And indeed work on some eighteenth-century accounts supports the findings for the earlier period that firms involved in the slave trade were doing little more than covering their costs.[5] But the focus on profitability may obscure a more fundamental aspect of the forced migration Africans to the Americas, namely the role of transport costs in determining the prices of slaves on both sides of the Atlantic and the number of people transported.

This paper, following on the work of Eltis, Richardson, Galenson and others, itemizes those factors that contributed to the cost of transporting the enslaved Africans, and measures the contribution of these costs to the difference between the prices of the slaves on the two sides of the Atlantic.[6] We analyze twenty-two voyages that left London between 1683 and 1685. Considerable use is made of the Eltis et al., *Slave Trade Database*; but our estimates rely mainly on the direct use of the manuscript records of the Royal African Company (RAC), which we combine with the *Database* to produce a close to complete picture of the various costs of each of the slave voyages. During the 1680s the RAC conducted much of its trade using hired ships, and the accounts describe the various payments made by the RAC both to the owners of the ships and the ship captains.[7] Importantly the records detail, in addition to these payments, the other expenses incurred by the RAC. The records also allow us to derive the earnings from activities related to the slave trade, most importantly the trade in gold and the transport of sugar. Although our starting point is the *Slave Trade Database*, we rely for the cost estimates primarily on the following Royal African Company records: the invoices of goods for purchasing Negroes in Africa; the accounts of the slave auctions in the Caribbean; and the RAC Copy Book of Accounts, which reports the amount paid to the ship owners for the transport of slaves and sugar, and

includes accounts of the earnings from gold and ivory.[8]

There was little variation in the cost structure of the voyages; and so to illustrate the nature of the costs, we begin by outlining the accounts of a single voyage, that of the 150-ton *Bonadventure*, which sailed from London on April 21, 1683. On board were goods valued at £1,306 (sterling) for the purchase of gold on the Windward Coast, £710 worth of supplies for Cape Coast Castle on the Gold Coast, and £1,235 for the purchase of an intended 320 Negroes at Ardra on the Slave Coast in the Bight of Benin.[9] The *Bonadventure* arrived in Barbados on January 16, 1684. Sixty-four Africans did not survive the middle passage and another seven died shortly after arrival. Of the remaining 249, the RAC sold 184 on its own account, the ship owners received 56, and the ship's captain was paid 9 slaves. On the ship's return to London, the RAC settled the account with the owners, crediting then with having delivered 256 slaves. At a rate of £5 per slave,[10] the total due the owners was £1,280 from which the RAC deducted the value of the 56 slaves the ship owners had already received as payment. These slaves, which had been sold in Barbados on the ship owners' account, were each valued at £15 or £840 in total, so the amount still owing was £440.[11] The value of the gold that had been purchased in Africa was £1,679.[12] As was typical of these voyages, the ship owners supplemented their income by participating in the gold trade. On this voyage the ship owners had contributed £350 of the £1,306 cargo sent to purchase the gold, and they received a corresponding share, 26.8 percent, of the return, or £450. There were in addition some small payments and adjustments.

Most important to the returns from a voyage were the receipts from the slave auctions. There are detailed reports of the auctions; and many of these have been analyzed, notably by Galenson, and Burnard and Morgan.[13] The account of the *Bonadventure*'s slave auction, which

took place in January 1684, is presented in Table 1. Men, women, boys, and girls, were sold mainly in small groups, and given the detail of the accounts it is possible to compute a price for each category of slave for each sale. For example, in the second sale listed, eight men and two women sold for £180 (Barbados currency), with payment due in seven months. Applying an annual discount rate of 20 percent[14] and weighting women at .9, the prices were £16.51 for the men and £14.86 for the women.[15] Galenson found that slave prices tended to fall in the sales listed lower in the account, and although that was not generally true of the *Bonadventure* auction, the prices of slaves in the last three sales were indeed exceptionally low.[16] These slaves, who were auctioned in large lots, sold for less than half the average price of the slaves listed higher in the account.[17] The Africans in these lots must have been in very poor condition, and we attribute the low prices to morbidity. Both the ship owners and the captain received most of their payment in slaves.[18] The captain's commission was five men, three women, and one girl; and the ship owners received twenty-five men, twenty-seven women, and four boys.[19] On the 184 slaves sold on its own account, the Royal African Company reported proceeds of £2,491 19s (Barbados currency).[20]

Our sample includes nine voyages to Barbados, twelve to Jamaica, and one to Nevis (see Table 2).[21] The time between the ship's departure from London and its arrival in the Caribbean averaged just over nine and a half months, and ranged from 182 days, for the voyage of the *Mary* to Jamaica, to 386 days, which was the time it took the *Owners Adventure* to reach Nevis.[22] Differences in the total time of the first two legs of the voyage often had less to do with the length of the middle passage than with the time it took to get to Africa and board the slaves.[23] The average length of the voyages through the Whydah and Ardra on the Slave Coast was 286 days;

and those ships that took on slaves further down the coast averaged 321 days. Although we do not have the dates of return, it appears, based on when the final accounts were recorded, that the ships reached London about six months after their arrival in the Caribbean. Thus, depending on the African port where the slaves were boarded the entire voyages were roughly fifteen to seventeen months. The size of the ships varied from 60 tons to 320 tons; and, although larger ships tended to take on and deliver more slaves, beyond 200 tons there were sharply diminishing returns to ship size. As ship size increased from 60 tons to 200 tons, numbers of slaves increased from about 200 to 550; but beyond 200 tons there was little difference in the number boarded.

Mortality on these voyages was much higher than the rates typical of the later slave trade, as is clear from a comparison of the number of Africans purchased and the number ultimately sold in the Caribbean.[24] Mortality averaged was just under 25 percent, with more than 90 percent of all deaths occurring prior to arrival in the Caribbean.[25] And there was wide variation in mortality. The rate on the voyage of the 300-ton *Prosperous* to Barbados was just 5 percent; whereas mortality on the voyage of the 80-ton *Expedition* to Jamaica was more than 60 percent, possibly due to a slave insurrection.[26] Perhaps surprisingly, there was no connection between mortality and either the size of vessel or the number of slaves boarded.[27] And there was virtually no difference between mortality on the somewhat longer voyages to Jamaica and those to Barbados.[28]

Decomposing the Cost

Three factors accounted for the gap between the price of slaves in the West Indies and on the African coast: mortality and morbidity on the middle passage; the costs of transporting and selling the slaves; and the offsetting income from the trade in gold and ivory, as well as the return

from carrying sugar and other freight from the West Indies to England. As noted, the *Bonadventure* auction included three large groups of slaves who sold for very low prices; and indeed all slave auctions included some sales, often of large lots, where prices were much lower than the average. We attribute the low prices to morbidity; and, recognizing that any cut-off price for morbidity is necessarily arbitrary, we assume that, where the price of an adult male-equivalent slave was less than £13 (local currency) in Barbados, £14 in Nevis, and £15 in Jamaica, the shortfall was due to the slave's arriving in very poor condition.[29] Setting aside the effect of age and gender, the relation between the African and West Indies price can be expressed as:

$$P^A = P^I(1-d-m) - \frac{C-R}{N}, \tag{1}$$

where P^A is the price in Africa, P^I is the price in the West Indies of a healthy slave, d is the mortality rate, m is the proportionate effect of morbidity on price, C is the gross cost of the voyage, R is income from the trade in gold and ivory and from the transport of sugar and other freight, and N is the number of slaves boarded in Africa. The cost of the voyage is assumed to allow for a normal return on capital, but it can be interpreted as also allowing for excess, or possibly negative, profits. In the case of the Royal African Company its return from a voyage would have had to cover the costs of maintaining the infrastructure of forts and trading establishments in the Gambia River, Bunce Island, Sherbro, and, most of all, the Gold Coast.[30]

During this period and until the 1720s the Royal African Company hired at least some ships to transport slaves. The cost to the Company of these voyages included, therefore, its payments to the ship owners. Not as large a component, but potentially important, was the income the ship owners and the Company earned from activities complementary to the slave trade. The trade in gold and ivory, and the revenue from carrying sugar and other freight, helped offset the

cost of transporting the Africans. The ship and the Royal African Company shared in the costs, and in the returns from the related trade, as equation (2) reflects:

$$(2) \qquad P^A = P^I(1-d-m) - \left(\frac{C^s + C^c}{N} - \frac{R^s + R^c}{N}\right),$$

where C^s, C^c is the (gross) cost of the voyage to the ship, the Royal African Company, and R^s, R^c is the revenue earned by the ship, the Company from sources other than the slave sales. As will be apparent, the revenues from gold and ivory could have a large impact on the net return to the Royal African Company from a voyage.

The slave auctions in the West Indies included men, women, boys and girls; and the records are sufficiently detailed that we can derive a price for each category.[31] Recognizing that mortality and morbidity could differ by age and gender, we compute the West Indies price as a weighted average of the price of each category of slave:

$$(3) \qquad P^A = \sum_{i=1}^{4} \alpha_i P_i^I (1-d_i-m_i) - \frac{C^S + C^C}{N} + \frac{R^S + R^C}{N}$$

where i refers to the category of slave (1 - men, 2 - women, 3 - boys, 4 - girls), and α_i is the share of slaves leaving Africa in category i.[32]

Africans sold for much higher prices in the West Indies than on the African coast. The average price of healthy male adult slaves in the Caribbean was £18 sterling, with prices in Jamaica averaging £3.8 higher than those in Barbados, £19.5 as compared to £15.7 (see Table 3).[33] For a given destination there was little variation by ship in the average slave price. In Jamaica men sold for £18 to £21, and in Barbados for £14.5 to £17.[34] The average selling price of all healthy slaves was £17.7 in Jamaica, £14.6 in Barbados, and £16.4 across the entire sample.[35] These prices can be compared to the Royal African Company's cost of purchasing the

slaves (see Figure 1). The African price is based on the cargo that was designated by the RAC for slaves and the number of Africans who were boarded on the ship.[36] There is a considerable gap between the lowest price of £2.61 paid on the 1685 voyage of the *John Bonadventure* and the £5.15 per slave paid on *Hopewell's* voyage,[37] but for nineteen of the twenty-three voyages the range is between roughly £3 and £4.[38] The average for the entire sample of voyages is £3.64. Notable, but entirely consistent with a competitive market, is the fact that, despite the higher price the Company received for slaves in Jamaica, it paid almost the same price in Africa whether the slaves were bound for Jamaica or Barbados. The price of the Jamaica-bound slaves averaged £3.56 and those going to Barbados were purchased for £3.78.[39]

Across the sample, the price of the slaves in Africa, £3.64, was 22 percent of the price these slaves would have sold for in the Caribbean, £16.35, had they all arrived in relatively good condition. The absolute differential was £14.16 for Jamaica, £10.79 for Barbados and £12.71 for the entire sample. Identifying the sources of these differentials is one of the main objectives of this paper. We begin with mortality and morbidity. Mortality averaged close to 25 percent both on the voyages both to Jamaica and Barbados; but because slave prices were higher in the Jamaica the absolute effect on the return was greater, £4.47 per slave sent from Africa versus £3.57. Mortality thus accounted for about a third of gap between the slave prices in these colonies and in Africa.

Less important than mortality but still significant in reducing returns was slave morbidity. Although our choice of cut-off price for morbidity is arbitrary, it seems clear that many slaves were purchased for low prices because they arrived in the West Indies in very poor condition. Often auctioned in large lots, these slaves typically sold for about half the price of what we define

as healthy slaves. For example, the *Elizabeth* sold 97 "healthy" adult male slaves for an average of £21.7 (local currency), and 29 adult male slaves who we define as "sick" for £11.7. At the auction of the *Good Fellowship* in Barbados, men sold for £17.59 (local currency) if they were healthy and £9.48 if they were sick.[40] Over the entire sample, the effect of morbidity averaged £1.3 sterling per slave. The loss was £1.7 on the voyages to Barbados; but, surprisingly, given the greater distance to Jamaica, the loss on those voyages was somewhat less, £1.1. Combined, mortality and morbidity reduced the average return per slave from £16.35 to £10.89, and together accounted for 43 percent of the gap between the African price and West Indies price of healthy slaves.

On voyages where the Royal African Company used hired ships, the cost of transporting the slaves was divided between the Company, the ship owners, and the ship's captain. As well, the agent who conducted the slave auctions in the West Indies typically received a commission of 7 percent of the return (see Table 4).[41] One of the costs borne by the RAC was for Negro provisions for the middle passage. The cargo, which was boarded in London, typically included flour, beef, beans, biscuits, brandy and tobacco. The cost per slave was not large; just £0.21 per slave or about 6 percent of their purchase price, which suggests that it was not in the Company's interest to scrimp on provisions. In addition slave vessels obtained provisions in Africa appropriate to the diets of slaves from the region where they were purchased.[42] The cost of the African provisions would have been much smaller than even the London cargo and for these ships appear to have been included in the price of the slaves. In the West Indies the Royal African Company also incurred about £0.14 per slave on such items as supplementary provisions and the hire of canoes to ferry the slaves to shore. Deducting these costs and the agent's commissions

leaves an average net return of £9.75 per slave, £10.85 on the voyages to Jamaica and £8.37 on those to Barbados. From this amount the Royal African Company had to cover the payments to the ship owners and captain, and the cost of purchasing the slaves in Africa.

The Royal African Company paid "freight" to the ship owners on all the slaves who were delivered to the West Indies. The rate was £5 per slave in Barbados and Nevis (Leaward Islands), and £5 8s 6d per slave arriving in Jamaica. Payment was mainly in slaves, who were then sold on the ship owners' account. The price of these slaves is reported in the auction of the *Expedition*; but for the other auctions, where no such prices are given, we assume the owners received the average price of the healthy slaves at that auction.[43] The total amount paid by the Royal African Company to the ship owners, both in slaves and cash, averaged £3.73 per slave who left Africa. The ship owners received £4.00 per slave on the Jamaican voyages and £3.42 on the voyages to Barbados.[44] Roughly two-thirds of the payment was in slaves, which still left a substantial credit that the owners received from the Company after the ship returned to London.[45] The ship's captain also was paid by the Royal African Company. His commission, received almost exclusively in slaves, was 5 percent of the number of slaves sold on the RAC's account.[46] With the exception of one voyage, we do not know the condition of the slaves paid to the captain; but, assuming they were healthy, the captain earned an average of £0.43 per slave who left Africa.[47] The price of a healthy slave averaged £3 pounds higher in Jamaica than in Barbados, which meant that captains on the Jamaican voyages earned 20 percent more in commissions than those who sailed to Barbados.

The net return to the Royal African Company was its income from the slave sales less its payments to the ship owners and the captain, and the cost of the slaves in Africa. The Africans

were purchased with a cargo that was loaded on the ship when it left London, but the Royal African Company did not receive any income until the ship returned to England, about sixteen months later. An additional cost then was the foregone interest on the value of the cargo over that period. Assuming a discount rate of 5 percent, we put the true cost of the slaves at 6.7 percent above their purchase price.[48] With this cost deducted along with the sales agents' commission and the Company's other costs, the Royal African Company netted on average £1.73 per slave. Notable is the difference in net returns from the Jamaican and Barbados voyages. Because the costs on these voyages were similar and the price of slaves in Jamaica was higher, the RAC's net income per slave was £2 more, £2.59 versus £0.55. In fact the captains who sailed to Jamaica received almost as much in commissions, £0.47 per slave, as the Royal African Company earned from the slave sales on the Barbados route.

Because the net return to the Company was the residual, its income from the voyages was highly variable (see Figure 3). Across the sample, the standard deviation of net returns per slave was £1.66, which was about equal to the mean return. By contrast, for the ship owners and captains, the standard deviation of returns was just 20 percent of the mean.[49] The overall risk to the Royal African Company, however, was likely much less, since the Company could diversify across voyages much more than the ship owners or captains.[50] The 1685 voyage of the *Friends Adventure* netted the Company the highest return per slave, £4.14. In Africa the Company paid nearly £4 for the salves, but this relatively high price was offset by an unusually high Jamaican price of over £18. More important, though, was the 16-percent slave mortality rate and the small morbidity cost. Least successful was the *Expedition*, which also sailed to Jamaica, but experienced a slave revolt that may have contributed to its disastrous mortality of 62 percent.

The high mortality greatly reduced the return of the ship owners and the captain, but it was the Royal African Company that was affected the most. It lost £0.67 per slave. Losses were almost as great on the voyage of the *Robert*, which transported Africans to Barbados. Here the problem was a combination of a higher than average African price, relatively high mortality and morbidity, and a lower than average selling price, even for Barbados.

The discussion to this point has focused on the earnings from the slave sales, and these earnings did indeed make up by far the greater part of the return from a voyage. But income from other sources had an impact on overall returns. Most vessels stopped at ports along the Windward or Gold Coast to buy gold, and there was a trade in ivory, although this was much smaller. Another source of income was the return from carrying sugar and other freight from the West Indies to Britain.[51] The return to the Royal African Company from the trade in gold and ivory averaged £0.64 per slave, with all but four voyages generating at least some revenue from these sources (see Figure 4 and Table 5).[52] The additional income had little impact on the return from some of the voyages, but it may have been decisive to the viability of others, particularly those involved in the Barbados trade. The additional income on the voyages to Barbados averaged £0.91 per slave nearly tripling the RAC's return. Indeed the impact of gold, ivory, and freight may have been even greater. On voyages that went through Barbados, the ship owners and captain earned £0.42 per slave from trade and freight. If these sources of income had not been available and the RAC had to make up the difference by paying the ship owners and captain more, its return per slave would have fallen from £0.55 to £0.13. Another effect of the additional income was to reduce the gap in returns between the Jamaican and Barbados voyages. The Barbados ships carried more gold, and as a result the RAC's return was increased by £0.5 per

slave more than on the Jamaican voyages.[53]

The revenue from gold, ivory, and freight was not as important to the ship owners and the captain. Income from these sources made up less than 10 percent of their total return. Still, the additional amounts, as just noted, may have reduced the payments the Royal African Company had to make to the hired ships, and in that sense were a factor that helped make the slave trade viable. Overall the revenue from gold, ivory and freight accounted for nearly 25 percent of the total income from the Barbados voyages, but just 10 percent for those to Jamaica (see Figure 6).

The total income of the Royal African Company, the ship owners, and the captain was the net amount earned per slave times the number of slaves (see Table 6).[54] Worst-performing was the voyage of the *Expedition*. Its earnings totaled just £405 and the RAC lost £139. By contrast, the 1683 voyage of the *John Bonadventure*, a 220-ton vessel that took on 550 slaves, generated £5,954, of which the RAC received £2,490 and the ship owners, £3,158, an amount that far exceeded what they earned on any of the other voyages.[55] The exceptional return was due in part to the large number of slaves boarded, but it was the low mortality of just 10 percent that mainly explains the success of this voyage. It may be surprising that a relatively small ship that took on so many slaves had low mortality; but, as we have noted, there was little relation across our sample between the number of Africans boarded and mortality. As a result, ships that took on more slaves had proportionally greater returns.[56]

Across the sample, income averaged £2,618 with the Jamaican voyages generating significantly more income than those to Barbados, £2,966 versus £2,243. This difference was despite ship tonnage and number of slaves averaging slightly higher on the Barbados voyages. The differential was due to the higher price of slaves in Jamaica and the fact that the greater

revenue from the slave sales was only partially offset by the lower returns from gold and ivory. It was the ship owners who received by far the largest share of the income from the slave trade, 56 percent or £1,562; and, although they they earned more from the voyages to Jamaica than to Barbados, the difference was small, £152. On the other hand, and indeed puzzling given that the Royal African Company could have adjusted its trade, is why it earned so much more from the Jamaican voyages. Its net income of £1,133 was nearly twice what the Company earned from the voyages to Barbados.[57]

The Impact of Transport Costs, Slave Mortality, and Slave Morbidity on the Slave Trade

From 1684 to 1686, 47,600 Africans were boarded on ships bound for the Caribbean, while the number disembarking was 37,300. The implied mortality of 22 percent is lower than for our sample, but we include in our mortality estimates those who disembarked but died before the slave auctions.[58] Of the total arrivals, Jamaica was receiving 3,550 per year and Barbados, 3,770.[59] Here we analyze the impact on slave prices and slave numbers of the various transport costs. These included the RAC's direct costs, the cost of the hired ship, and the mortality and morbidity associated with the trade. Figure 7 describes a market that includes these factors. D represents the demand for slaves in the West Indies and S the supply of slaves in Africa. Direct transport costs shift the demand curve, while mortality and morbidity reduce the absolute value of its slope. Mortality affects the supply curve as well, causing it to rotate upward.[60] Because the number of slaves arriving in the West Indies is lower than the number departing Africa, there are two equilibrium quantities as well as two equilibrium prices, both determined by the intersection of the D′ and S′ curves. At these equilibria, the price in the West Indies, P_I, exceeds the price in

Africa, P_A, and slave arrivals, Q_I, are less than slave departures, Q_A.

The effect of a change in each type of transport cost can be represented by a shift or a change in slope of the appropriate curve. We base our empirical results on constant-elasticity supply and demand curves:

(4) $$Q_A = a P_A^{\gamma}, \text{ and}$$

(5) $$Q_I = b P_I^{-\eta},$$

where γ is the elasticity of supply and η is the elasticity of demand. Letting T be transport costs per slave exclusive of mortality and morbidity, we can rewrite equation (1) as:

(6) $$P_A = P_I(1-d-m) - T.^{61}$$

In equilibrium, the number of slaves demanded in the West Indies equals the number supplied in Africa adjusted for mortality:

(7) $$Q_I = (1-d)Q_A.$$

From equations (4) to (7), the equilibrium price of slaves in the West Indies is derived as the solution to:

(8) $$P_I^{1+\frac{\eta}{\gamma}}(1-d-m) - TP_I^{\frac{\eta}{\gamma}} = [\frac{b}{(1-d)}]^{\frac{1}{\gamma}}$$

Differentiating equation (8) with respect to T, d, and m solves for the effect of these variables on P_I, P_A, Q_I, and Q_A.

The results are presented in Table 7 for Jamaica, Barbados, and the entire sample. The elasticity of demand, η, is assumed to be 1 throughout, and the elasticity of supply, γ, is set at 1 or ∞. The lower value of γ is more appropriate to the entire Caribbean, whereas the perfectly elasticity assumption better represents the supply curve faced by an individual colony. The

derivative with respect to T is the effect of a £1 increase in transport costs on the relevant variable. Increases in transport costs raise the price of slaves in the West Indies and lower the price in Africa. For example, assuming a supply elasticity of 1, a £1 increase in costs raises the price in the West Indies by £1.13.[62] For an infinitely elastic supply curve, the increase in price is much greater, £1.51. The large derivative helps explain why the price of slaves in Jamaica was significantly higher than in Barbados. On the Barbados voyages, the earnings from gold, ivory, and freight averaged £0.5 more than on the voyages to Jamaica. These earnings differentially lowered the net transport cost to Barbados, and likely reduced the slave price differential by about £0.75. The greater cost of the ship and captain on voyages to Jamaica also had a magnified effect.[63]

The effect of transport costs is in absolute terms much less on African than West Indies prices. For a supply elasticity of 1, a £1 increase in costs leads to a £0.25 decline in the African price; but, because slave prices in Africa were one-fifth West Indies prices, the relative effect is similar. Since most individual colonies were a small part of the overall slave market, a change that affected costs only in a single colony would have had little impact on slave prices in Africa.

One of the effects of higher transport costs was to reduce the number of Africans transported, with departures falling proportionally more than arrivals, because of mortality. Assuming a supply elasticity of 1, a £1 increase in costs reduces departures by 734 Africans and arrivals by 549. Both are about 7 percent of the corresponding total departures and arrivals. A change in transport costs that affected only a single colony likely had a larger proportional on arrivals to that colony. For example a £1 increase in transport costs that affected only Barbados would reduce arrivals by 402 slaves, or 12 percent of total arrivals during this period.[64]

Changes in mortality had dramatically different effects on the African and West Indies slave markets. Figure 7 illustrates why. An increase in the mortality rate, d, causes the demand curve, D′, to rotate downward and the supply curve, S′, to rotate upward. Both changes reduce the number of slave arrivals and increase the West Indies price. On the other hand, the two changes have offsetting effects on the African side of the market. The rotation in the D′ curve reduces departures, whereas the rotation in the S′ curve increases them. The effect of a one percentage point increase in mortality ($\gamma = 1$) on the West Indies price is £0.24. As well, arrivals are reduced by 118 slaves, or 1.5 percent of the annual total for the Caribbean. The effect of mortality on the individual colonies is similar, and the results are not sensitive to the elasticity of slave supply. Slave mortality on the middle passage was falling after the 1680s.[65] Our results suggest that these declines may have significantly reduced slaves prices and increased slaves arrivals. The impact of mortality on the African market is, by contrast, very small. It has almost no effect on price: for $\gamma = 1$, a 1 percentage point increase in mortality reduces the African price by £0.004; and the impact on departures is minimal as well, a decline of 12 slaves for the entire Caribbean. Thus, declining mortality in the late-seventeenth and eighteenth century likely had little impact on the slave trade off the African coast. The final variable, morbidity, has an effect very similar to mortality for the West Indies side of the trade; but because morbidity did not create a wedge between slave departures and arrivals, the impact on African prices and numbers is much greater.[66] Assuming $\gamma = 1$, a 1 percentage point increase in morbidity reduces the African price by £0.04 and lowers departures to the Caribbean by 121.

The breakdown of transport costs and the calculations in Table 7 provide a snapshot of the slave trade in the mid-1680s, but our analysis of the Royal African Company account has

implications that go far beyond the results of this investigation. After 1690, prices of slaves in the West Indies were rising and the size of the trade increased dramatically. As early as the 1720s, more than 20,000 Africans were being transported annually, and the price of slaves had risen to between £25 and £30.[67] There is evidence that the price of slaves in Africa was increasing as well.[68] Undoubtedly greater demand for slaves was driving the market, but falling mortality and perhaps falling morbidity were also having an effect. In addition there may have been a change over time in the cost of transporting the slaves. Our approach to the slave trade should allow us to address these effects and explain not just the experience of the 1680s, but the movement of prices and the pattern of forced migration in the later period.

Two of our major findings in particular would seem to have significant implications for analysis of the slave trade when it was at its peak in the century and a half following on from the present study. The produce traffic carried on by slave vessels, so important to the viability of some of the ventures examined here, has tended to be treated as a separate business in the later period. Studies of profits generated by the slave trade have not taken this into account or have assumed that it was of minor importance. Partly, this is because gold exports - initially the most valuable of West African commodities - declined sharply after 1700.[69] Yet this decline was offset to some extent by the increasing importance of ivory, dye woods, and, in the early decades of the 1700s, by Brazilian gold which found its way to Britain via exchange between British and Portuguese slave ships on the African coast. Second, the major contribution of slave mortality to the costs of the voyage that emerges here should be taken into account in any reassessment of the eighteenth and nineteenth century slave trade. It is now well known that shipboard mortality declined by about half between 1700 and 1807, but the impact on long run trends in the costs and

volume of the transatlantic slave trade has yet to be recognized. Studies of the economics of slave trading have focused on the direct shipping costs and the value of the trading cargoes carried to the coast. The accounts of the voyages in the sample explored in this paper suggests that such a focus cannot by themselves explain the volume and direction of the transatlantic slave trade.

Appendix

Derivation of the Impact of Transport Costs, Slave Mortality, and Slave Morbidity on the Slave Trade

The effect of transport costs, slave mortality, and slave morbidity on the slave trade is derived by differentiating equation (8) by the variable we are considering, either T, d, or m. The change in the African price, P_A, is based on equation (6). The relations are:

(1a) $$\frac{dP_I}{dT} = \frac{P_I^{\frac{\eta}{\gamma}}}{\frac{\gamma+\eta}{\gamma} P_I^{\frac{\eta}{\gamma}}(1-d-m) - \frac{\eta}{\gamma} T P_I^{\frac{\eta-\gamma}{\gamma}}}, \qquad \frac{dP_A}{dT} = \frac{dP_I}{dT}(1-d-m) - 1 .$$

(1b) $$\frac{dP_I}{dd} = \frac{P_I^{\frac{\eta+\gamma}{\gamma}} + \frac{1}{\gamma}\left[\frac{b}{(1-d)a}\right]^{\frac{1}{\gamma}-1} \frac{1}{1-d}}{\frac{\gamma+\eta}{\gamma} P_I^{\frac{\eta}{\gamma}}(1-d-m) - T P_I^{\frac{\eta-\gamma}{\gamma}}}, \qquad \frac{dP_A}{dd} = \frac{dP_I}{dd}(1-d-m) - P_I .$$

(1c) $$\frac{dP_I}{dm} = \frac{P_I^{\frac{\gamma+\eta}{\gamma}}}{\frac{\gamma+\eta}{\gamma} P_I^{\frac{\eta}{\gamma}}(1-d-m) - T P_I^{\frac{\eta-\gamma}{\gamma}}}, \qquad \frac{dP_A}{dm} = \frac{dP_I}{dm}(1-d-m) - P_I .$$

Finally, the change in slave departures and arrivals is based on equations (1a) to (1c) and equations (4) and (5).

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Endnotes

1. Crafts, "The Industrial Revolution," p. 47; and Schofield, "British Population Change," p. 64.

2. From 1700 to 1770, sugar output of the British Caribbean increased from 40,000 to 144,100 tons. Eltis, "The Slave Economies of the Caribbean," pp. 110, 113.

3. Eltis et al., "Slave Prices, the African Slave Trade and Productivity in the Caribbean," and "Slave Prices, the African Slave Trade and Productivity in Eighteenth Century South Carolina."

4. Galenson, *Traders, Planters, and Slaves*; Eltis, *Rise of African Slavery*.

5. Anderson and Richardson, "Market Structure."

6. Eltis, *The Rise of African Slavery*; Eltis, "Volume and Structure of the Transatlantic Slave Trade;" Eltis, Lewis and Richardson, "Slave Prices, the African Slave Trade;" Eltis and Richardson, "Prices of African Slaves;" Galenson, *Traders, Planters, and Slaves*; Anderson and Richardson, "Market Structure;" Inikori, "Market Structure;" Burnard and Morgan, "Dynamics of the Slave Market."

7. From 1680 to 1685 hired ships were used on at least 75 percent of the voyages, but this share declined as the RAC acquired its own fleet. By 1700, the RAC was hiring ships for 40 percent of its voyages. Davies, *Royal African Company*, p. 195; Galenson, *Traders, Planters, and Slaves*, p.103.

8. British Public Records Office. *Treasury Papers*. T70/913, T70/963-966.

9. As was the case with most of the voyages in our sample, the intended purchase of Negroes equalled the actual number who departed Africa.

10. All slaves who were able to walk off the ship were credited including those who died before the sale.

11. The slaves sold on the ship owners' account were valued at £16 in the Leeward Islands and £17 in Jamaica. Davies, *Royal African Company*, p. 199.

12. With the cargo valued at £1,306, the ship purchased just over 426 oz., which after firing reduced to 420 oz. At £4 sterling per ounce the value of the gold after adjustments and charges was £1679 10s. The net income from the trade in gold was thus £373.

13. Galenson, *Traders, Planters, and Slaves*; Burnard and Morgan, "Dynamics of the Slave Market." See also Eltis and Richardson, "Prices of African Slaves."

14. Although it is not evident in this slave auction because the lots are too dissimilar, in other auctions the six-month difference in payment for apparently equivalent groups of slaves was

typically 10 percent.

15. The other weights are: boys, 0.75; and girls, 0.7.

16. Galenson, *Traders, Planters, and Slaves*, p. 55.

17. For all but the last three sales, the price of slave men averaged £18.5 (local currency), whereas adult male slaves, at the last three sales, sold for just £8.1.

18. Beginning in 1678, The RAC required that two-thirds of its payment to the ship owners be in slaves. Davies, *Royal African Company*, p. 199.

19. The three men and four women, who arrived in Barbados but died before the sale, were credited in the ship owners' account as having been delivered.

20. This was net of the £10 in expenses associated with the sale, The RAC would have paid 7 percent of these proceeds to the sales agent. See Davies, *Royal African Company*, p.

21. We thus have voyages to the Eastern Caribbean (Barbados), the Leaward Islands (Nevis), and the Western Caribbean (Jamaica).

22. The *Mary* went to Senegambia, the most northerly of the African trading regions.

23. A comparison of the length of the voyages from London to the Caribbean gives an imputed Middle Passage to Jamaica 15 days longer than to Barbados. Eltis et al. *Slave Trade Database*.

24. In the sample of voyages used by Klein et al., " Transoceanic Mortality," Table 5, mortality declined from 23 percent before 1700 to about 10 percent by the mid-eighteenth century.

25. On the voyages of the *Daniel and Elizabeth* and the *Mary* (Captain Carter), roughly 25 percent of mortality occurred after arrival, but the average was less than 4 percent on the other voyages .

26. The usual cause of death was dehydration due to dysentery, but it is unlikely that this cause alone would have led to such high mortality. An alternative explanation to the slave revolt, would be an outbreak of smallpox.

27. Moreover, there was also no relation between mortality and "packing" as represented by the ratio of slaves boarded to tonnage. In fact a regression of mortality on packing results in a negative (insignificant) coefficient. The relation (excluding the voyage of the *Expedition*) is:
$M = 39.3 - 6.44\,P$, $R^2 = .133$, where t-statistics are in parentheses. M is the mortality rate and
(3.94) (-1.67)
P is the ratio of Africans boarded to ship tonnage.

28. Weighted-average mortality was 24.9 percent on voyages to Jamaica and 24.5 percent on voyages to Barbados. These results are in line with what Klein et al., "Transoceanic Mortality,"

found for this period. From 1684 to 1686 the ratio of all disembarkations to embarkations was .742 for Jamaica and .774 for Barbados, suggesting a slightly lower mortality rate on the Barbados voyages.

29. The different cut-off prices reflect differences in slave prices in the three colonies.

30. Between 1698 and 1712, when the Parliament formally permitted "private" traders into the traffic (effectively ending the Company's monopoly on the African coast), the private traders were required to pay 10 percent of the total value of their trading cargoes to the RAC to help cover the costs of these establishments. When the Royal African Company was finally liquidated in 1753, the British Parliament placed the forts under the administration of a new "Company of Merchants Trading to Africa" the major task of which was to maintain the forts with the aid of an annual parliamentary subsidy.

31. Galenson's *Traders, Planters, and Slaves* includes a thorough analysis of many of these records.

32. The number of slaves departing Africa is not given by category, which means we do not know mortality at sea by age and gender, although it is given for those who died after arrival. We assume mortality at sea was the same for all groups. Morbidity can be fully distinguished by age and gender because of the completeness of the Caribbean sale records.

33. Healthy adult male slaves are assumed to be those who sold for £15 (local currency) or more. The cut-off for women and children adjusted proportionally. Note that in this period local currency both in Jamaica and Barbados was worth 90% of sterling. We assume the same rate for Nevis.

34. These are the auction averages by ship. Individual slave price varied more. There were two comparative outliers among these voyages. The prices received on the *Bonadventure's* voyage were, at £18.5 well above the average for Barbados; while the slaves on the *Hopewell* sold for an average of £16.7, which was significantly below the usual prices in Jamaica. Even so, the price from the *Hopewell* auction was close to the top of the range for Barbados.

35. These prices are similar to those derived by Eltis and Richardson, "Prices of African Slaves," from a much larger sample.

36. There were three voyages, those of the *Prosperous*, the *Roebuck*, and the *Susanna*, for which the information on number of slaves departing Africa is missing. In these cases we use the number that the RAC gave in its accounts as "intended" to be purchased. In most cases the number intended and the number departing are the same, and where there is a difference it is small. Only for the *Mary* (Captain Carter) was the difference more than 10 percent (11 percent fewer slaves departed than were intended to be purchased).

37. Perhaps explaining the high price on *Hopewell* voyage is the possibility that some of the cargo attributed to slaves may in fact have been provisions for Cape Coast Castle.

38. The standard deviation was £0.68.

39. In fact, the average price of slaves bound for Barbados was slightly higher, but most of the differential was due their age and gender composition. A slightly higher proportion of men was sent to Barbados than to Jamaica. The price of the Africans boarded on the *Mary* (Captain Carter) in Senegambia was well above the average at £4.43; but otherwise there was little relation between price and port of origin.

40. These were the slaves sold on the Company's account. We do not have prices for the slaves paid to the ship owners and the captain.

41. Davies, *Royal African Company*, p. 296.

42. Thus vessels trading in Upper Guinea purchased millet and rice; on the Gold Coast, millet, and in the Bight of Biafra, yams.

43. This assumption may slightly bias upward the ship owners, since they did sell a few sick slaves from the *Expedition*. In deriving the return to the ship owners we assume the sales agent received the usual 7-percent commission. For the purpose of settling the final account with the ship owners, the RAC valued the slaves at £15, £16, and £17 depending on whether the slaves were sold in Barbados, the Leeward islands, or Jamaica. These prices were typically very close to what the ship owners would have received for the slaves, assuming they were healthy.

44. The difference was mainly due to the 8s 6d greater payment for slaves delivered to Jamaica.

45. Unfortunately, we do not have the double-entry accounts showing the balance owing to the ship owners. There are, however, such accounts for several voyages in the 1670s. The net owing to the ship owners for those voyages is very close to the amount based on the approach used here. See McIntyre, "Balanced - At a Cost."

46. Since the slaves paid to the ship owners were not part of the calculation, the captain's share in terms of total arrivals was somewhat less. In a few cases, the captain received, in addition to slaves, small cash payments from the RAC.

47. This was in addition to any other income he received from the voyage. We assume the usual 7-percent sales agent's commission was deducted from the auction returns.

48. The rate on British Government consols during this period was 4 percent. Clark, "Cost of Capital," p. 273.

49. The standard deviation of the ship owners' return was £0.81, and the standard deviation of the captain's commission was £0.09.

50. The *Database* shows that few individual captains made more than ten voyages in the course of a career, and while ship owners might be involved in many more voyages through part shares,

and indeed in non-slave ventures as well, no other owner in the history of the slave trade came close to matching the number of voyages sent out by the Royal African Company. Between 1673 and 1732, the Company dispatched 653 slave ships to the African coast as well as at least one hundred vessels that sought African produce alone. Eltis et al., *Trans-Atlantic Slave Trade*.

51. A potential source of income that we have not included is the return to the RAC from sugar. We have included only the income from freight on sugar paid to the ship. In later years, the Company likely received some return from this source, but in the mid-1680's the price of sugar in England was unusually low, and Davies concludes that the payment to the ship for freight, as well as duties and other costs, would have exhausted any possible return to the RAC. See Davies, *Royal African Company*, p. 341.

52. Returns, however, from the voyages of the *Expedition* and the *Friends Adventure* (1685) were very small. This income was entirely from ivory.

53. RAC voyages to Jamaica carried little gold at this time because the western Caribbean was recognized as far more prone to piracy and interference from other Europeans, especially the Spanish. Indeed, Jamaica itself was a base for pirates down to the early 1670s. See Zahedieh, "Trade, Plunder, and Economic Development."

54. The return to the sales agents, which averaged £288, is not included in the totals.

55. The 1685 voyage of the *John Bonadventure* generated the next highest returns to the ship owners, £2,725.

56. A linear regression of total returns on number of slaves boarded gives:
TR = -278 + 7.68 SB, R^2 = .62, t-statistics in parentheses, where TR is total return and SB is
(-.509) (5.67)
number of slaves boarded.

57. The greater risk of piracy on voyages to Jamaica, which, as we noted, likely reduced the trade in gold, may also explain the difference in returns.

58. Excluding two voyages, mortality after arrival averaged about 4 percent of total mortality. Eltis et al., *Trans-Atlantic Slave Trade*.

59. Eltis et al., *Trans-Atlantic Slave Trade*.

60. One could interchange the supply and demand curve shifts, but this depiction seems the most straightforward.

61. The term, T, corresponds to $\frac{C-R}{N}$ in equation (1).

62. The magnified effect is due to mortality and morbidity, which creates a wedge between the price of healthy slaves in the West Indies and the average price of all slaves who left Africa.

63. With the costs of the ship and captain added, about 60 percent of the £3 differential in slave prices is explained.

64. This assumes the elasticity of supply, γ, is ∞.

65. Klein et al., "Transoceanic Mortality."

66. To the extent, however, that slaves who arrived sick had higher subsequent mortality or were unable to work and thus had to be replaced, our assumption of no wedge needs to be modified.

67. Eltis et al., "Caribbean Slave Prices."

68. Richardson estimates that in the 1720s, the price of slaves in West and West-Central Africa averaged £6, or about 65 percent above the prices of the 1680s. See Richardson, "Prices of Slaves," pp. 52-53.

69. Van den Boogart, "Trade Between Western Africa,;" Eltis, "Relative Importance of Slaves;" Curtin, "Africa and the Wider Monetary World."

Table 1
Account of the Slave Sales of the Bonadventure
Barbados: January 22, 1684

Months[a]	Men	Women	Boys	Girls	Pounds[b]	Shillings
	11		1		248	
7	8	2			180	
6	2	1	1		70	
5	5				97	
6	5	2	8	3	306	
6			1	1	26	
6	6	1	1		146	
5	4		1		92	
3	1		3	2	84	
	1				18	10
2	15	1			320	
6	1	1			32	
12	2	2			70	
		1			17	
3		1			16	10
	1				17	
				1	11	
6	2	1			51	
4	13	27			400	
8	6	14			200	
12	8	16			100	
	91	70	16	7	2502	
Captain	5	3		1		
Ship	25	27	4			
Died[c]	3	4				
Total	121	100	20	8		
Expenses					10	1
Net Proceeds					2491	19

[a] Months to payment.

[b] Barbados currency (.9 sterling)

[c] Died after arrival.

Source : British Public Records Office, *Treasury Papers* , T70/913, 963-966.

Table 2
Royal African Company Voyages with Hired Ships:
London Departure, 1683 and 1685

Ship	Departure - London	Major Buying	Arrival - Caribbean		Tonnage	Slaves	
	month/day/year	Port - Africa	Days (from London)			Purchased	Sold[a]
Bonadventure	4/21/1683	Whydah	Barbados	271	160	320	249
Daniell and Elizabeth	6/1/1683	Ardra	Barbados	273	200	530	410
Elizabeth	6/30/1685	Whydah	Jamaica	299	320	600	344
Expedition	4/8/1685	Calabar	Jamaica	332	80	220	84
Friends Adventure	8/151683	Calabar	Jamaica	317	120	280	215
Friends Adventure	5/5/1685	Angola	Jamaica	297	105	330	277
Good Fellowship	6/12/1685	Ardra	Barbados	267	157	400	226
Hopewell	2/6/1683	Whydah	Jamaica	267	120	260	175
John Bonadventure	7/10/1683	Ardra	Jamaica	351	220	550	495
John Bonadventure	9/26/1685	na	Jamaica	255	220	550	431
Mary (Captain Gilbert)	11/14/1685	Gambia	Jamaica	182	60	200	185
Mary (Captain Carter)	10/14/1685	Whydah	Barbados	261	300	535	354
Owners Adventure	3/18/1685	Ardra	Nevis	386	na	218[b]	145
Oxford	8/20/1685	Cabinda	Jamaica	346	100	420	360
Pellican	8/6/1683	New Calabar	Jamaica	257	80	170	131
Prosperous	2/21/1683	Angola	Barbados	353	250	610	579
Return	7/31/1685	Ardra	Jamaica	298	195	340	211
Robert	2/22/1683	Whydah	Barbados	329	100	343	235
Roebuck	7/13/1685	Ardra	Barbados	261	70	180	156
Saint George	8/25/1685	Ardra	Jamaica	252	300	586	463
Susanna	8/4/1685	Ardra	Barbados	203	120	260	198
Unity	5/8/1683	Angola	Barbados	348	140	397	298

[a] Sold or paid to the ship owners and captain.

[b] Two underage Africans not included.

Sources: Eltis et al., *Slave Trade Database*; and British Public Records Office, *Treasury Papers*, T70/913, 963-966.

Table 3

Slave Prices and the Revenue from Slave Sales

Voyage*	Slave Price, £ sterling			Mortality		Morbidity	Average Revenue
	Africa	Caribbean (healthy)[a]		percent	loss	loss	£ per slave
		Men	All		£ per slave	£ per slave	purchased in Africa
Bonadventure	3.86	16.64	15.34	22.2	3.41	2.13	9.81
Daniell and Elizabeth	4.17	15.55	14.47	22.6	3.28	2.22	8.97
Elizabeth	3.43	19.52	18.11	42.7	7.73	0.72	9.66
Expedition	3.22	20.52	17.69	61.8	10.94	1.33	5.43
Friends Adventure (1683)	3.45	18.78	16.97	23.2	3.94	0.93	12.09
Friends Adventure (1685)	3.98	21.29	18.21	16.1	2.93	0.39	14.90
Good Fellowship	3.25	15.83	15.21	43.5	6.62	1.07	7.52
Hopewell	5.15	16.74	15.40	32.7	5.03	0.54	9.83
John Bonadventure (1683)	4.18	18.19	17.00	10.0	1.76	0.90	14.34
John Bonadventure (1685)	2.61	20.24	18.45	21.6	4.00	1.69	12.77
Mary (Captain Gilbert)	4.43	19.42	18.69	7.5	1.43	1.95	15.31
Mary (Captain Carter)	3.11	15.16	14.13	33.8	4.78	1.07	8.28
Owners Adventure	2.92	17.89	17.23	33.5	5.81	0.38	11.04
Oxford	3.72	20.71	18.44	14.3	2.63	1.83	13.98
Pellican	3.89	20.35	18.15	22.9	4.16	1.51	12.48
Prosperous	4.91	15.63	14.48	5.1	0.74	2.17	11.57
Return	2.95	18.86	17.95	37.9	6.81	1.06	10.08
Robert	4.14	16.43	14.52	31.5	4.83	1.38	8.30
Roebuck	3.03	16.89	15.78	13.3	2.12	1.39	12.26
Saint George	3.07	19.75	17.31	21.0	3.63	1.16	12.52
Susanna	2.89	15.60	14.31	23.8	3.42	0.97	9.92
Unity	3.48	14.54	13.84	24.9	3.42	1.99	8.42
AVERAGE[b]							
All	3.64	17.83	16.35	25.04	4.12	1.34	10.89
Jamaica	3.56	19.54	17.72	25.19	4.47	1.14	12.11
Barbados	3.78	15.68	14.57	24.33	3.57	1.66	9.33

* Voyages to Barbados in italics; voyage to Nevis in bold type; others to Jamaica.

[a] Price per healthy slave.

[b] Weighted by the number of slaves purchased in Africa.

Sources : text, and British Public Records Office, *Treasury Papers* , T70/913, 963-966.

Table 4

Returns from Slave Sales: Royal African Company, Ship Owners, and Captain

(pounds sterling per slave purchased in Africa)

Voyage*	Income Slave Sales[a]	Slave Provisions[b]	Net Income Slave Sales[c]	Payments to Ship Owners In Slaves[d]	Payments to Ship Owners Total[e]	Captain's Commissions[f]	Net Return RAC[g]
Bonadventure	9.12	0.35	8.74	2.50	4.03	0.41	0.19
Daniell and Elizabeth	8.34	0.26	8.06	2.28	3.58	0.38	-0.35
Elizabeth	8.99	0.36	8.60	2.11	3.16	0.41	1.38
Expedition	5.05	0.35	4.68	1.03	1.67	0.24	-0.67
Friends Adventure (1683)	11.24	0.44	10.77	2.53	4.16	0.41	2.52
Friends Adventure (1685)	13.85	0.48	13.33	2.97	4.41	0.54	4.14
Good Fellowship	6.99	0.33	6.64	1.76	2.68	0.30	0.20
Hopewell	9.14	0.33	8.79	1.97	3.44	0.38	-0.53
John Bonadventure (1683)	13.33	0.31	13.01	3.20	4.65	0.56	3.34
John Bonadventure (1685)	11.88	0.38	11.48	2.80	4.34	0.55	3.81
Mary (Captain Gilbert)	14.24	0.44	13.77	2.73	4.40	0.26	4.38
Mary (Captain Carter)	7.70	0.28	7.40	1.90	2.53	0.32	1.24
Owners Adventure	10.27	0.36	9.88	2.20	3.32	0.36	3.08
Oxford	13.00	0.46	12.52	3.07	5.46	0.58	2.51
Pellican	11.61	0.53	11.04	2.69	4.10	0.48	2.31
Prosperous	10.76	0.39	10.34	2.84	4.05	0.49	0.57
Return	9.38	0.31	9.04	2.15	3.61	0.39	1.90
Robert	7.72	0.35	7.35	2.05	3.18	0.36	-0.60
Roebuck	11.41	0.21	11.18	2.94	4.24	0.49	3.21
Saint George	11.65	0.40	11.21	2.68	3.74	0.50	3.70
Susanna	9.23	0.24	8.97	2.28	3.60	0.40	1.88
Unity	7.83	0.34	7.47	2.14	3.00	0.36	0.39
AVERAGE[h]							
All	10.13	0.36	9.75	2.43	3.71	0.43	1.73
Jamaica	11.26	0.39	10.85	2.57	4.00	0.47	2.59
Barbados	8.68	0.31	8.34	2.28	3.37	0.39	0.55

* Voyages to Barbados in italics; voyage to Nevis in bold type; others to Jamaica.

[a] Total revenue from slave sales less the selling agents' commissions which are put at 7 percent. Davies, *Royal African Company*, p. 296. The commission is applied whether the slaves were sold on the account of the RAC, the ship owners, or the ship captain.

[b] The cost of "negro provisions" for the middle passage, which averaged £.21. To this cost has been added additional expenses incurred in the Caribbean associated with selling the slaves. In a few cases, where a payment to a factor is reported, it is included.

[c] Income from slave sales less provisions and selling costs. The imputed interest on these costs (5 percent for 16 months) has been included.

[d] The value of slaves based on the prices of healthy slaves, unless the actual sale prices are given. The 7-percent sales agent's commission is deducted.

Table 4 (continued)

[e] The ship was credited for each negro delivered to the Caribbean (including those who died before the sale). The amount was £5 per slave for Barbados and the Leeward Islands and £5.33 for Jamaica. The slaves paid as commissions were valued in the accounts at £15, £16, and £17 for Barbados, the Leewards, and Jamaica, respectively. There were small adjustments both positive and negative for expenses incurred by the ship or the RAC; although where the Charter was violated, the (negative) adjustment could be significant.

[f] The captain's commission was paid almost entirely in slaves.

[g] Net income from slave sales less payments for freight (ship)and commissions, and the price of slaves in Africa. Imputed interest on the cargo used to buy slaves is also deducted.

Sources : text, and British Public Records Office, *Treasury Papers* , T70/913, 963-966.

Table 5
Total Income from the Voyage: Slaves, Gold, Ivory, and Freight
(pounds sterling per slave purchased in Africa)

Voyage*	Royal African Company			Ship Owners and Captain		
	Gold and Ivory[a]	Slaves	Total	Gold, Ivory and Freight[a]	Slaves[b]	Total
Bonadventure	0.65	0.19	0.84	0.24	4.44	4.68
Daniell and Elizabeth	0.86	-0.35	0.51	0.34	3.96	4.30
Elizabeth	0.69	1.38	2.07	0.50	3.57	4.07
Expedition	0.04	-0.67	-0.63	0.56	1.91	2.47
Friends Adventure (1683)	0.13	2.52	2.65	0.11	4.56	4.67
Friends Adventure (1685)	0.02	4.14	4.16	0.01	4.95	4.96
Good Fellowship	0.84	0.20	1.03	0.43	2.98	3.42
Hopewell	0	-0.53	-0.53	0.31	3.83	4.14
John Bonadventure (1683)	1.19	3.34	4.53	1.09	5.21	6.30
John Bonadventure (1685)	0.56	3.81	4.36	0.62	4.89	5.50
Mary (Captain Gilbert)	0	4.38	4.38	0.14	4.66	4.81
Mary (Captain Carter)	1.25	1.24	2.49	0.44	2.85	3.29
Owners Adventure	0.64	3.07	3.71	0.93	3.69	4.61
Oxford	0	2.51	2.51	0.28	6.03	6.32
Pellican	0	2.31	2.31	0.45	4.58	5.03
Prosperous	0.68	0.57	1.25	0.31	4.54	4.84
Return	0.52	1.90	2.42	0.19	4.00	4.19
Robert	1.11	-0.60	0.51	0.46	3.53	4.00
Roebuck	1.05	3.21	4.26	0.75	4.74	5.48
Saint George	0.52	3.70	4.22	0.21	4.24	4.44
Susanna	1.84	1.88	3.72	1.09	4.01	5.10
Unity	0.32	0.39	0.72	0.14	3.36	3.50
AVERAGE[c]						
All	0.64	1.73	2.37	0.43	4.14	4.57
Jamaica	0.42	2.59	3.02	0.42	4.46	4.88
Barbados	0.91	0.55	1.47	0.42	3.76	4.18

* Voyages to Barbados in italics; voyage to Nevis in bold type; others to Jamaica.

[a] The revenue from gold and ivory less the cost of the cargo, which includes the imputed interest. Freight (mainly sugar) paid by the RAC to the ship owners or captain.

[b] Income from the transport of slaves.

[c] Weighted by the number of slaves purchased in Africa.

Sources : text, and British Public Records Office, *Treasury Papers* , T70/913, 963-966.

Table 6
Total Income the Slave: Royal African Company, Ship Owners, and Captain
(pounds sterling)

Voyage*	Slaves[a] (number)	Royal African Company	Ship Owners	Captain	Total
Bonadventure	320	269	1,365	138	1,773
Daniell and Elizabeth	530	271	2,076	204	2,551
Elizabeth	600	1,242	2,197	246	3,684
Expedition	220	-139	490	54	405
Friends Adventure (1683)	280	742	1,194	117	2,053
Friends Adventure (1685)	330	1,372	1,460	181	3,013
Good Fellowship	400	413	1,247	119	1,780
Hopewell	260	-138	975	100	938
John Bonadventure (1683)	550	2,490	3,158	306	5,954
John Bonadventure (1685)	550	2,399	2,725	302	5,427
Mary (Captain Gilbert)	200	877	909	53	1,838
Mary (Captain Carter)	535	1,331	1,590	176	3,097
Owners Adventure	218	809	926	80	1,815
Oxford	420	1,055	2,411	242	3,708
Pellican	170	393	773	82	1,248
Prosperous	610	763	2,658	296	3,717
Return	340	822	1,291	133	2,246
Robert	343	174	1,249	123	1,546
Roebuck	180	768	900	89	1,757
Saint George	586	2,475	2,313	291	5,078
Susanna	260	967	1,221	105	2,293
Unity	397	284	1,247	143	1,674
AVERAGE[c]					
All	377	893	1,562	163	2,618
Jamaica	375	1,133	1,658	175	2,966
Barbados	397	582	1,506	155	2,243

* Voyages to Barbados in italics; voyage to Nevis in bold type; others to Jamaica.

[a] Slaves purchased in Africa.

Source : Tables 2 and 5.

Table 7
The Effect of Transport Costs, Mortality, and Morbidity:
Slave Prices and Numbers
($\eta = 1$)

	Jamaica		Barbados		Caribbean	
	$\gamma = 1$	$\gamma = \infty$	$\gamma = 1$	$\gamma = \infty$	$\gamma = 1$	$\gamma = \infty$
Price -West Indies[a]	17.72		14.73		16.42	
Effect of:						
Transport Costs[b]	1.13	1.46	1.12	1.57	1.13	1.51
Mortality[c]	0.25	0.26	0.22	0.23	0.24	0.25
Morbidity[d]	0.20	0.26	0.17	0.23	0.19	0.25
Price-Africa[a]	3.56		3.78		3.64	
Effect of:						
Transport Costs[b]	-0.23	0	-0.29	0	-0.25	0
Mortality[c]	-0.0037	0	-0.0057	0	-0.0040	0
Morbidity[d]	-0.0402	0	-0.0423	0	-0.0411	0
Slave Departures	4,787		4,868		10,674[e]	
Effect of:						
Transport Costs[b]	-305	-392	-371	-534	-734	-995
Mortality[c]	-5	-6	-7	-12	-12	-18
Morbidity[d]	-54	-70	-55	-79	-121	-163
Slave Arrivals	3,554		3,767		8,105[e]	
Effect of:						
Transport Costs[b]	-228	-293	-279	-402	-549	-744
Mortality[c]	-53	-52	-55	-59	-118	-122
Morbidity[d]	-40	-52	-41	-59	-90	-122

[a] Based on the sample of voyages.

[b] Effect of a £1 per slave increase in transport costs.

[c] Effect of a one percentage point increase in mortality.

[d] Effect of a one percentage point increase in the morbidity cost.

[e] British Caribbean.

Sources : text and Eltis et al., *Slave Trade Database.*

FIGURE 1

Slave Prices: Africa and West Indies ("healthy" slaves)

(pounds sterling)

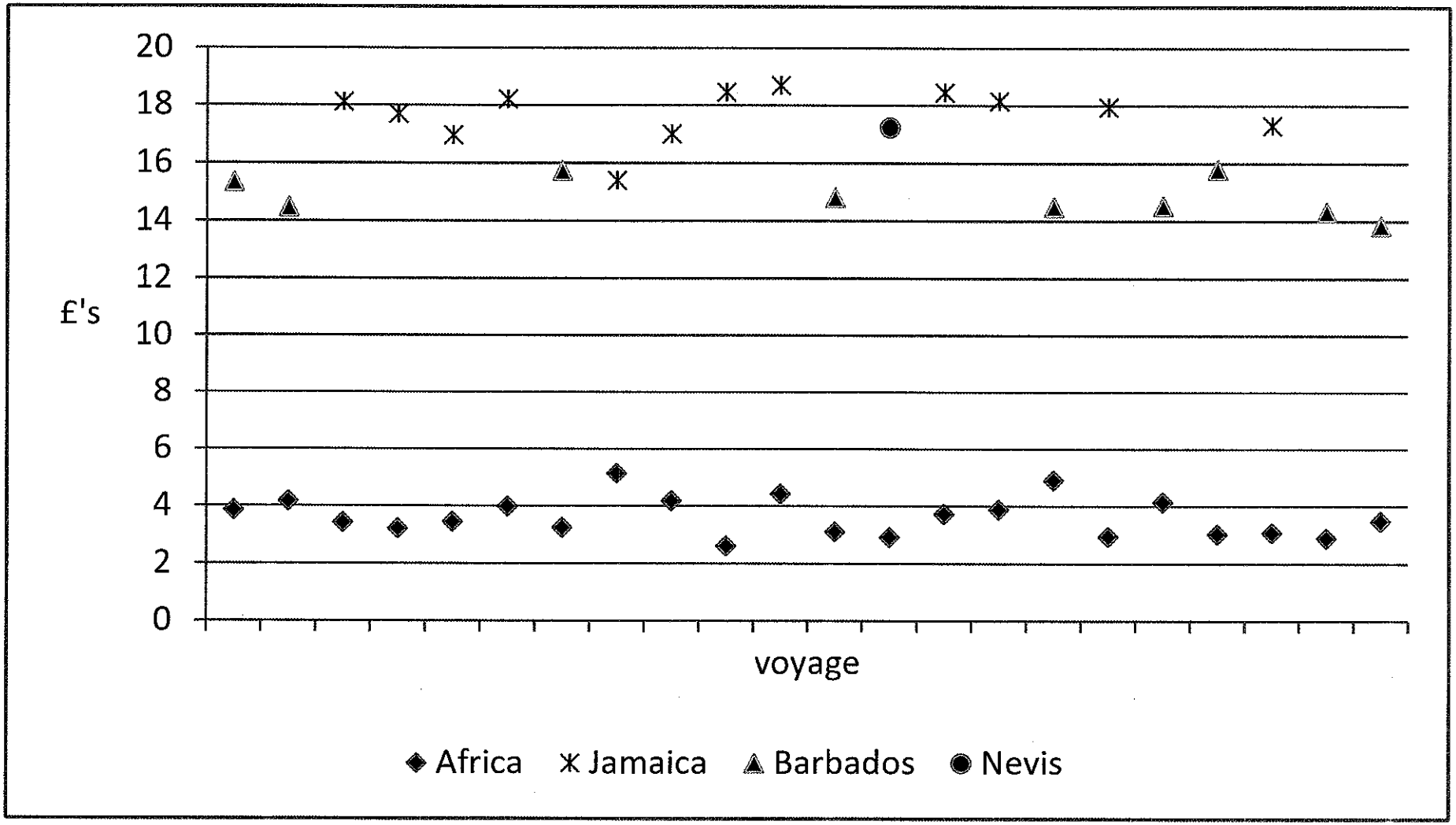

FIGURE 2
Average Revenue and the Effect of Mortality and Morbidity
(pounds sterling per slave purchased in Africa)

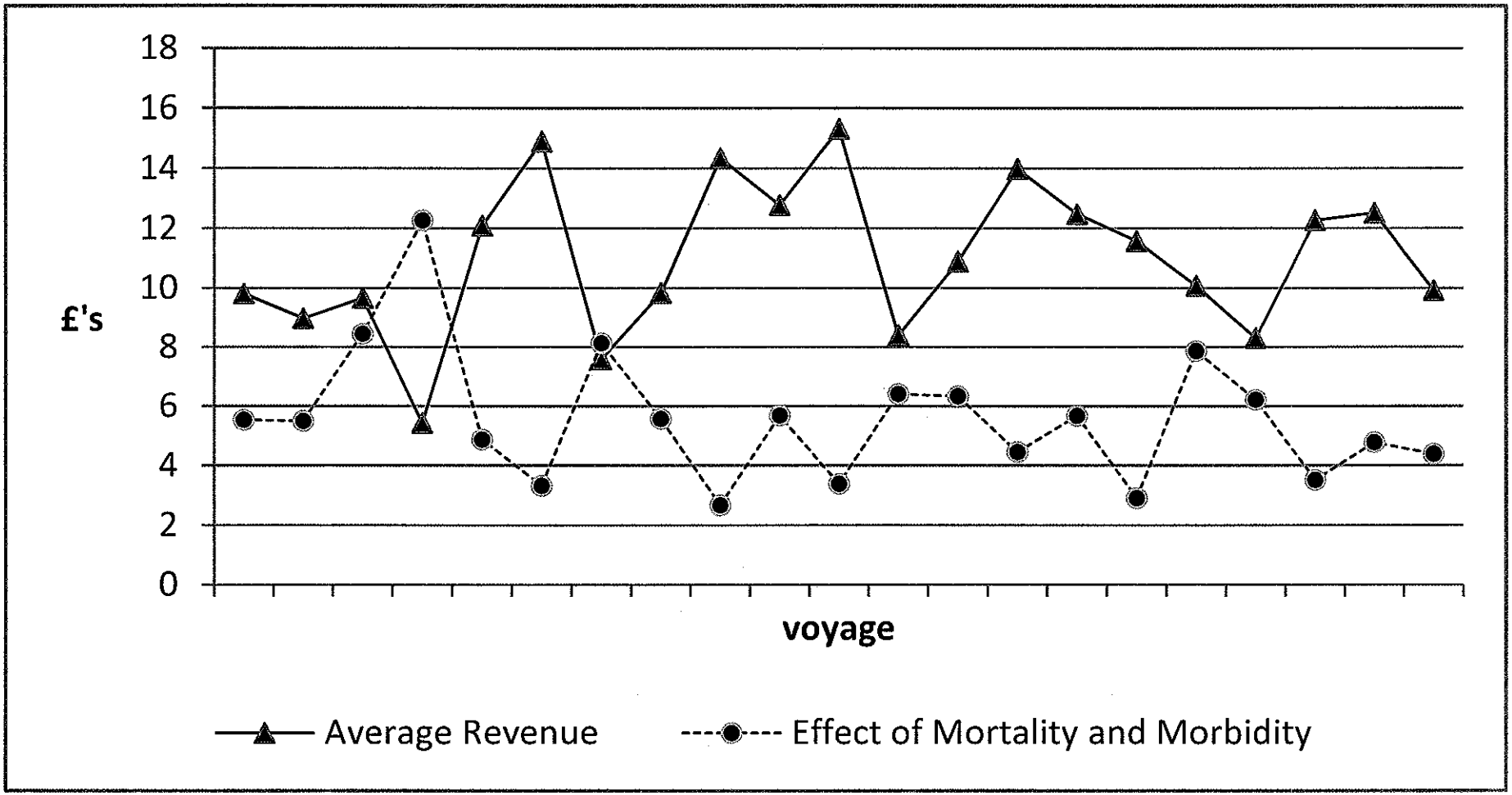

FIGURE 3

Return from Transporting Slaves: Royal African Company, Ship Owners and Captain
(pounds sterling per slave purchased in Africa)

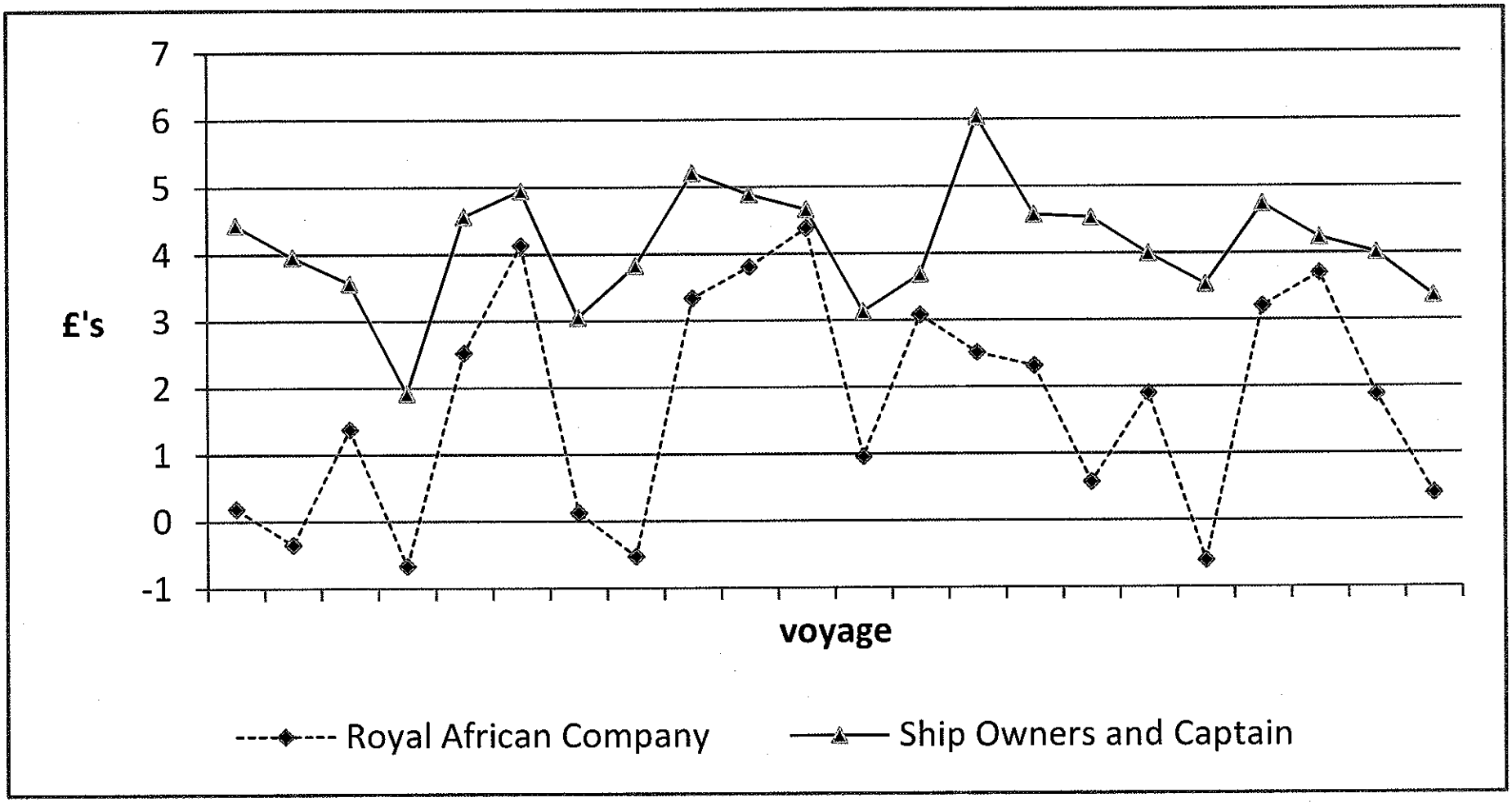

FIGURE 4
Return to the Royal African Company from Gold and Ivory
(pounds sterling per slave purchased in Africa)

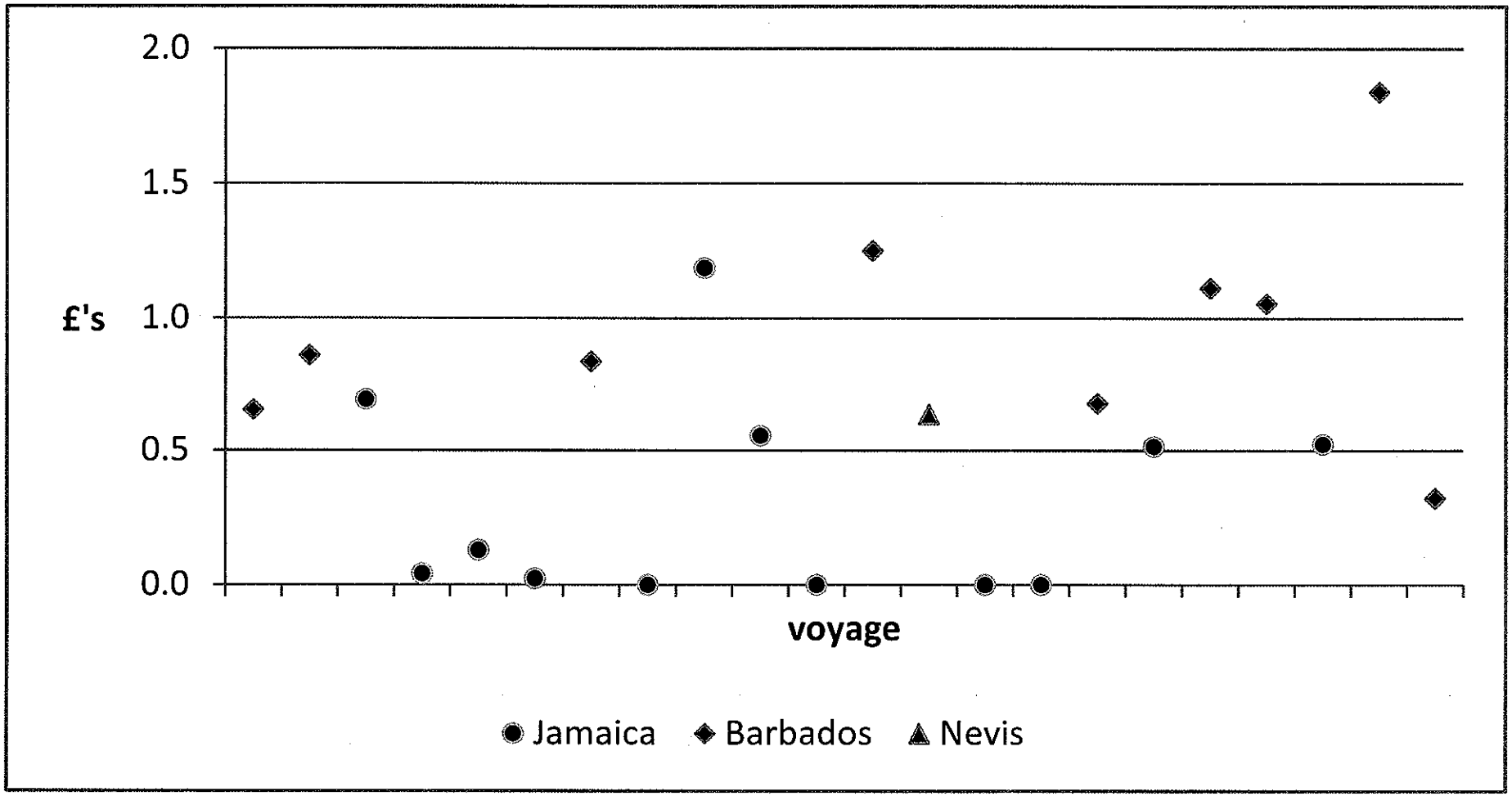

FIGURE 5

Return from Slaves, Gold, Ivory, and Freight
(pounds sterling per slave purchased in Africa)

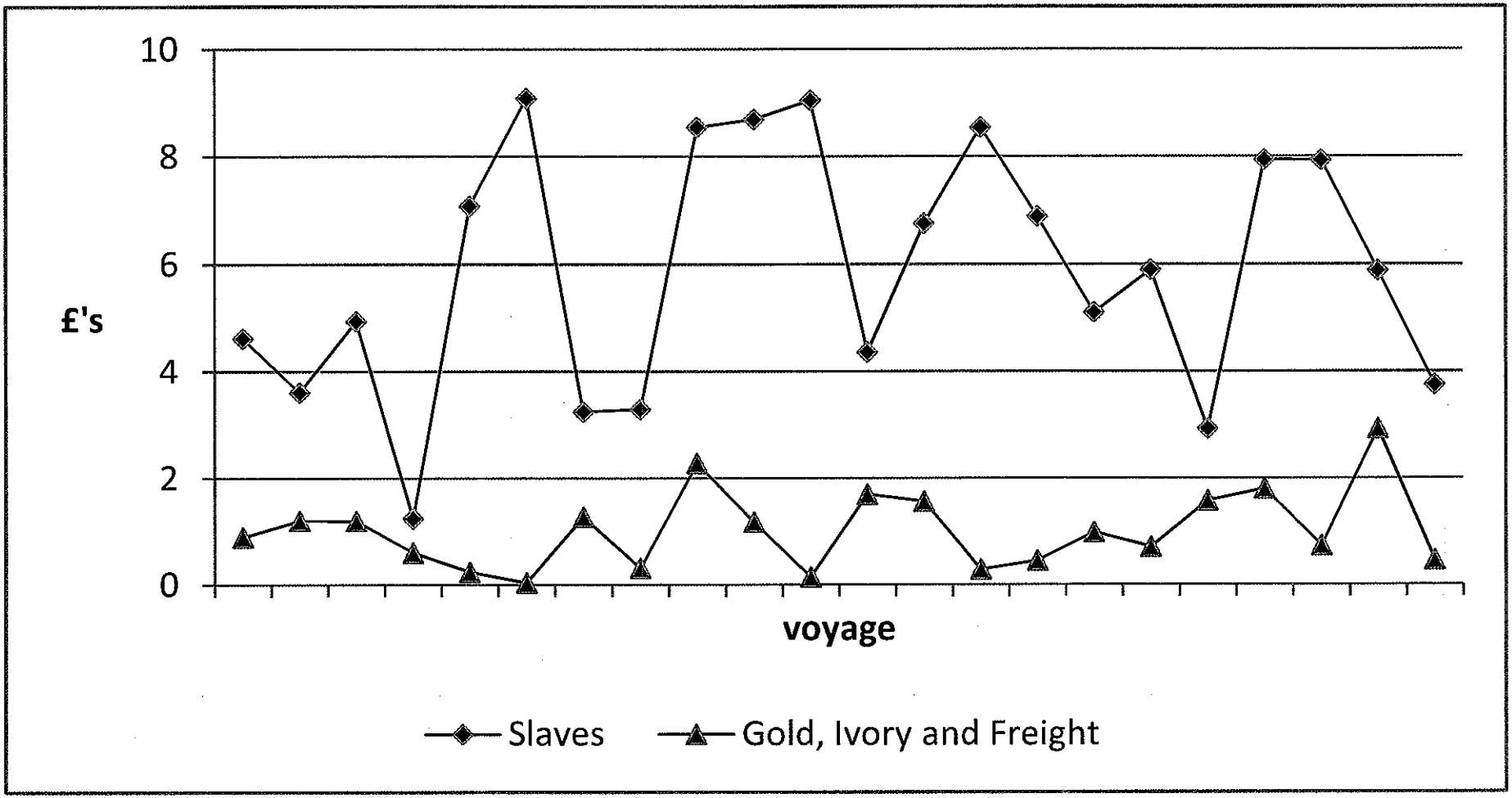

FIGURE 6
Total Return per Voyage and the Number of Slaves Boarded
(pounds sterling)

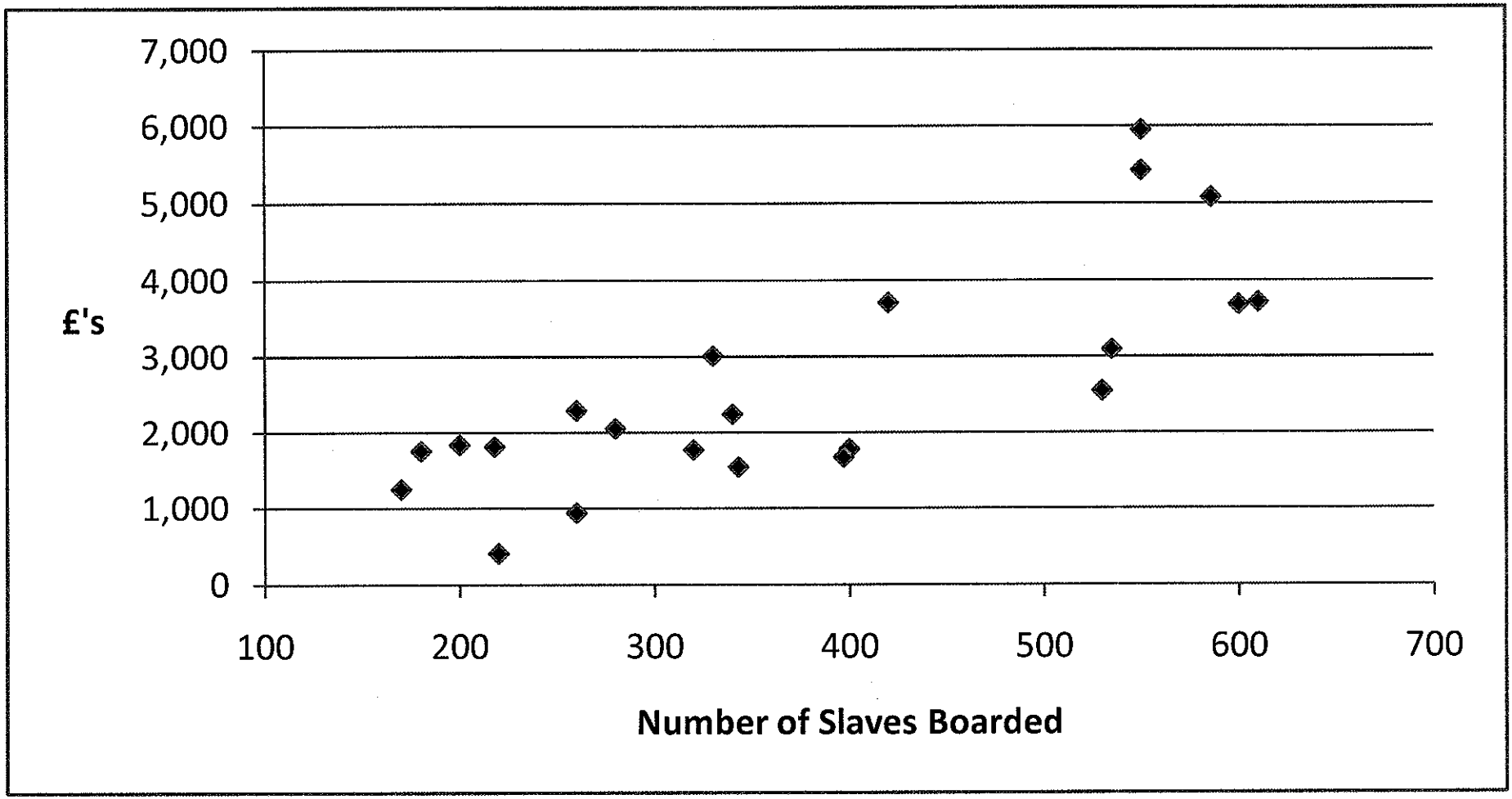

Figure 7
The Slave Trade Market