

# **Working in the “White Man’s Grave”: Epidemiological Risk and Compensating Wage Differentials on the 18<sup>th</sup> century Gold Coast**

Klas Rönnbäck, ph.d., corresponding author, University of Gothenburg,

klas.ronnback@econhist.gu.se

Stefan Öberg, ph.d., University of Gothenburg

Stefania Galli, ph.d.-student, University of Gothenburg

WORK IN PROGRESS. PLEASE DO NOT CITE WITHOUT THE AUTHORS’ APPROVAL

## **Abstract**

We investigate if the Europeans relocating to the Gold Coast in the 18<sup>th</sup> century were compensated for the extreme risk they were taking. Their real wage was about 63–126 percent higher than in England but they also faced an extremely high risk of dying within their contract period. The wage premium was low given this extreme risk: the implied value of a statistical life was substantially lower than modern-day values. The relocating men must either have placed a very low value on their own lives, or not have been fully aware of the risks they were facing.

## **1. Introduction**

Early European colonization depended greatly upon the feasibility of settlements, which led to differences in the colonization policies and institutions adopted in different colonies. In the period preceding the great medical improvements, Europeans were caught in a trap of high mortality when relocating to a different environment, particularly in the tropical zone. This

relocation risk was the reason behind the quite limited European penetration in many areas of the world before the 19<sup>th</sup> century, of which Africa is probably the most important example (Crosby 1986; Acemoglu, Johnson, and Robinson 2001). The 16<sup>th</sup> century Portuguese adventurer Joao de Barros well described the common belief of Africa being a high-risk zone, by stating that “[...] *it seems that for our sins, or for some imperscrutable judgment of God, in all the entrances of this great Ethiopia [Africa] that we navigate along, He has placed a striking angel with flaming sword of deadly fevers, who prevents us from penetrating into the interior to the springs of this garden [...]*” (quoted in Crosby 1986, 139).

This and many other travellers’ experiences contributed to the idea that Africa was unsafe for Europeans. Most unsafe was allegedly West Africa, and the perception of West Africa as the ‘White Man’s Grave’ spread fast (Curtin 1961; Acemoglu, Johnson, and Robinson 2001).

Corroborating evidence came also from the European military expeditions in the region. They registered an unusually high mortality rate among the troops that for a long time prevented the advancement of the European imperialistic interests in the interior of the continent (Curtin 1998).

Nonetheless, the European trading activities continued in Africa. To operate the trade, the European companies required a number of skilled labourers. They also found, or at least perceived, that local supply of skilled labour on the West African coast was unsatisfactory. The European companies operating in early modern Africa therefore had to acquire much of what skilled labour they needed from Europe. The idea of West Africa being a ‘white man’s grave’ must however have reduced people’s willingness to relocate to West Africa voluntarily, if it was widely known. It is therefore a puzzle what made Europeans take the extreme risk of accepting a posting in West Africa. According to Philip Curtin, the decision to relocate to Africa could therefore only be motivated by a deadly mix of ignorance and coercion (Curtin 1998, 12).

This paper contributes to solving this puzzle by estimating the wage premium for craftsmen relocating from England to the Gold Coast (in current-day Ghana) between 1707 and 1740. In this way we can investigate if a risk compensating wage premium could also be part of the motivation for men to agree to take the risk of working on the Gold Coast. We use newly collected data on a sample of European male employees of the English Royal African Company stationed on. We also use this data to get improved estimates of how high the increased risk of death was. To evaluate if the risk premium was reasonable we calculate the value of a statistical life implied by the increases in pay and risk. Our results show that labourers accepting to work in West Africa were paid a certain compensating wage differential, about 63–126 percent increased real wage, for the increased risk of working in the ‘white man’s grave’. Our results also show that the newly arriving employees faced an extremely high risk of dying: the risk of dying within one year was around 378–492 per-mille, and the risk of dying within a contract period on the coast (three years minimum) was a staggering 845–1,027 per-mille. Few of the employees ever made it back home to England. We conclude that the wage premium was not high given the elevated risk of dying: the estimated value of a statistical life was in the range of 0.6–3.3 times the employees’ annual wage, substantially lower than estimates of both historical and modern-day values of a statistical life. Europeans relocating to the Gold Coast must either have placed a very low value on their own lives, or not have been fully aware of the very high risks associated with serving there.

## **2. Theoretical framework**

The present research will study the economic incentives for relocation in the form of compensating wage differentials. The concept of compensating wage differentials dates back to Adam Smith, who stated that one of the five principles determining the pecuniary gain from an employment was “the agreeableness or disagreeableness of the employment themselves” (A. Smith 1904, 111). This first principle has become fundamental in wage theory since, without compensating wage differentials, it would be virtually impossible to attract workers to voluntarily perform the so-called ‘disagreeable’ jobs. That is because, Smith argued, in a situation of complete information and freedom to change job, workers would rationally refuse to be employed in ‘disagreeable’ jobs and look for more pleasant jobs (Borjas 2010, 205–206). In order to avoid a situation of constant crowding out from ‘disagreeable’ jobs, employers would then either have to resort to direct coercion of the labour force (see for example Domar 1970), or to increase the level of wages above the level of wages for ‘agreeable’ jobs. The amount needed to compensate for the disadvantages need to be at least high enough to create situation where workers are indifferent between ‘disagreeable’ and ‘agreeable’ jobs given their different levels of compensation (Borjas 2010, 206–212).

The ‘disagreeableness’ of a job can include everything from the working conditions or the status of the job, to health related issues and much more. One challenge of the theory is however whether a characteristic of a job is more or less universally considered ‘disagreeable’ or not. The theory predicts that there will be a compensating wage differential only for jobs which are considered ‘disagreeable’ quite generally in the population. Empirical studies on modern-day data have however shown that there are few job characteristics – except for risk of dying – where evidence can be found of a compensational wage differential (Borjas 2010, 223).

The present study draws from the specific strand of the literature that looks at occupational hazard. In the case under scrutiny, that hazard takes the form of epidemiological risk of dying. The theoretical starting point for the present research is provided by Smith, who assesses that “[p]erhaps the most measurable, if not the most disagreeable attribute of a job is the risk of injury. In the absence of full ex-post compensation, therefore, one would expect to observe ex-ante compensation in the form of wage premium paid to workers in industries where the probability of injury is non zero” (R. S. Smith 1973, 3).

### **3. Previous research**

#### **3.1 Compensating wage differentials in economic history**

The living environment in pre-20<sup>th</sup> century urban areas was worse than in the rural, with bad environmental quality, a shorter life expectancy and higher infant mortality rates (for an overview of studies of England, see for example Voth 2004). These ‘urban disamenities’ were to some extent compensated by higher incomes in the urban than in the rural areas, even if the urban incomes in real terms were reduced by higher costs of living. Jeffrey Williamson was able to study the level of this compensating wage differential in late 19<sup>th</sup> and early 20<sup>th</sup> century England, using the infant mortality rate in towns as a proxy for the urban disamenities: an increase in infant mortality rate of 1 per cent was then found to be associated with a 0.2–0.3 per cent higher nominal wage (Williamson 1981; 1982; 1984; 1990, table 9.5). John Brown has further shown that the epidemiological risk of living in certain parishes (using the local prevalence of water-borne diseases as a proxy) was positively associated with wages in 19<sup>th</sup> century England (Brown 1990, table 1; see also Dobson 1989b). In a study of regional wages in the United States in the

late 19<sup>th</sup> and early 20<sup>th</sup> century, Joshua Rosenbloom on the other hand found the completely opposite result: a negative relationship between the infant mortality rate and the regional manufacturing wages (Rosenbloom 1996, table 5). The author speculates about whether this might be an effect of reverse causality (low wages causing high infant mortality). A recent study of urban-rural wage gaps in Sweden during the same period of time found that urban disamenities such as a higher mortality rate possibly could contribute to explaining wage gaps in the 19<sup>th</sup> century, but not anymore in the early 20<sup>th</sup> century, since urban and rural mortality rates were pretty similar from this period onwards (Lundh and Prado 2015, table 2).

Another strand of literature has looked at wage premia in particularly risky industries or occupations, focusing on the late 19<sup>th</sup> or early 20<sup>th</sup> centuries. The results point in very different directions – in some of the cases studied, wages were higher in risky industries, whereas no such premia could be found in some other cases (Lewchuk 1991; Fishback 1992, chap. 7; Kim and Fishback 1993; Fishback and Kantor 1992; Silvestre 2006). For the early modern period, Steckel and Jensen (1986, 75) mentions that crewmen working in the slave trade, and thus facing a higher risk of dying than seamen working in other places, received an about 20 percent wage premium as well as a larger advance on their pay. Davies (Davies 1975a, 98) also briefly discusses the puzzle of why the men accepted to relocate to West Africa. He compares the annual incomes of soldiers on the Gold Coast with daily incomes of unskilled labourers in London but does not calculate the wage premium.

The whole, longer-term compensating wage premium might not be captured by differences in the wage at one point in time. The occupational hazard was historically probably much higher for seamen than for labourers ashore (Kasakoff and Adams 2000). In a study of the Dutch East India Company, Jan Lucassen did however claim that the wages paid to the seamen were on par with

those paid to an unskilled labourer ashore. What induced people to accept working for the Dutch company was, according to Lucassen, instead the promise of continuous employment for several years, as well as the chance for private trading (Lucassen 2004, 17). Especially men who had difficulties finding or keeping a job at home would have had more to gain from taking on a job with guaranteed employment and pay. Floud et al. (2006, chap. 2) review the available evidence of why men joined the British Army in the 18<sup>th</sup> and 19<sup>th</sup> centuries. They find that poverty, for example caused by un- or underemployment, probably was the most common reason. There can certainly also have been other benefits from accepting a position. There was also, for example, a chance of being promoted if in the employ of the Dutch East India Company, an issue studied by Claudia Rei (2014). Charters (2012, 224) also writes about that serving as a naval or military surgeon was a well-known way to advance and build a career for physicians, especially for those without sufficient resources to advance in Britain (see also St Clair 2007, 123–124).

### **3.2. The epidemiological risk in early modern West Africa**

The mortality of settler populations depended to a large extent on the difference in epidemiological environment in the areas of origin and destination. The tropical areas of the world in general have different infectious agents than temperate areas, as well as a larger variety (K. F. Smith et al. 2007). The increased mortality in the tropical environment was a result of being exposed to a new range of pathogens, including yellow fever and the more deadly *falciparum* malaria (Klepp 1994; Coelho and McGuire 1997). The vast majority of those Europeans who died in West Africa, did so due to various “fevers” caused by these pathogens (Steckel and Jensen 1986, table 2), against which Europeans had acquired no immunity: even though malaria was not uncommon in England, the English endemic mosquitos were the vectors

of malaria of a different kind than the more fatal *falciparum*, typical of tropical climates (Dobson 1989a; Reiter 2000).

Previous research shows quite widely different estimates of the adult settler crude death rates of Europeans settling in pre-colonial West Africa. Philip Curtin's widely cited data shows that the crude death rates among British troops stationed in West Africa by the early 19<sup>th</sup> century were truly disastrous: 353 per 1,000 persons at risk per year for the Sierra Leone Command, and 562 per 1,000 persons at risk per year for the Cape Coast Command (Curtin 1968, table 1; 1990, table 1; Feinberg 1974, 358–359). K.G. Davies, Harvey Feinberg and Ann Carlos have attempted to study the death rate among employees of the European slave trading companies on the Gold Coast during the 18<sup>th</sup> century. Their results vary from 160 to 270 per 1,000 persons at risk per year on average (Davies 1975a, tables 2-3; Feinberg 1974; Carlos 1994, 322).

The risk of dying was much higher in West Africa than in England. The five-year death rate for young adult men (age 25–29 years) in England was 51 per 1,000 in 1640–1689 and 26 per 1,000 in 1750–1809 (Wrigley 1997, table 6.26). Mortality rates varied across localities in the eighteenth century England (Dobson 1989b). Mortality rates were, for example, higher in London than in the rest of England. Data on the specific mortality rates in London is very problematic due to imperfect sources, but estimates indicate that the crude death rate in London in the early 18<sup>th</sup> century was 55 per cent higher than the national figures (Landers 1993, table 5.6). The infant mortality rate in London at this time has been estimated to be around 342 per 1,000 births, whereas it was between 166 and 193 per 1,000 births in rural parishes in England – i.e. some 77–106 per cent higher in London than in the rural parishes (Razzell and Spence 2004, table 12). Even if there were substantial variations in mortality in England around the eighteenth century, these differences are rather small compared to the difference between England and West Africa.



### **3.3. The value of a statistical life**

We calculate the value of a statistical life (VSL), estimated from the differences in wage level and risk of dying, to evaluate how the eighteenth century compensating wage premium compares to modern values. The VSL is widely used for evaluating different policy proposals, societal risks etc. and therefore has huge practical implications. There is a very large literature trying to estimate both the VSL and the risk premium using different methodologies. Viscusi summarizes the literature studying VSLs estimated from compensating wage differentials and present estimates adjusted for publication bias and methodological differences between studies (Viscusi 2015). He finds that the VSL is about \$10 million (2013 prices) in present-day USA - almost 200 times the annual income per capita in the country.

To our knowledge, the concept of the value of a statistical life has not been used in historical studies in this field previously. Previous research on the value of a statistical life has been based on modern-day data, and primarily focused on developed countries. A report from OECD summarizes a number of previous VSL-estimates from around the world (based instead on asking people about how much they would be willing to pay to reduce a risk): the ratio of VSL to GDP per capita then ranges from around 4–6 for some developing countries such as China or Bangladesh, to well over 400 for some developed countries such as Denmark or Taiwan (OECD 2012, table 3). We should therefore be open to the possibility that the VSL in this historical context is lower than modern-day values.

How the VSL estimated for the eighteenth century compares to modern-day values can tell us something about the income elasticity of VSL. There is a theoretically expected and empirically supported positive association between the level of income and the VSL (Doucouliagos, Stanley,

and Viscusi 2014). Studies from high-income countries find that the income elasticity is about 0.6. The choice of the income elasticity, quite naturally, can make a huge difference to our estimates if we want to translate the VSL from high-income to low-income contexts or groups. Using the relatively low income elasticities estimated in the literature lead to nonsensical results if used to transfer VSL from high- to low-income countries (Hammit and Robinson 2011). A higher elasticity, at about 1 or even higher, lead to more reasonable results and are also supported, for example, by the few longitudinal studies available (Costa and Kahn 2004). If the VSL as a multiple of an annual income estimated for the eighteenth century is lower than present-day values, this implies that the VSL is a luxury good with an income elasticity higher than one (Hammit and Robinson 2011).

### **3.4. The Royal African Company**

It is well-known that various forms of legal coercion of labour were common in early modern Europe. Far from all work undertaken was motivated by a voluntary choice made by the labourer (Steinfeld 1991). There has for example been much previous research into the frequent use of impressment undertaken by the Royal Navy in England (Rogers 1994; Linebaugh and Rediker 2000; Rogers 2003). In contrast to the legal means open to the Royal Navy, however, the Royal African Company was a private, chartered company. In theory, at least, the company had no legal right to impress people into its service. Davies, in passing, notes that the Company therefore often had to promise to pay high wages in order to induce people to leave England (Davies 1975b, 252–253). Ann Carlos has argued that this pay to a large extent was an incentive system created to reduce principal-agent problems associated with the operation of a multinational enterprise (Carlos 1994). William St Clair has on the other hand argued that the Royal African Company had no problem to get enough officers to enlist voluntarily to work for the Royal

African Company – indeed, he claimed, the Company even had a waiting list of officers willing to relocate to West Africa. What enticed many of these people to enlist for the Company, St Clair argues, was not necessarily any high wage *per se*, but that they stood a good chance of receiving promotion and making a career on the Gold Coast, precisely because the mortality rate was so high (St Clair 2007, 123–124).

The Company did on the other hand occasionally face some problems getting enough ordinary soldiers to enlist voluntarily. On at least one occasion, during a period of war with the Dutch, the enlisted soldiers were therefore made up of convicted criminals, who received a pardon if they enlisted in the service of the company (Reese 2005, 287; St Clair 2007, 131). Less is known about the methods employed to recruit craftsmen, but presumably they were generally enlisted on a voluntary basis, just like the more high-ranking civil servants and officers. Ty Reese has however found one example of when the Company employed a “crimp” whose job it was to get craftsmen to enlist. To “crimp” was a “to trap [somebody] into military or sea service”, synonymous with impressment (Merriam-Webster 2015: 4crimp). It is however not clear in the source whether the crimp actually used any coercive measures. What is clear is that he enticed the craftsmen to enlist through promises of high wages (which to some extent was misleading because the wages were not paid in British pounds sterling, but in the West African coastal pounds (Reese 2005, 285)). In total, while the company might have used trickery and misleading promises, there is little evidence in the previous literature to suggest that any coercion was resorted to regularly in order to get any Englishmen to enlist for the Royal African Company.

Previous research has shown how the Company normally employed around a hundred Europeans on the Gold Coast. There was a great stratification among its employees, with the chief merchants and factors being paid a wage many times that of the ordinary soldiers or craftsmen (Davies

1975b, 247–252). The soldiers were generally enlisted for a period of five years, whereas craftsmen were enlisted for three years, with little or no chance to leave once they had enlisted, except if discharged for misbehaviour (Reese 2005, 285; St Clair 2007, 129). According to the regulations, two-thirds of the wages were supposed to be paid while the men were working in Africa, whereas the last third of the wages were to be paid once the employee had finished his service and returned to England (Davies 1975b, 253). If this was put into practice, a large share of the employees never received that final third share, since they died before ever returning. The Company initially tried to prohibit private trading among its employees, but soon realized it had to permit private trading to some extent in order to provide some further incentives beyond that supplied by the wages paid (Davies 1975b, 258).

## **4. Research design and data**

### **4.1. Data**

Data on the risk of dying and wages paid to European employees working on the Gold Coast in West Africa has been assembled from the economic accounts of the English Royal African Company, kept in the British National Archives. The Company kept regular Pay Bills of the employees of the Company, including information on the employees' name, occupation, wages paid, as well as a column for miscellaneous information (where, for example, they could record the ethnicity of the employee, any handicap, when an employee arrived on the coast, relocations on the coast, and the eventual fate of an employee who stopped working for the company). Since the company kept separate Pay Bills for each individual castle or fort along the coast, it is possible to determine the specific place where the individual worked. The payment lists were

created each time the Companies paid their employees. The wages were normally paid bi-monthly, with a deduction in wages if a person did not work throughout the whole two-month period. In spite of the amount of information provided, the Pay Bills do not report background information for its English employees. It is impossible to determine where the employees were coming from in England, their age and social profile or their individual skill level.

Rönnbäck has recorded all wage payments to the employees of the Company into a database, along with all other information available from the Pay Bills. The account books were missing completely in some years, or for parts of some years. This creates some unfortunate gaps in the series' of data assembled (Rönnbäck 2015). The sources used are the lists of payments to employees of the Company from 1707, 1713–1716, 1718–1720, 1723–1725, 1728–1731, 1733–1740 (where the gaps are due to years when the account books have gone missing).

We follow the previous research (Feinberg 1974; Davies 1975a; Carlos 1994) in using the economic accounts of the Company as sources of demographic information. The difference between our approach and the previous research is that we use a different type of source material, Pay Bills instead of Lists of Living and Dead, and that we nominally linked the Pay Bills over time to create longitudinal observations of the employees while they were on the coast. We had enough data to calculate the risk of dying for the period 1713–1740, with some gaps in the data. The lists were created frequently enough to allow imputing dates with reasonable accuracy in the few cases where they were missing.

The spelling of the names was standardized in the initial extraction of the data. Links were then created between observations with the same name that appeared in two consecutive lists. We used all available information for the linking: the name, time and place of employment as well as any

other notes available. We checked all short gaps manually and bridged them where there was enough information to conclude that it was the same individual before and after. We bridged gaps of up to a year but the longer the gap, the more non-conflicting information was required to accept the link. We also linked individuals over the known gaps created by lists being missing in the archives if there was enough information to conclude that it was likely to be the same person (see Öberg and Rönnbäck 2015b for further discussion of the linking and data).

When conducting nominal linking of sources there is always a risk of false links, i.e. assuming that different individuals with the same name are the same person. The Company employed a limited number of Europeans – at most some 200 people at any single occasion, but often much fewer than this, so there are virtually no two employees at the same time by the same names. The materials also have several other features reducing the risk of false links. Firstly, the high frequency of observations reduce the likelihood of a person with a certain name leaves or dies unnoticed and another person with the same name appearing, also unnoticed, before the creation of the next payment list. Secondly, the notaries generally made notes in the lists if a person had just arrived, was moved to another location or died. The men were paid from the time they arrived on the coast (Davies 1975a, 84). If someone died the Company paid any outstanding wage, until the date of death or the date the person stopped working, to the heirs. Thirdly, both the Company and the employees had incentives to include the right people in the lists. The people responsible for keeping the books might have had an incentive to try to underreport actual deaths among the employees: if unchecked, they could thereby possibly keep reporting wage payments to the dead souls, while in reality diverting the supposed wage payments into their own pockets. Since the accounts had to be signed by all the key high-ranking (and highly paid) merchants working for the Company (Davies 1975b, 244), they did however stand to lose a lot if found out

cheating in this way. While it is impossible to know for certain if this entails a real problem for estimating risk of dying, it seems reasonable to assume that such malpractice was limited (compare Davies 1975a, 84–85).

There is also (almost) standardized wording with regards to starting an employment when a person either “arrived” or “entered”. The arrivals sometimes have notes on the person arriving “from England” or of payment advanced or left behind in London. We have therefore interpreted “arrivals” and information on payment left in London as indicating that this is the first time a person appears on the Gold Coast. Persons “entered” into service seem to be a more mixed group, including for example the African employees or employees of mixed background are noted as “entering”. We have therefore assumed this to indicate a person being employed on the coast. We present the risk of dying for newly arrived men and for all employees taken together.

The accounts do not report explicitly the ethnical origin of all employees, but regularly reported whether a person was not English (e.g. Portuguese or Dutch), and in particular if they were of African (noted as “black” or “negro” in the source) or mixed African/European (noted as “mulatto” in the source) background. We have assumed that all employees which are *not* reported as neither African nor mixed background were of European origin. Given that the risk of dying probably were lower among people of African or mixed background, this assumption would lead to a downward bias in the estimated risk of dying if any people were erroneously included among the Europeans.

## **4.2 Research design**

### **4.2.1. Compensating wage differentials**

Due to data availability and comparability reasons, we study the wage premia for manual, skilled workers – i.e. craftsmen. This is for the simple reason that the Royal African Company employed no unskilled Europeans to relocate to Africa. All unskilled labour necessary at the forts or castles on the West African coast was performed either by hired African labourers, or by castle slaves purchased by the Company to undertake the work.

All occupations of the European employees working on the Gold Coast were classified according to the HISCO- and HISCLASS-schemes, including the ranking of occupations according to skill level required (on a scale of 1-4) (Leeuwen, Maas, and Miles 2002; Leeuwen and Maas 2011).

For the analysis in this part of the paper, all Europeans employed by the Company in an occupation requiring HISCLASS-coded skill level 3 were selected. Occupations which possibly entailed a supervisory function (such as the factors and bomboys) were then excluded from the sample. What remained in the sample of Europeans working for the Company in Africa were, in essence, a number of different craftsmen, including blacksmiths, bricklayers, carpenters, coopers, masons and shipwrights. In total, the sample included 483 wage observations of craftsmen for the whole period under study. Appendix A shows data on the sample sizes by year.

In order to analyze the wage premia paid to the employees relocating to Africa, data on English daily wages paid to craftsmen were taken from Robert Allen's database for wages and prices published online (Allen 2007). Among the numerous cities available, London and Oxford were chosen in light of the fact that the skilled workers relocating to West Africa were mainly of English origin (Davies 1975a, 85–86). In order to compare the figures to the monthly wage payments from the Royal African Company accounts, it is here assumed that the English craftsmen on average worked 250 days per year, an assumption following previous comparative research on the topic (Allen 2009, 37). It is of interest to analyse both the nominal and real wage



premium paid to the labourers relocating to West Africa. The nominal wage premium is of interest, since it ought to have influenced the decision to relocate *ex ante*, before they had had a chance to learn how much the nominal wages (generally paid in kind rather than in coin) were worth in reality. The real wage premium is however also of key interest, since it would reveal the actual premium *ex post* (once having relocated) on living standards enjoyed while working in Africa. This real wage premium could also have influenced the decision if the recruiting Company or previous employees spread information on this.

In order to study the real wage premium, the method of subsistence ratios is employed. The method was pioneered by Robert Allen (Allen 2001; Allen 2009). The subsistence ratio is calculated as a ratio between annual income and household annual cost of living (based on the local prices for a subsistence basket of goods). The construction of subsistence ratios requires cost of living series for both London and West Africa. Gold Coast prices were taken from Rönnbäck's database, also assembled from the accounts of the Royal African Company (Rönnbäck 2015). Price data for England were taken from Clark's database on English prices and wages since the 13<sup>th</sup> century (Clark 2006). The cost of living series was weighed by the assumed 'subsistence basket of goods' (for details on the subsistence baskets assumed, see appendix to Allen 2009; Rönnbäck 2014), including all the goods that presumably were consumed by a household composed of two adults and two children, including food, clothing, fuel, lightning and rents (Allen 2009, 37). The assumption that the Company's skilled workers were likely to have a family might be debated. However, such an assumption does not change the overall picture. Many English workers might have created a family in the Gold Coast, just as their English counterparts would have done in England. In addition, some others might have left their families in England, and relocated attracted by the opportunity to save money for their family back home.

Wage premia were then calculated as  $(W_{gc} - W_e)/W_e$ , i.e. the difference between the wage paid on the Gold Coast and the wage paid in England, divided by the wage paid in England, for both the nominal and real wages, respectively.

#### **4.2.2. The epidemiological risk**

We used the linked observations from the primary sources to calculate the risk of dying among European men employed on the Gold Coast by the Royal African Company over the period 1713–1740. We calculated rates separately for men observed as arriving from England and for all employees taken together. The risk of dying on the Gold Coast was estimated using the Nelson-Aalen cumulative hazard for one, three and five years. The cumulative hazards are presented as the expected number of deaths occurring in a group of 1,000 people. The mortality rates are a major improvement on the estimates provided by Davies (1975a) in that we do count presence at the coast continuously. He used the first surviving List of Living and Dead for each year and averaged over 4–5 years as the denominator for his death rates and the average number of dead per year as the numerator.

To evaluate to what extent these people were compensated for the increased risk, we need to establish how much higher the risk was on the Gold Coast, compared to the risk of dying in Europe. We do unfortunately not know the age structure of the colonial personnel but should expect them to be younger than the general male population. Davies (Davies 1975a, 87) studied the passenger lists of the Royal African Company's ships in which the age of the passenger was sometimes stated. He reports that the average age at recruitment was 25.6 years, with the oldest recruit being 64 and the youngest 12 years old. We do not know if the age of the people for

whom an age was stated were systematically younger or older than usual, but this finding gives an indication that most recruits were young adults.

Because the age structure of the employees is unknown and adult mortality is influenced by age we need to assume an age structure for the colonial personnel and combine this with age-specific risk of dying to create a benchmark. There are not too many reliable and detailed estimates of adult mortality for the early eighteenth century that allow for this (but see Wrigley 1997). We chose to use period life tables for men in Sweden in 1751–1760 from the Human Mortality Database. The risk of dying was somewhat higher in Sweden than it was in England for most age groups (see appendix table A1 for a comparison), but the rates are similar enough to enable us to use the Swedish data instead of the results available for England. There are two reasons for using the Swedish data instead of the English, firstly, because the yearly, age-specific life tables allow us to calculate the risk of dying over a one, three and five year period, and, secondly, because the Swedish data allow us to include younger men in the comparison group. We calculate the risk of dying under four different assumptions of the age structure of the colonial personnel. The different assumptions are described in detail in appendix table A2.

*Table 1. Risk of dying within one, three and five years for adult men in Sweden 1751–1760, under four different assumptions of age structure*

Assumed age structure:		Very young	Young	Plausible	Old
Risk of dying within...		Risk of dying (per-mille, ‰)			
One year	Average	10.5	11.4	12.1	13.6
	(Min.–Max.)	(8.8–13.8)	(9.6–15.0)	(10.2–15.8)	(11.3–17.8)
Three years	Average	32.7	35.3	37.3	42.0
	(Min.–Max.)	(28.5–37.9)	(30.7–40.9)	(32.4–43.0)	(36.5–48.5)
Five years	Average	54.5	58.2	61.0	67.8
	(Min.–Max.)	(49.9–60.3)	(53.4–64.4)	(56.2–67.4)	(62.5–74.9)

*Note: Calculations based on the period life table for men in Sweden 1751–1760 ('Human Mortality Database' 2015). The risk of dying is age-standardized using four different assumptions of the age structure of the employees of the Royal African Company shown in Table A2.*

The calculated risks of dying shown for the four assumed age groups in table 1 are not too wide apart. The choice of which specific age structure to assume for the sample of personnel working for the Royal African Company does therefore seem to have comparatively little impact upon the baseline risk of dying in Europe, against which we are going to compare the increased risk of dying from migration to West Africa. The regression results presented in table A4 shows that the assumption about the age structure doesn't influence the estimated VSL.

#### **4.2.3. The value of a statistical life**

It is difficult to evaluate objectively if a person is paid a reasonable compensation for accepting a particular risk. One way of trying to determine if this was the case is by calculating the value of a statistical life (VSL). The VSL can be calculated by dividing the increased pay by the difference in risk:

$$\text{Value of a statistical life} = \frac{\frac{\text{Wage in high risk environment} - \text{Wage in lower risk environment}}{\text{Wage in lower risk environment}}}{\text{Risk of dying in high risk environment} - \text{Risk of dying in lower risk environment}}$$

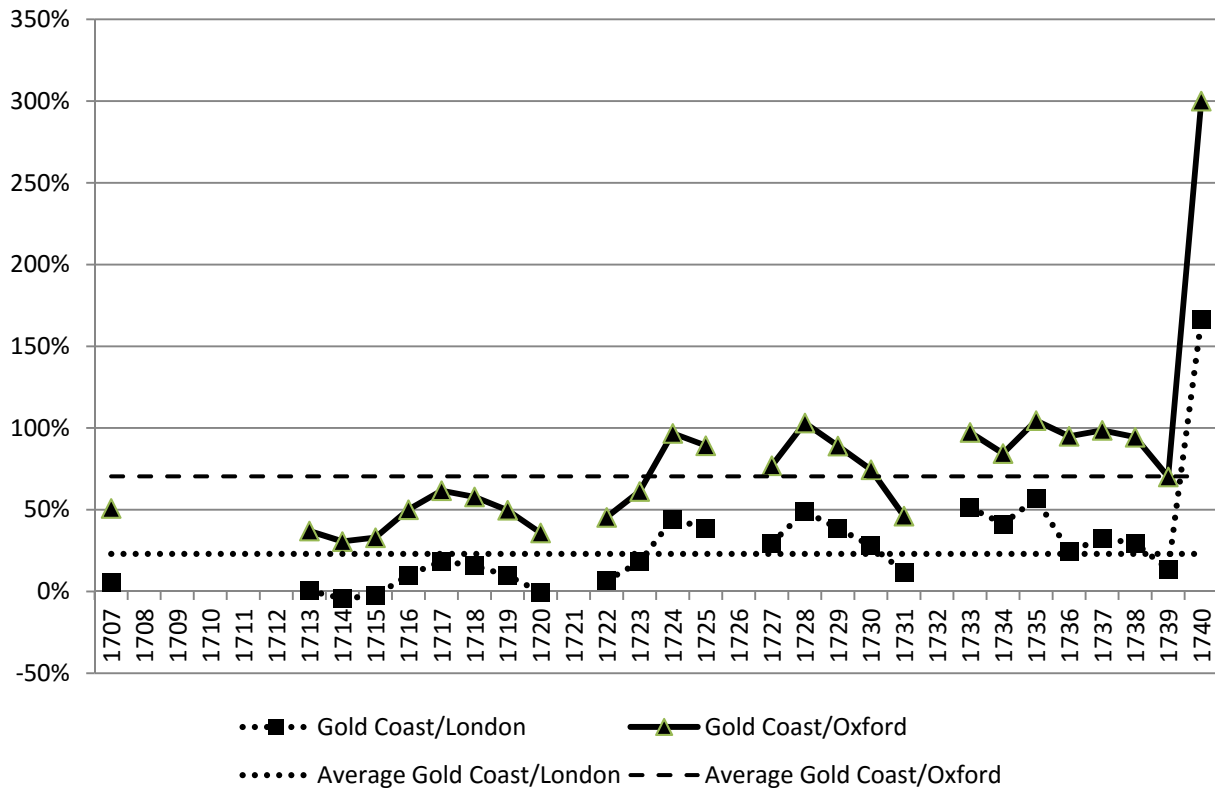
To be able to compare our VSL estimates with others, including present-day values, we calculate the VSL as a multiple of an annual income. Considering that there are variations and uncertainties regarding both the wage premium and the risk of dying we calculate the VSL for all possible combinations of the figures presented in tables 1 and 2 and figures 1 and 2. We present summary statistics of these VSLs in table 3 and figure 3. Table A4 in the appendix presents results from an analysis of how the calculated VSLs are influenced from using different types of measures, sources and assumptions.

## **5. Compensating wage differentials**

### **5.1. Nominal wage premia**

Figure 1 shows the nominal wage premia promised *ex ante* to the craftsmen enlisting to work for the Royal African Company on the Gold Coast. Relative to the wages paid to craftsmen in Oxford, the wage premia was on average 70 per cent during the period studied, while the premia on average was 23 per cent relative to the wages paid in London at this time.

Figure 1. Nominal wage premia paid to craftsmen working on the Gold Coast (markup on wage relative to wages paid in London and Oxford, respectively), 1707-1740



Sources: Gold Coast data based on British National Archives T70/380-413 (Royal African Company: Accounts). English data based on (Allen 2007).

The sample is small in total, which makes it hard to draw solid conclusions about trends over time. Nonetheless, in the first two decades of the period studied, the nominal wage premia relative to wages paid in London seems to be virtually zero, or even negative in some years. The workers of the Royal African Company were thus during this time in no way compensated economically, in nominal terms, for the higher epidemiological risk of working in West Africa relative to the risk of working in London. The wage premia might however have increased somewhat during the period, so that it in the decades that followed hovered around 30–50 per cent. The very last year of the period studied was clearly an outlier: for some reason, not

explained in the accounts, the Company all of a sudden paid a nominal wage more than double that what it previously had paid to the craftsmen. We can only speculate as to the reasons behind this sudden and very drastic rise in wages, but possibly the craftsmen in question were not just paid for their work, but for example also had supervisory responsibilities (e.g. over the castle slaves) which never were taken note of in the accounts.

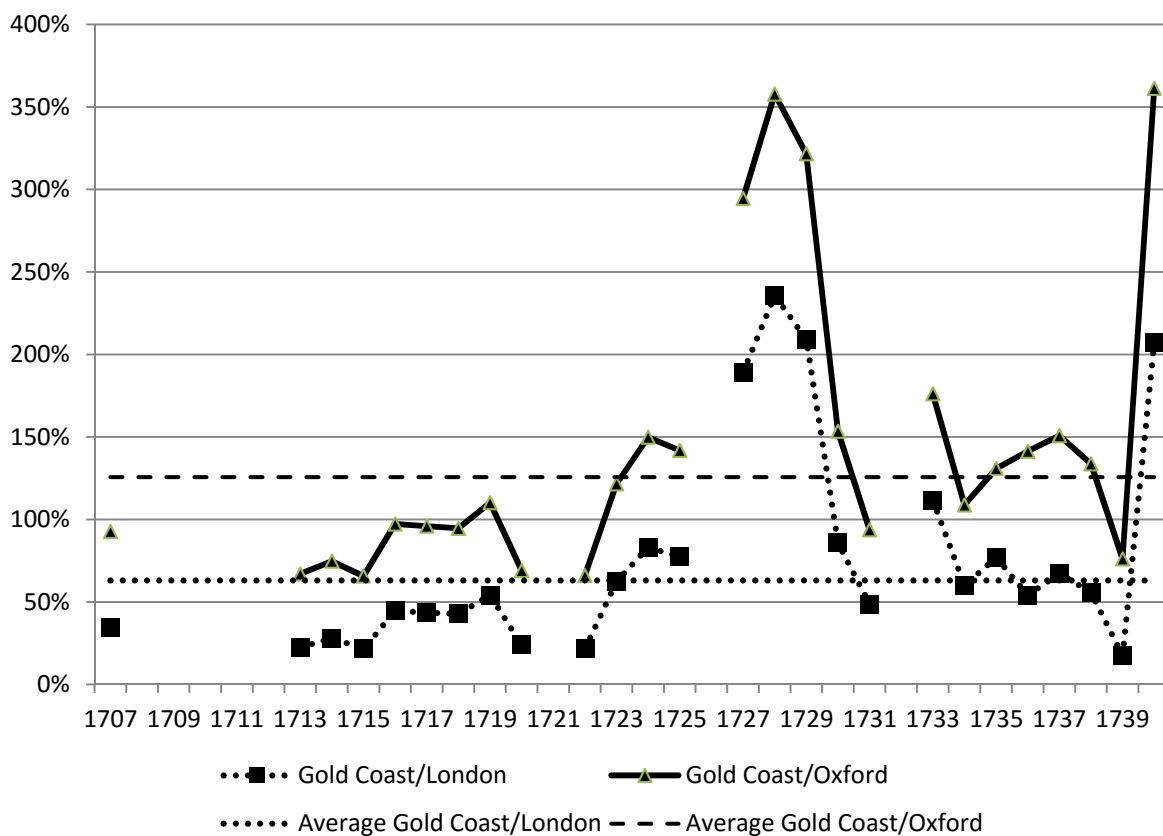
The accountants also make some notes about some of the people arriving on the coast: some people are reported as having “Left £X payable in England”, whereas in other cases there are comments about a certain sum being “advanced” in England. The former might be a reflection of the regulation noted earlier that a certain share of the wages were withheld and only paid once the employee had served out his contract in full. The latter does perhaps indicate, instead, that the person had received an advance payment in England. Davies (1975a, 84) mentions that the men started to get paid once they arrived on the coast but that it was customary to get an advance of wages before sailing. The amounts received or left in England vary quite widely in our sample. They typical amount to 30% of the annual wage of the person on the Gold Coast but vary between 7 and 91%.

## **5.2 Real wage premia**

The nominal wage premia was but one side of the equation when relocating to work in Africa. In reality, the employees were generally paid in kind with goods traded by the Company. The English craftsmen moving to the Gold Coast would however also find that the cost of living was lower there than it was in central England, if they were willing to consume local staples rather than more expensive foodstuffs imported from England. This would have substantial implications for the real wages that potentially could be earned by relocating to West Africa. Figure 2 below

shows the real wage premium granted to English craftsmen moving to Africa *ex post*, estimated in the form of the relationship between the subsistence ratios of the craftsmen working on the Gold Coast and in England, respectively, under the assumption that the craftsmen purchased local staples to provide for their daily food requirements.

Figure 2. Real wage premia paid to craftsmen working on the Gold Coast (markup on wage relative to wages paid in London and Oxford, respectively), 1707-1740



Sources: Gold Coast data based on British National Archives T70/380-413 (Royal African Company: Accounts). English data based on (Clark 2006; Allen 2007).

As can be seen in figure 2, the real wage premia were considerably higher than the nominal wage premia shown in figure 1 above: relative to the wages paid in London, the average real wage premia for relocating to the Gold Coast was on average 63 per cent, and relative to the wages



paid in Oxford, the real wage premia for relocating to the Gold Coast was on average 126 per cent. The differences between the London and Oxford subsistence ratios must be interpreted with some caution due to the fact that there, so far, only exists one price series for England as a whole, whereas it seems plausible to assume that the cost of living might have been higher in London than in Oxford. Since the Gold Coast prices fluctuated quite substantially during the period (with a particular low point in the years 1727–1729), the Gold Coast subsistence ratios also fluctuated. Even if these outliers (again, with the outlier in the last year of the period studied) would be excluded, there would still be a positive trend in the series, indicating that the real wage premia increased over time.

It might be argued that different experience and skill levels might have driven the positive and substantial wage difference existing between skilled workers in England and on the Gold Coast. We believe that it is unlikely that the sample is driven solely by such selection bias. It seems implausible that the workers relocating to the Gold Coast were particularly experienced or capable, since those craftsmen most probably could have found well-paid jobs at home quite easily. Instead, we believe it is more plausible that the recruits of the Royal African Company rather belonged to the less experienced group, to whom the benefits of relocation should have appealed much more. Davies (1975a, 86) mentions that the company sometimes had to pay higher wages in order to attract competent craftsmen.

## **6. The epidemiological risk on the Gold Coast**

We use the longitudinal data described above to calculate the risk of dying of all European, male employees of the British Royal African Company for the period 1713–1740. We have

information on 1460 individuals followed for 1745 person-years. A description of the samples used for the estimates can be found in appendix table A3. The results are summarized in table 2.

*Table 2. The risk of dying within one, three and five years on the Gold Coast for European male employees of the Royal Africa Company, all employees and men newly arrived from England*

Years included:		1713-1740		1733-1740	
Employees included:		All employees	Newly arrived	All employees	Newly arrived
Risk of dying within...		Risk of dying (per-mille, ‰)			
One year	Estimate	345	492	275	378
	95% CI	(309-386)	(399-608)	(217-347)	(236-606)
Three years	Estimate	658	1 027	577	845
	95% CI	(589-736)	(823-1 281)	(472-706)	(564-1 264)
Five years	Estimate	804	1 086	682	970
	95% CI	(706-916)	(859-1 373)	(554-838)	(629-1 495)

Source: estimates based on British National Archives T70/380-413 (Royal African Company: Accounts).

The risk of dying within one year is extremely high, at 345 per-mille for the whole sample, and 492 per-mille for the newly arrived in particular. Table 2 also reports data for the period 1733–1740 in particular, since this is the period for which we have the most complete set of data covering the longest continuous time-period and including most forts on the Gold Coast. The estimated risk of dying within one year is slightly lower during this period, at 275 per-mille for the whole sample of employees, or 378 per-mille for newly arrived only. As is also shown in the table, the risk of dying within the contract period (generally three or five years, depending on the contract entered into) was truly overwhelming: for new arrivals, the estimated risk of dying within three years was between 845 and 1,027 per-mille. Most of the employees simply never made it back to England alive. The risk is relatively stable over time except for a few peak years, for example 1721, with exceptionally high mortality rates (Öberg and Rönnbäck 2015b).

The data reported in table 2 includes all male European employees of the Royal African Company. Some might argue that soldiers faced particularly higher death risk than civilians. When controlling for this, however, no apparent distinction in this regard emerges between soldiers and workers (Öberg and Rönnbäck 2015a). It seems to be the case that both soldiers and civilian employees shared similarly high risk of dying.

### **7. The value of a statistical life**

The men who accepted to relocate to the Gold Coast in practice faced a substantially elevated risk of dying, at a seemingly modest wage premium. In order to estimate how reasonable the compensation was, we estimate the value of a statistical life (VSL). The median and average of the resulting estimates of the VSL are presented in table 3, for both nominal and real wage premia and based on the difference in the risk of dying within one, three or five years, respectively. (A regression analysis summarizing influences on the estimated value of a statistical life can be found in appendix table A4.)

*Table 3 Summary of the estimated values of a statistical life (VSL) presented as multiples of an annual wage for the employees of the Royal African Company, 1707–1740*

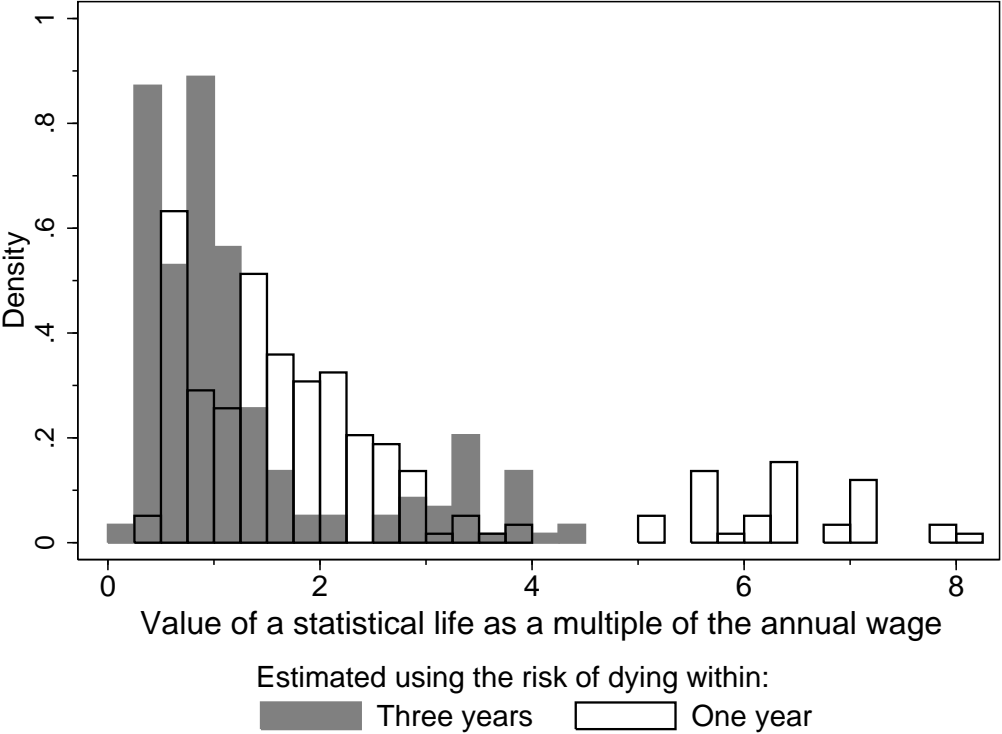
VSL based on the difference in the risk of dying within:	The estimated value of a statistical life	VSL based on:	
		Real wages	Nominal wages
one year	Median	2.48	1.32
	Average	3.30	1.70
three years	Median	1.21	0.64
	Average	1.61	0.83
five years	Median	1.07	0.58
	Average	1.43	0.73

Source: estimates based on British National Archives T70/380-413 (Royal African Company: Accounts).

Note: The summary statistics were calculated after excluding the negative estimates of the value of a statistical life excluding 1,296 observations caused by negative wage premiums in 1714 and 1715 when comparing with London, final N=43,632.

The median and average values of the calculated VSLs is in the range of 0.58–3.30 multiples of an annual wage. The distribution of a sub-sample of the results is reported in figure 3, showing that most of the results are in the range of 0.5–1.5 times the annual wage of the sample of employees. As can also be seen in the figure, some of the high estimates are in range of 6–8 times the annual wages. These high estimates are however the results of the odd outliers in the wage series in 1727–1729 and 1740, discussed previously.

Figure 3. The distribution of the estimated values of a statistical life for employees of the Royal African Company, 1707–1740



Source: estimates based on British National Archives T70/380-413 (Royal African Company: Accounts).

Note: The values were calculated using real wages. The English wages are for London. The mortality risk for the Gold Coast was estimated for all employees, 1713–1740. The “plausible” assumption of the age structure was used to age-standardize the risk of dying in Sweden. Only estimates above zero are included in the figure.

As was discussed in the section on methodology, there are reasons to expect that the VSL estimated for this historical sample would be lower than modern-day values. The estimated values of a statistical life for the employees of the Royal African Company however differ by orders of magnitude from studies of modern-day VSL in developed countries, where the estimated VSL often is in the range of 100–400 multiples of the average annual income of the population. The VSL estimated in the present paper is not even as high as the estimates of the

VSL in some of the poorest countries in the world today, such as Bangladesh (OECD 2012, table 3). The figures are furthermore low when compared to other historical data. Jeffrey Williamson has reported data on infant mortality rates in urban and rural areas, as well as data on urban nominal wage premia, that enable us to make a crude computation of a VSL for mid-19<sup>th</sup> century England. Using the infant mortality rates as a proxy for the differences in the risk of dying within one year, the value of a statistical life in England are in the range of 2–5 times the annual income (own estimate based on Williamson 1990, tables 9.3 & 9.7), whereas the estimated corresponding VSL of the employees of the Royal African Company was around 1.3–1.7 time the annual income, as was shown in table 3. The employees of the Royal African Company did thus at best approach the urban wage premium in England, and at worst was paid a considerably lower premium relative to the elevated risk they faced.

It seems reasonable to assume that risk-takers among the Europeans were more prone than others to trade the high risk of losing their life for a certain wage premium. In other words, the individual propensity to take risk could have played a role in the decision to relocate, in the sense that a large ex-ante compensation for the risk of losing life on the job is appealing primarily to workers with a relatively strong propensity to risk. Since the VSL is a quotient it is strongly influenced by the denominator (i.e. the difference in risk). The estimated VSL is usually lower in studies that use a larger risk difference in their estimation (OECD 2012; Viscusi 2015).

Considering that the difference in risk here is extremely large, this could be another explanation that the VSL found in this paper is so low. We find that the real wage premium was higher than the nominal because of lower costs of living on the Gold Coast. The real wage premium presented above assumes that the men consumed only local staples, and not imported European

goods. If they did consume also imported goods this would have reduced the real wage premium towards the nominal.

There are also a number of unknown factors that could have contributed to increasing the actual, longer-term wage premium, and thus the VSL. The fact that relocation brought about great opportunities for career advancements, unavailable in England, can also be seen as an additional reason in favour of relocation. However, it is impossible to tell to what extent workers in England were aware of this *a priori*, as limited evidence is available in this regard. The secure and full-time employment in Africa increased the incentives, especially for men who had difficulties finding or keeping a job in England. If the wages paid on the Gold Coast indeed was only two-thirds of the actual pay (with one third to be paid after the contract was completed, Davies 1975b, 253), this would quite naturally increase the wage premium and VSL substantially. The private trading that was allowed by the company could also have contributed to the money the men could make on the coast. Davies (1975a, 96–97) reports results from studying inventories of men who died on the Gold Coast. He finds that while some high ranking officials seem to have made a lot of money, most men did not. Most of the soldiers did not leave any valuable assets behind.

Our results show that the wage premium paid could have been part of the reason for why the men were willing to relocate to West Africa. But the premium was so low compared to the risk that there must have been also other factors at play. As was mentioned at the outset, Philip Curtin once argued that “coercion and ignorance” were crucial for explaining why Europeans relocated to West Africa during this period (Curtin 1998, 12). Some of the soldiers might certainly have enlisted under the threat of otherwise receiving punishment for a crime they were convicted of. There is however nothing in the previous literature that suggests that coercion was common practice in order to persuade the skilled labourers to enlist for the Company. Ignorance of the real

dangers that they were facing when relocating to work in the ‘White Man’s Grave’ ought therefore to have been the key factor in the equation. This conclusion seems reasonable in light of the fact that so very few workers survived their contract and went back to England. This must have drastically reduced the possibility of information or rumours spreading about how high the risk of dying actually was. Furthermore, the company itself must surely have tried to prevent any such information from diffusing, as that would have hindered the Company’s ability to continuously provide the Gold Coast with new recruits. The simple fact that West Africa thus actually was a ‘White Man’s Grave’ to such a very high extent, would then have served to keep down any demands for compensational wage differentials.

## 8. References

- Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2001. ‘The Colonial Origins of Comparative Development: An Empirical Investigation’. *American Economic Review* 91 (5): 1369–1401.
- Allen, Robert C. 2001. ‘The Great Divergence in European Wages and Prices from the Middle Ages to the First World War’. *Explorations in Economic History* 38 (4): 411–47.
- . 2007. ‘Prices and Wages in London and Southern England, 1259–1914’. [www.nuff.ox.ac.uk/users/allen/studer/london.xls](http://www.nuff.ox.ac.uk/users/allen/studer/london.xls).
- . 2009. *The British Industrial Revolution in Global Perspective*. Cambridge: Cambridge University Press.
- Borjas, George J. 2010. *Labor Economics*. Boston: McGraw-Hill Irwin.
- Brown, John C. 1990. ‘The Condition of England and the Standard of Living: Cotton Textiles in the Northwest, 1806–1850’. *The Journal of Economic History* 50 (03): 591–614.
- Carlos, Ann M. 1994. ‘Bonding and the Agency Problem: Evidence from the Royal African Company, 1672-1691’. *Explorations in Economic History* 31 (3): 313–35.
- Charters, Erica. 2012. ‘Making Bodies Modern: Race, Medicine and the Colonial Soldier in the Mid-Eighteenth Century’. *Patterns of Prejudice* 46 (3-4): 214–31. doi:10.1080/0031322X.2012.701491.
- Clark, Greg. 2006. ‘England, Prices and Wages since 13th Century’. UC Davis. <http://gpih.ucdavis.edu/>.
- Coelho, Philip R., and Robert A. McGuire. 1997. ‘African and European Bound Labor in the British New World: The Biological Consequences of Economic Choices’. *Journal of Economic History* 57: 83–115.



- Costa, Dora L., and Matthew E. Kahn. 2004. 'Changes in the Value of Life, 1940–1980'. *Journal of Risk and Uncertainty* 29 (2): 159–80.
- Crosby, Alfred W. 1986. *Ecological Imperialism: The Biological Expansion of Europe, 900–1900*. Cambridge: Cambridge University Press.
- Curtin, Philip D. 1961. "'The White Man's Grave': Image and Reality, 1780–1850". *The Journal of British Studies* 1 (1): 94–110.
- . 1968. 'Epidemiology and the Slave Trade'. *Political Science Quarterly*, 190–216.
- . 1990. 'The End of the "White Man's Grave"? Nineteenth-Century Mortality in West Africa'. *Journal of Interdisciplinary History*, 63–88.
- . 1998. *Disease and Empire: The Health of European Troops in the Conquest of Africa*. Cambridge: Cambridge University Press.
- Davies, K. G. 1975a. 'The Living and the Dead: White Mortality in West Africa, 1688–1732'. In *Race and Slavery in the Western Hemisphere: Quantitative Studies*, edited by Stanley L. Engerman and Eugene D. Genovese, 83–98. Quantitative Studies in History 4. Princeton: Princeton U.P.
- . 1975b. *The Royal African Company*. New York: Octagon.
- Dobson, Mary J. 1989a. 'History of Malaria in England.' *Journal of the Royal Society of Medicine* 82 (Suppl 17): 3.
- . 1989b. 'Mortality Gradients and Disease Exchanges: Comparisons from Old England and Colonial America'. *Social History of Medicine* 2 (3): 259–97.
- Domar, Evsey D. 1970. 'The Causes of Slavery or Serfdom: A Hypothesis'. *The Journal of Economic History* 30 (01): 18–32.
- Doucouliaqos, Hristos, T. D. Stanley, and W. Kip Viscusi. 2014. 'Publication Selection and the Income Elasticity of the Value of a Statistical Life'. *Journal of Health Economics* 33: 67–75.
- Feinberg, Harvey M. 1974. 'New Data on European Mortality in West Africa: The Dutch on the Gold Coast, 1719–1760'. *The Journal of African History* 15 (03): 357–71.  
doi:10.1017/S0021853700013530.
- Fishback, Price V. 1992. *Soft Coal, Hard Choices: The Economic Welfare of Bituminous Coal Miners, 1890–1930*. Oxford: Oxford University Press.
- Fishback, Price V., and Shawn Everett Kantor. 1992. "'Square Deal" or Raw Deal? Market Compensation for Workplace Disamenities, 1884–1903'. *The Journal of Economic History* 52 (04): 826–48.
- Floud, Roderick, Kenneth Wachter, and Annabel Gregory. 2006. *Height, Health and History: Nutritional Status in the United Kingdom, 1750–1980*. 1st ed. Cambridge: Cambridge University Press.
- Hammit, James K., and Lisa A. Robinson. 2011. 'The Income Elasticity of the Value per Statistical Life: Transferring Estimates between High and Low Income Populations'. *Journal of Benefit-Cost Analysis* 2 (01): 1–29.
- 'Human Mortality Database'. 2015. University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany). Accessed October 1. [www.mortality.org](http://www.mortality.org).
- Kasakoff, Alice B., and John W. Adams. 2000. 'The Effects of Migration, Place, and Occupation on Adult Mortality in the American North, 1740–1880'. *Historical Methods: A Journal of Quantitative and Interdisciplinary History* 33 (2): 115–30.
- Kim, Seung-Wook, and Price V. Fishback. 1993. 'Institutional Change, Compensating Differentials, and Accident Risk in American Railroading, 1892–1945'. *The Journal of Economic History* 53 (4): 796–823.

- Klepp, Susan E. 1994. 'Seasoning and Society: Racial Differences in Mortality in Eighteenth-Century Philadelphia'. *The William and Mary Quarterly*, 473–506.
- Landers, John. 1993. *Death and the Metropolis : Studies in the Demographic History of London 1670-1830*. Cambridge: Cambridge University Press.
- Leeuwen, Marco H. D. van, and Ineke Maas. 2011. *HISCLASS : A Historical International Social Class Scheme*. Leuven: Leuven University Press.
- Leeuwen, Marco H. D. van, Ineke Maas, and Andrew Miles. 2002. *HISCO: Historical International Standard Classification of Occupations*. Leuven: Leuven University Press.
- Lewchuk, Wayne. 1991. 'Industrialization and Occupational Mortality in France prior to 1914'. *Explorations in Economic History* 28 (3): 344–66.
- Linebaugh, Peter, and Marcus Rediker. 2000. *The Many-Headed Hydra : Sailors, Slaves, Commoners, and the Hidden History of the Revolutionary Atlantic*. Boston: Beacon Press.
- Lucassen, Jan. 2004. 'A Multinational and Its Labor Force: The Dutch East India Company, 1595–1795'. *International Labor and Working-Class History* 66: 12–39.
- Lundh, Christer, and Svante Prado. 2015. 'Markets and Politics: The Swedish Urban–rural Wage Gap, 1865–1985'. *European Review of Economic History* 19 (1): 67–87.
- Merriam-Webster. 2015. 'Dictionary and Thesaurus'. <http://www.merriam-webster.com/>.
- Öberg, Stefan, and Klas Rönnbäck. 2015a. 'Social, Racial and Gender Differences in Mortality the "White Man's Grave": Mortality among Europeans on the West Coast of Africa in the Eighteenth Century'. Working Paper. Gothenburg.
- . 2015b. 'The White Man's Grave Revisited - Settler Mortality Rates in Pre-Colonial West Africa'. Working paper. Gothenburg.
- OECD. 2012. 'The Value of Statistical Life: A Meta-Analysis'. [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/EPOC/WPNP\(2010\)9/FINAL&doclanguage=en](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/EPOC/WPNP(2010)9/FINAL&doclanguage=en).
- Razzell, P., and C. Spence. 2004. 'Poverty or Disease Environment? The History of Mortality in Britain 1500–1950'. In *M. Breschi and L. Pozzi (eds.), The Determinants of Infant and Child Mortality in Past European Populations*. Udine, Italy: Forum, 43–66.
- Reese, Ty. 2005. 'The Drudgery of the Slave Trade: Labor at Cape Coast Castle, 1750-1790'. *The Atlantic Economy during the Seventeenth and Eighteenth Century: Organization, Operation, Practice, and Personnel*, Ed. Peter Coclanis (Columbia, SC, 2005), 277–96.
- Rei, Claudia. 2014. 'Careers and Wages in the Dutch East India Company'. *Cliometrica* 8 (1): 27–48.
- Reiter, Paul. 2000. 'From Shakespeare to Defoe: Malaria in England in the Little Ice Age.' *Emerging Infectious Diseases* 6 (1): 1.
- Rogers, Nicholas. 1994. 'Vagrancy, Impressment and the Regulation of Labour in Eighteenth-Century Britain'. *Slavery and Abolition* 15 (2): 102–13.
- . 2003. 'Impressment and the Law in Eighteenth-Century Britain'. In *Norma Landau (ed.), Law, Crime and English Society, 1660-1830*, 71–96.
- Rönnbäck, Klas. 2014. 'Living Standards on the Pre-Colonial Gold Coast: A Quantitative Estimate of African Laborers' Welfare Ratios'. *European Review of Economic History* 18 (2): 185–202.
- . 2015. *Labour and Living Standards in Pre-Colonial West Africa: The Case of the Gold Coast*. London: Routledge.
- Rosenbloom, Joshua L. 1996. 'Was There a National Labor Market at the End of the Nineteenth Century? New Evidence on Earnings in Manufacturing'. *The Journal of Economic History* 56 (03): 626–56.

- Silvestre, Javier. 2006. 'Wage Compensation for Workplace Disamenities during Industrialization: The Case of Spain, 1909–20'. *Labor History* 47 (1): 43–72.
- Smith, Adam. 1904. *An Inquiry into the Nature and Causes of the Wealth of Nations*. London: Methuen.
- Smith, Katherine F., Dov F. Sax, Steven D. Gaines, Vanina Guernier, and Jean-François Guégan. 2007. 'Globalization of Human Infectious Disease'. *Ecology* 88 (8): 1903–10.
- Smith, Robert Stewart. 1973. 'Compensating Wage Differentials and Hazardous Work'. US Dept. of Labor, Office of the Assistant Secretary for Policy, Evaluation, and Research.
- St Clair, William. 2007. *The Door of No Return: The History of Cape Coast Castle and the Atlantic Slave Trade*. New York: Bluebridge.
- Steckel, Richard H., and Richard A. Jensen. 1986. 'New Evidence on the Causes of Slave and Crew Mortality in the Atlantic Slave Trade'. *The Journal of Economic History* 46 (01): 57–77. doi:10.1017/S0022050700045502.
- Steinfeld, Robert J. 1991. *The Invention of Free Labor: The Employment Relation in English and American Law and Culture, 1350-1870*. Chapel Hill, NC: University of North Carolina.
- Viscusi, W. Kip. 2015. 'The Role of Publication Selection Bias in Estimates of the Value of a Statistical Life'. *American Journal of Health Economics* 1 (1): 27–52.
- Voth, Hans-Joachim. 2004. 'Living Standards and the Urban Environment'. In *Roderick Floud and Paul Johnson (eds.), The Cambridge Economic History of Modern Britain 1700-1860*, 1:268–94.
- Williamson, Jeffrey G. 1981. 'Urban Disamenities, Dark Satanic Mills, and the British Standard of Living Debate'. *The Journal of Economic History* 41 (01): 75–83.
- . 1982. 'Was the Industrial Revolution Worth It? Disamenities and Death in 19th Century British Towns'. *Explorations in Economic History* 19 (3): 221–45.
- . 1984. 'British Mortality and the Value of Life, 1781–1931'. *Population Studies* 38 (1): 157–72.
- . 1990. *Coping with City Growth during the British Industrial Revolution*. Cambridge: Cambridge University Press.
- Wrigley, Edward Anthony. 1997. *English Population History from Family Reconstitution, 1580-1837*. Cambridge: Cambridge University Press.