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## The Enslavement of Africans: A Demographic Model<sup>1</sup>

Patrick MANNING\*

### RÉSUMÉ

*Ce modèle concerne l'impact, au XVIII<sup>e</sup> siècle de la traite transatlantique et transsaharienne des esclaves sur la composition et la croissance des populations africaines. L'Afrique est divisée en deux régions exportatrices: la Côte, qui alimente le marché du Nouveau Monde avec des esclaves, en majorité masculine; et l'Intérieur, qui fournit des esclaves à prédominance féminine au monde musulman. Pour chaque région, le modèle indique la répartition par âge et par sexe des ravisseurs d'esclaves, des populations subissant les razzias, des esclaves exportés et des esclaves retenus en Afrique. Les prévisions démographiques du modèle sont confrontées aux données historiques disponibles sur la composition des populations africaines.*

### I — THE NUMBERS GAME REVISITED

In 1969 John D. Fage, using Philip D. Curtin's newly published estimates of the magnitude of the Atlantic slave trade, hypothesized that slave exports did no more than halt population growth in West Africa.<sup>2</sup> Returning to the topic some years later, he expressed surprise that his apparently controversial stand had elicited so little response, since it conflicted with some earlier impressions of massive depopulation of the continent.<sup>3</sup> His explicit quantitative conclusion—no depopulation—and his implied qualitative conclusion—neither social nor demographic transformation—have since gained wide acceptance in the interpretation of

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2. Fage, "Slavery and the Slave Trade in the Context of West African History," *Journal of African History* 10 (3, 1969): 393-404. See also Curtin, *The Atlantic Slave Trade: A Census* (Madison: The University of Wisconsin Press, 1969).

3. Fage, "The Effect of the Export Slave Trade on African Populations," in R.P. Moss and R.J.A. Rathbone, eds., *The Population Factor in African Studies* (London: Holmes & Meiers, 1975), p. 15. More recently, Fage has argued that the institutions of slavery and polygyny were little changed by the impact of the slave trade: Fage, "Slaves and Society in Western Africa, c. 1445 - c. 1700," *Journal of African History* 21 (3, 1980): 289-310.

the slave trade's impact upon Africa.

With the passage of several additional years and the development of much new data, the time is surely ripe for a review of the demographic impact of slavery and slave trade upon Africa. It is time to revisit and extend the "numbers game," to recall Curtin's ironic yet well-chosen term.<sup>4</sup> In contrast to the aggregate approach of Fage's calculations, I propose a disaggregated demographic model including the factors of sex, age and price of slaves, with the object of generating hypotheses about the impact of slavery on the composition and growth rate of African populations. The model is also intended to provide a coherent framework for comparison of the demographic history of African regions (the West African coast, the northern savanna, the Congo-Angola region, and East Africa), as well as of Mid-East and New World populations of African descent.

The fundamental hypothesis is that the export slave trade was the main determinant of the character and development of African slavery. African slavery existed, of course, prior to the Atlantic slave trade and probably before the Saharan slave trade. The model, while it does not attempt to disprove these facts, may nevertheless be seen as a test of the notion that the quantitative significance of slavery in Africa is attributable primarily to external demand.<sup>5</sup> Without attempting to explain why the

4. Curtin, *Census*, pp. 3-13. Curtin's term referred to the speculative game of guessing slave exports; his census replaced that game with a new game, based on historical data. The present effort represents a return to a more speculative game, since the data on populations within Africa are so sparse. Among the studies which have explicitly touched on the demographic impact of the slave trade upon Africa are: Roger Anstey, *The Atlantic Slave Trade and British Abolition, 1760-1810* (Cambridge: Cambridge University Press, 1975), pp. 79-82; K. David Patterson, *The Northern Gabon Coast to 1875* (Oxford: Oxford University Press, 1975), pp. 78-80; David Northrup, *Trade Without Rulers: Pre-Colonial Economic Development in South-Eastern Nigeria* (Oxford: Oxford University Press, 1975), pp. 78-80; David Northrup, *Trade Without Rulers: Pre-Colonial Economic Development in South-Eastern Nigeria* (Oxford: Oxford University Press, 1978), pp. 65-84; Patrick Manning, *Slavery, Colonialism and Economic Growth in Dahomey, 1640-1960* (Cambridge: Cambridge University Press, forthcoming); Joseph Inikori, "The Slave Trade and the Atlantic Economies, 1451-1870," in UNESCO, *The African Slave Trade from the Fifteenth to the Nineteenth Century* (Paris: 1979), pp. 56-87. In addition, John Thornton has made a stimulating contribution, using an approach which I shall call "disaggregated": "The Slave Trade in Eighteenth Century Angola: Effects on Demographic Structures," *CJAS/RCEA*, 14 (3, 1980): 417-27.

5. For a key statement of the view that export demand conditioned the development of African slavery, see Walter Rodney, "African Slavery and Other Forms of Social Oppression on the Upper Guinea Coast in the Context of the Atlantic Slave Trade," *Journal of African History* 7 (3, 1966): 431-44. For indications of the use of slaves in production in the pre-Atlantic-trade savanna, see J.-P. Olivier de Sardan, "Captifs ruraux et esclaves impériaux du Songhay," in Claude Meillassoux, ed., *L'Esclavage en Afrique précoloniale* (Paris: Maspero, 1975), pp. 111-13. See also Fage, "Slaves and Society."

external demand for African slaves existed, nor why Africans acceded to this external demand, the model does illustrate how slavery within Africa grew in response to a given external demand for slaves.

Secondly, I argue that the export slave trade surely limited growth and may well have reduced population in large areas of Africa, and that it caused transformations in the age, sex and family structure of African populations. African regions supplying slaves to the Christian world exported mostly men and ended up with a local surplus of women, reinforcing the institution of polygyny. African regions supplying slaves to the Muslim world, in contrast, exported mostly women and ended up with a local surplus of men, reinforcing the use of male slaves in production.

Thirdly, regional, temporal and sexual variations in slave prices brought about important demographic and social effects. As the most outstanding example of this factor, price changes brought about a major transformation in the extent and character of slavery in Africa during the nineteenth century. As the external demand for slaves was gradually shut off, slave prices fell substantially and, in response, the use of slave labor in African production expanded rapidly.<sup>6</sup>

Fage's aggregate calculations remain the starting point for discussion of the demographic impact of slave exports: his calculations compare the population of West Africa as a whole with the trans-Atlantic exports of slaves. Starting with estimated twentieth-century population figures, and fitting them to an exponentially growing rate of total population increase which was then projected backwards in time, Fage concluded that in 1850 the population of West Africa was 28 million and that its rate of growth was 3.9 per thousand per year. Projecting the rate of increase backward in the same manner, but subtracting slave exports from population in each decade, Fage arrived at a population of 25 million and a growth rate of

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6. For descriptions of slavery in the nineteenth century, see Paul E. Lovejoy, "The Characteristics of Plantations in the Nineteenth-Century Sokoto Caliphate (Islamic West Africa)," *American Historical Review* 84.(5, 1979): 1267-71; Frederick Cooper, *Plantation Slavery on the East Coast of Africa* (New Haven: Yale University Press, 1977); Meillas-soux, *L'Esclavage*; and Suzanne Miers and Igor Kopytoff, eds., *Slavery in Africa: Historical and Anthropological Perspectives* (Madison: University of Wisconsin Press 1977). On the quantitative dimension of the nineteenth-century export trade, see David Eltis, "The Export of Slaves from Africa, 1821-1843," *Journal of Economic History* 27 (2, 1977): 409-33; and Eltis, "The Direction and Fluctuation of the Transatlantic Slave Trade, 1821-1843: A Revision of the 1845 Parliamentary Paper," in Henry A. Gemery and Jan S. Hogendorn, eds., *The Uncommon Market: Essays in the Economic History of the Atlantic Slave Trade* (New York: Academic Press, 1980), pp. 273-301.

1.5 per thousand in 1700, and a population of 20 million in 1600.<sup>7</sup> Fage then compared the rate of export of slaves in the eighteenth century (an average of 40,000 slaves per year from a population of 25 million, or 1.6 per thousand per year) to the assumed growth rate (1.5 per thousand), and concluded that the export of slaves might have cancelled out population growth, but that it did not depopulate West Africa. On the other hand, he concluded that the Congo-Angola region and East Africa, being of sparser population, might have suffered depopulation as a result of slave exports.

In qualitative terms, Fage went further to suggest that West Africa was not seriously hurt by the export of slaves:

The conclusion to which one is led, therefore, is that whereas in East and Central Africa the slave trade, sometimes conducted in the interior by raiding and warring strangers, could be extremely destructive of economic, political and social life, in West Africa it was part of a sustained process of economic and political development.<sup>8</sup>

Fage extended this line of thought for West Africa, arguing that the slave trade failed to transform society:

In the worst affected areas, the effect may have been no more than to cream-off surplus population, i.e. those whom it was more profitable to sell in return for imports than to employ in production at home.<sup>9</sup>

The "historicism" of this argument was attacked immediately by C.C. Wrigley, who objected to the reasoning that slavery was a necessary and objectively positive influence in the development of West Africa.<sup>10</sup> Wrigley's critique, in fact, has remained the only direct attack on Fage's reasoning.

Meanwhile, several modifications may be proposed to Fage's simple aggregate calculations, and some of these were discussed by Fage himself: he noted that the rate of population growth might have been higher than assumed, that more men than women were exported, and that the areas from which the largest number of slaves came are today the most populous areas of West Africa. Fage thought that the effect of these additional considerations was to reduce the estimated impact of slave

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7. Fage, "Effect," pp. 16-19. Note that Fage's 1969 estimates of the rate of natural increase are high by a factor of ten: he should have said 1.5 per thousand and 1.9 per thousand for the eighteenth century, rather than 15 and 19. Fage, "Slavery," pp. 399-400.

8. Fage, "Slavery," p. 400.

9. Fage, "Effect," p. 20.

10. C.C. Wrigley, "Historicism in Africa: Slavery and State Formation," *African Affairs* 70, No. 279 (1971): 113-24.

exports on West Africa, although this is arguable.<sup>11</sup> Nevertheless, Fage's quantitative conclusion is likely to stand: for West Africa as a whole, population probably did not decline markedly in the eighteenth century, and perhaps not even at the late-eighteenth-century height of slave exports.

Does this conclusion imply, therefore, that the export of slaves failed to influence the growth and composition of African population? The argument which follows is intended to demonstrate that such an assumption is false. Through the disaggregated approach, I intend to show that the implications of Fage's quantitative conclusion are more serious than he realized, and that his qualitative conclusion—social continuity and economic development in the era of the slave trade—is misleading.

Ultimately, the demographic model may be evaluated against the substantial amount of data on African slavery. At present, however, the data are scattered unevenly through the primary and secondary sources. Most available observations on slavery and slave trade in Africa date from the nineteenth century, and these observations cannot be simply projected back to earlier times. The approach followed here is, first, to present the general model, and then to present enough data to indicate that the argument is plausible, but to stop short of an attempt to verify it.<sup>12</sup>

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11. Partially countervailing factors may be noted for each of these factors: a higher rate of population growth implies an eighteenth-century population smaller than that proposed by Fage; fertility of the women remaining in Africa was reduced by the expansion of polygynous marriage; and slave merchants naturally concentrated on the areas which were then, as now, most densely populated. For Central and East Africa, meanwhile Fage concurred that depopulation probably accompanied the export of slaves. Fage, "Effect," p. 20; see also Anstey, *Slave Trade*, p. 82.

12. The key work in quantifying the export of slaves from Africa has been done by Philip D. Curtin and Ralph A. Austen. While the work of revising Curtin's initial figures continues, the most convenient summary of regional and temporal variation in the Atlantic trade is still his *Census*, along with his "Measuring the Atlantic Slave Trade," in Stanley L. Engerman and Eugene D. Genovese, eds., *Race and Slavery in the Western Hemisphere: Quantitative Studies* (Princeton: Princeton University Press, 1975), pp. 107-28. For Austen's work on quantifying the northern and eastern export of slaves, see his "The Islamic Red Sea Slave Trade: An Effort at Quantification," *Proceedings of the Fifth International Conference on Ethiopian Studies* (Chicago, 1979), pp. 443-67; and Austen, "The Trans-Saharan Slave Trade: A Tentative Census," in Gemery and Hogendorn, *The Uncommon Market*, pp. 27-76. Two major review articles provide a comprehensive analysis of the literature on slavery. See Frederick Cooper, "The Problem of Slavery in African Studies," *Journal of African History* 20 (1, 1979): 103-25; and Paul E. Lovejoy, "Indigenous African Slavery," *Historical Reflections* 6 (1, 1979): 19-61.

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## II — THE MODEL: THE DIRECTION OF THE DEMOGRAPHIC EFFECTS

The assumptions of the model are intended to approximate, in a highly simplified fashion, the eighteenth-century conditions of the export of slaves from Africa.<sup>13</sup> First, the slave trade is divided into that on the Coast (i.e., the western coast of Africa), delivering slaves to the New World, and the Interior (i.e., the northern savanna), delivering slaves to the Mid-East and North Africa. Secondly, within each of these regions, we assume that a single slave raid takes place, in order to investigate its effects. Thirdly, the immediate effects of that raid are considered for the Raided (those who lose population in the slave raid), for the Raiders (those who collect slaves and then retain or sell them—including the retained slaves who now become part of this group), and for the Deportees (those sent across the Atlantic, the Sahara or the Red Sea). Fourthly, each of these populations is revisited some fifteen years later, to assess the impact of the raid on fertility and population growth.

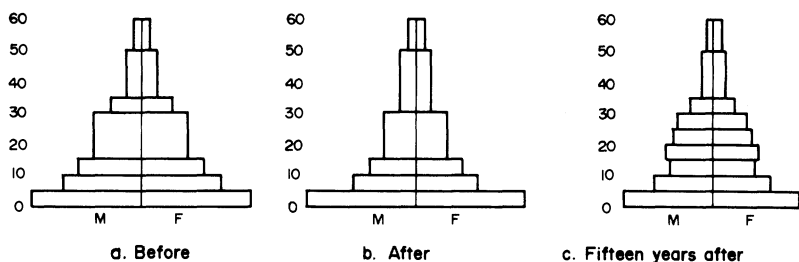
The raid is assumed to result in the capture of persons of both sexes and all ages, but it is assumed that a disproportionate number of the captives are young men and women, from fifteen to thirty years of age, as these were the most valuable.

### *The Coast*

In addition to the assumptions above, it is assumed that all males and half the females captured in the raid are exported, and that half the females are retained by the Raiders. The idealized age pyramids for the Raided, the Raiders and the Deportees, as shown in Figure 1 through 3, each indicate the population composition before the raid, after the raid (and the attendant export of slaves), and fifteen years later.

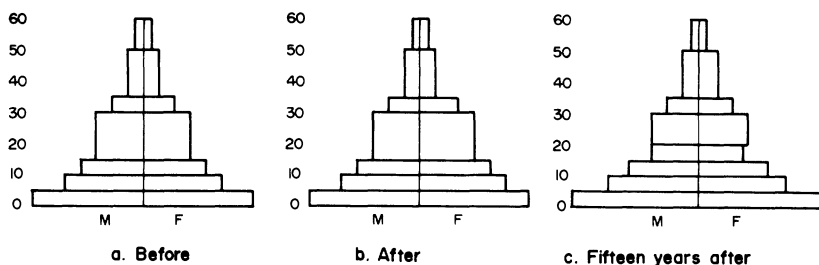
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13. The author has undertaken work in computer simulation of the impact of enslavement on African populations. This technique permits more elaborate and realistic specification of assumptions, but it is based on an approach similar to that of the model presented here.



(Figure 1. Coast: The Raided)

The total population of the Raided (see Figure 1) declines as a result of the raid, by the amount of those captured and perhaps killed. The age-specific birth rate remains the same after the raid, to the degree that an unchanged family structure tends to keep it the same. On the other hand the loss of population, as with other disasters such as famine and epidemic, might tend to cause an increase in age-specific birth rate. The crude birth rate, however, declines since fertile women are now a smaller portion of the total population. Fifteen years later, therefore, a relative dearth of children under fifteen will remain. By our assumptions, the sex ratio remains equal for all age groups. After fifteen years, however, a relative bulge in women of childbearing age will appear, and the crude birth rate will increase. On the other hand, another slave raid at this point would again reduce the relative size of the 15-30 age group, and reduce the crude birth rate.

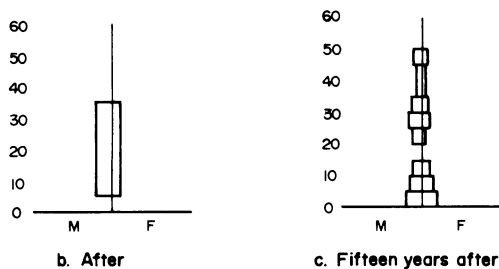


(Figure 2. Coast: The Raiders)

As shown in Figure 2, total population among the Raiders grows as a result of the raid, even after the sale of all male slaves, because half of the female slaves are retained. Most of the women of marriageable age are brought into polygynous relationships (marriage or concubinage), and many of them may end up in harems of the political and military elite. The



age-specific birth rate declines, as a result of the lower fertility of women in polygyny, but the crude birth rate rises because of the larger percentage of fertile women in the total population. Returning in fifteen years, one will find a relatively large number of children under fifteen, and an equality of sexual balance in their cohort as opposed to the predominance of women in the cohort of their mothers. The arrival of women captured in another slave raid, however, would again provide a surplus of women of childbearing age, and would restore the crude birth rate to a higher level; it would otherwise have fallen to a level below the initial level.



(Figure 3. Coast: The Deportees)

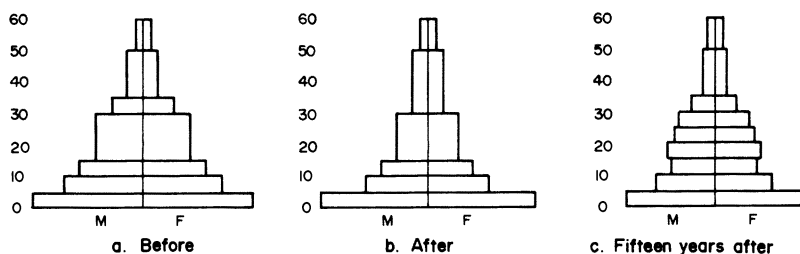
The Deportees from the Coast are assumed to be in the ratio of 2:1, men to women, with a disproportionate number in the age group from 15 to 30. The fertility of women may be assumed to decline, as a result of the harsh conditions of slavery, and the crude birth rate also declines by comparison with their ancestral population, both as a result of declining fertility and as a result of the small percentage of women in the deported population. In the New World, slaves marry slaves, in the great majority, so that the new population is mostly black rather than interracial. This population remains predominantly male, except at the youngest ages. New slaves brought in are predominantly male, so that the sexual imbalance remains, and the population is unable to replace itself because of the shortage of women.<sup>14</sup>

### *The Interior*

As before, it is assumed that the slaves include a disproportionate number of young men and women, ages 15 to 30, captured in equal numbers in a single raid. Female prices are assumed to be higher than male prices on both sides of the desert (since the demand for female concubines and domestics was greater than the demand for male workers), but the

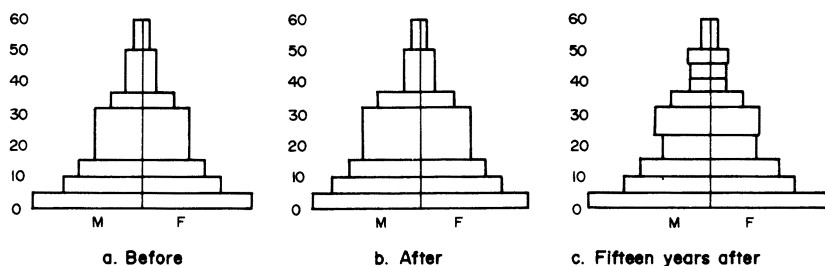
14. Curtin, *Census*, pp. 31-2, 58-60.

differential is assumed to be higher in North Africa and the Mid-East.<sup>15</sup> As a result it is assumed that 2/3 of the females are exported and that 1/3 are retained; and that 1/3 of males are exported while 2/3 are retained.



(Figure 4. Interior: The Raided)

The results of the slave raid, under these conditions, are the same for those who lose in the Interior as for those who lose on the Coast: total population declines, fertility remains unchanged or increases slightly, and crude birth rate falls. A smaller number of children is produced for the next generation, but the sexual balance remains undisturbed.

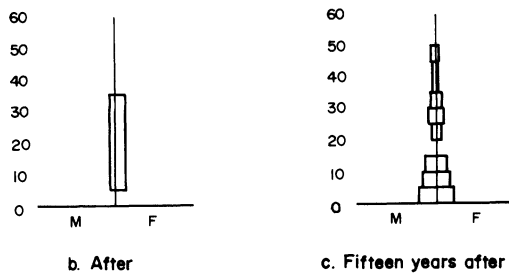


(Figure 5. Interior: The Raiders)

For the Raiders of the Interior, total population grows, with the number of males retained doubling the number of females retained. The women are brought into polygynous relationships, notably with leading figures in the society, and their fertility declines in comparison to fertility in monogamy in their adopted society or in their natal society. The crude birth rate increases because of the additional women brought into the society, but it declines because of lower polygynous fertility and especially

15. For some nineteenth-century figures showing higher prices and a higher differential in prices for women in the export rather than in the domestic slave market, see Roberta Ann Dunbar, "Slavery and the Evolution of Nineteenth-Century Damagaram," in Miers and Kopytoff, *Slavery in Africa*, p. 161.

because of the excess of men in the society: the overall direction of change in the crude birth rate is thus unclear. Slave males, presumably, married only infrequently. Returning in fifteen years, one would find that the population had grown, in addition to its previous growth, as a result of the progeny of the slave women, and that the sexual balance of the new generation would tend to reduce the relative excess of males. By this time, the number of women of childbearing age would have declined, and the crude birth rate would decline as well. The addition of slaves from a new raid would again increase the population, and would again lower the age-specific birth rate.



(Figure 6. Interior: The Deportees)

The slaves exported across the Sahara are assumed to be 2:1, females to males. Once across the desert, the fertility of the slave women declines as a result of their polygynous marriages—and declines even further, to the degree that women fail to marry.<sup>16</sup> The crude birth rate of the slave population would rise, in comparison to ancestral population, because of the large percentage of fertile women. But, as on the southern side of the desert, it may be assumed that slave men did not marry, while slave women did. The result in the Mid-East is the tendency toward disappearance of slaves as a social group: biologically, through assimilation of African slaves into the dominant population, and socially, through the manumission of children of free fathers.<sup>17</sup> After fifteen years the crude birth rate of the slave population would decline as the sex balance becomes more even and as the population ages. The arrival of subsequent slaves would help to replenish this declining population, and would increase its crude birth rate.

16. Austen, "Trans-Saharan Slave Trade," p. 44.

17. Ibid.

To summarize the demographic predictions of the model, comparing each population before and after the raid, the directions of the expected effects are as follows:

The Raided (Coast and Interior): Population declines, age structure becomes younger, a sexual balance is maintained, and no additional incentive for polygyny exists.

The Raiders (Coast): Population increases, age structure becomes slightly older, a surplus of females develops, polygyny is reinforced heavily, little male slavery exists, and male slaves may marry.

The Raiders (Interior): Population increases, age structure becomes older, a surplus of males develops, polygyny is reinforced among privileged strata, male slavery is reinforced, and male slaves do not marry.

The Deportees (Coast): Population declines, age structure becomes older, a large surplus of males develops, a disincentive for polygyny exists, slaves marry slaves, and the slave-descended population remains distinct.

The Deportees (Interior): Population declines, age structure becomes older, a large surplus of females exists, slave women marry free men, slave men do not marry, and the slave-descended population is assimilated.

### *III — THE SIGNIFICANCE OF THE EFFECTS*

If the directions of the effects predicted by the model are relatively unambiguous, it remains to demonstrate that they could have been demographically significant. As noted above, it is impossible with present data to perform a conclusive test. Nonetheless, by specifying some additional assumptions and using available figures on the export of slaves from Africa, one may estimate whether the effects predicted in the model ought to have been of observable magnitude.

Let us make the following assumptions: (1) The Raiders and the Raided, initially, have equally large and structurally identical populations (as shown in Tables 1 and 2); (2) 30% of those captured are of ages 0-14, 50% are of ages 15-30, and 20% are of ages over 30; (3) A mortality of 10% accompanies capture, and an additional mortality of 10% accompanies crossing the Atlantic or the Sahara; (4) As assumed in the model, three-fourths of those captured on the Coast are exported (all the males

TABLE I  
*Coast: Effect of Exporting 1% of Total Population*  
(Assuming initial population of 4000, equally divided between Raiders and Raided.)

	The Raided: Before		The Raiders: Before		The Deportees	
	Females	Males	Females	Males	Females	Males
0-14	500	500	500	500	4.0	8.0
15-30	300	300	300	300	8.0	16.0
> 30	200	200	200	200	1.3	2.7
Total	2000		2000		40	
	The Raided: After		The Raiders: After			
	Females	Males	Females	Males		
0-14	490.1	490.1	504.5	500		
15-30	280.2	280.2	308.9	300		
>30	196.7	196.7	201.5	200		
Total	1934		2014.8			
Population Change	-3.3%		+0.7%			

Note: If the changes shown after the raid are doubled, they may be taken as an approximation of the actual demographic impact of slave exports on the Coast during the eighteenth century, during the course of each decade.

1% of total population

TABLE II  
*Interior: Effect of Exporting 1% of Total Population*  
(Assuming initial population of 4000, equally divided between Raiders and Raided.)

	The Raided: Before		The Raiders: Before		The Deportees	
	Females	Males	Females	Males	Females	Males
0-14	500	500	500	500	7.9	4.0
15-30	300	300	300	300	15.9	7.9
>30	200	200	200	200	2.6	1.7
Total	2000		2000		40	
	The Raided: After		The Raiders: After			
	Females	Males	Females	Males		
0-14	485.3	485.3	504.4	508.8		
15-30	270.6	270.6	308.8	317.7		
>30	195.1	195.1	201.5	202.9		
Total	1902		2044.1			
Population Change	-4.9%		+2.2%			

Note: If the changes shown after the raid are halved, they may be taken as an approximation of the actual demographic impact of slave exports, during the course of a decade, on the Interior during the eighteenth century.

1% of total  
population

and half the females), and half of those captured in the Interior are exported (one third of the males and two thirds of the females).

Here I emphasize that the calculations are rather sensitive to several of the assumptions, to wit: the proportion of women enslaved and exported, the rate of mortality upon enslavement, and the proportion of children enslaved. If we assumed a smaller proportion of women enslaved and exported, the calculated demographic drain is disproportionately reduced. If we assumed a higher mortality in enslavement, in contrast, we would calculate a more serious population drain for a given level of slave exports. And if we assumed more children to be enslaved (but not exported), we would conclude that the age structure of the Raided became older while that of the Raiders became younger. For the present, however, I believe it is appropriate to proceed with the assumptions indicated in the paragraph above: in selecting them, I have assumed that the expected life of a slave was short, and that slave raiders, merchants and purchasers preferred to concentrate on young adult slaves, both male and female, from whom an immediate return could be expected.<sup>18</sup>

Finally, in order to set a standard for purposes of comparison, let us assume that one percent of the region's total population is exported in chains in the year of the raid. Given this and the previous assumptions, Tables 1 and 2 show the immediate demographic impact of the export of one percent of the total regional population as slaves, for the Coast and the Interior respectively.

Table 1 shows that the export of one percent of the Coastal population causes a 3.3% decline in the population of the Raided, and an increase of 0.7% in the population of the Raiders. For the Interior, Table 2 shows that the export of one percent of regional population causes a 4.9% decline in the population of the Raided, and a 2.2% rise in the population of the Raiders.

To assess the relationship between the hypothetical Tables 1 and 2 and the actual impact of slave exports, we may first compare the assumed 1% annual export with estimated actual rates of slave export. For the Coast from Senegal to Angola, an eighteenth-century population of 25 million and an average annual export of 50,000 yield an export rate of 0.2% per

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18. On the enslavement of women, see Dunbar, "Damagaram," p. 160; James H. Vaughan, "Mafakur: A Limbic Institution of the Margi," in Miers and Kopytoff, *Slavery in Africa*, p. 88; Patrick Manning, "Un Document sur la fin de l'esclavage au Dahomey," *Notes Africaines*, No. 147 (1975): 90-1. I wish to thank Martha Olney, Joseph C. Miller and Richard Roberts for their comments on the sensitivity of these assumptions, further analysis of which is being pursued as part of the computer simulations.

year.<sup>19</sup> For the Interior, the savanna from Senegal to the Nilotic Sudan, exports of 7000 slaves per year from a population of 15 million yield an export rate of roughly 0.05% per year.<sup>20</sup> For the Red Sea coast and the Horn, where slave exports followed the model of the Interior, exports of some 4500 slaves per year from a population of under ten million yield an export rate of roughly 0.05% per year.<sup>21</sup>

The tables thus exaggerate the impact of slave exports in any single year. The effect of successive years of slave raids and exports, however, would be somewhat similar to the effect of a large slave raid followed by a lapse of several years. Crudely, therefore, five successive years of exports of 0.2% of the population from the Coast would have an impact similar to that shown in Table 1. For the Interior, similarly, twenty successive years of exports of 0.05% of the population would have an impact equivalent to that shown in Table 2. Or, to phrase the rules of thumb more conveniently, ten years of Atlantic slave trade had an impact roughly double that shown in Table 1, and ten years of Saharan or Red Sea slave trade had an impact roughly one half that shown in Table 2.

The impact of eighteenth-century slave exports on the Coast would thus seem to have been of considerable demographic significance, and the predicted effects should be readily visible in quantitative and qualitative accounts. For the Interior, the predicted effects of slave exports are rather smaller, and would have been visible to observers on a more selective basis. Even in the Interior, however, the impact of slave exports may still have been demographically significant, notably because of the preferential export of women. Further, I have assumed for the sake of convenience that the total population was divided into equal numbers of Raiders and Raided, with no allowance for non-participating groups. If either group were to be less than half of the total population, the relative demographic effects on that group for each one percent of regional slave exports would be magnified accordingly. Increases in assumed rates of mortality or of retention of slaves by the Raiders would have the same result.

Having indicated, through comparison of actual rates of export of slaves with the assumed one percent per year in the model, that the

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19. The figure of 25 million for the coastal population is guessed at by allocating 15 million out of Fage's estimate of 25 million for all of West Africa to the Coast, and then adding another 10 million for West Central Africa (the Congo-Angola region).

20. The estimated total Interior population of 15 million includes the remaining 10 million on the West African savanna, plus 5 million in the Nilotic Sudan.

21. A population of 8 million for the Horn in the eighteenth century is consistent, given the above estimates for other regions, with the relative population of the various regions today.



magnitude of the predicted effects might indeed have been large enough to be observable, let us further examine the properties of the model, turning first to the closely related issues of the sex ratio, marriage patterns and fertility.

For the Coast, as shown in Table 1, the sexual balance among the Raided remains the same by assumption, while among the Raiders the female population rises from 50% to 50.7% of the total. The proportion of women of child-bearing age (15-30) among the Raided falls from 15% to 14.5% of population, while among the Raiders the equivalent figure rises from 15% to 15.3%. Among the Deportees, women of child-bearing age are 20% of the total. Among the Raided, the ratio of women 15-30 to men over 15 (a proxy for the ratio of potential brides to grooms) falls from 60% to 59%, while among the Raiders the equivalent ratio rises from 60% to 62%. Among the Deportees, the ratio falls to a much lower 43%. Thus slave raiding acts as an incentive to polygyny among the Raiders, and as a disincentive to polygyny among the Raided and especially among the Deportees.

Turning to the Interior, as shown in Table 2, the sexual balance among the Raided remains the same by assumption, while among the Raiders the female population falls from 50% to 49.6% of the total population. The proportion of women of child-bearing age among the Raided falls from 15% to 14.2%, while the proportion of women of child-bearing age among the Raiders rises from 15% to 15.1%. Among the Deportees, women of child-bearing age are 40% of the total. Among the Raided, the ratio of women 15-30 to men over 15 (as before, a proxy for the ratio of potential brides to grooms) falls from 60% to 58%, while among the Raiders it falls from 60% to 59% of total males but rises to 62% of non-slave males. Among the Deportees the ratio rises to 74%, but the figure is not relevant since slave women did not marry slave men. The export of slaves thus reinforced polygyny in the mid-East and discouraged it among the Raided; it acted to reinforce polygyny among the Raiders to the degree that male slaves were unable to marry.

Assuming constant rates of age-specific fertility, the slave trade would have decreased the crude birth rate among the Raided everywhere and among the Raiders in the Interior; it would have increased the crude birth rate among the Raiders on the Coast and among the Deportees everywhere. For the Deportees in the Atlantic trade, however, the very low rate of age-specific fertility is a well-attested fact, and is surely related to

the strenuous and degrading conditions of New World slaves.<sup>22</sup> Similar indications are given for slaves in North Africa.<sup>23</sup> The same factor may have made itself felt in African societies, thus reducing the age-specific fertility of women among coastal and interior Raiders. In addition, marriage patterns had a differential effect on fertility: it is generally the case that women in polygynous marriages have fewer children than those in monogamous marriages.<sup>24</sup> Among the Raided, therefore, age-specific fertility might have been increased by the modest decline in polygyny, while among the Raiders fertility would have been decreased by the expansion of polygyny. Deportees across the Sahara would have suffered a decline in fertility, as they entered concubinage or multiple marriage, while trans-Atlantic Deportees would have had an increase in age-specific fertility due to this factor. For the latter instance, it is clear that this effect was too weak to overcome the negative impact of slavery on fertility.

The effects of slavery on fertility can perhaps be estimated for New World slave populations, though it is not obvious that the results could be extended to other regions. The effect of polygyny on fertility, however, can be observed in current African data. Census reports suggest that marital fertility in polygyny is significantly lower than in monogamy, and that the effect is compounded as the number of wives increases: the differential is as much as 20% for marriages in the same society.<sup>25</sup>

The modern distribution of polygyny in western Africa gives indirect support to the predictions of the model on the impact of slave exports on

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22. Curtin, *Census*, pp. 28-34. On the high rate of abortion among West Indian slaves, see Gabriel Debien, *Les Esclaves aux Antilles françaises (XVIIe - XVIIIe siècles)* (Basse-Terre and Fort-de-France, 1974), pp. 363-6.

23. Austen, "Trans-Saharan Slave Trade," p. 50.

24. The magnitude of this differential is yet to be agreed upon by demographers, as it interacts with other factors. See Victor Piché, "Social Change, Family and Fertility in Sub-Saharan Africa: Theoretical and Methodological Appraisal" (Ph.D. dissertation, Cornell University, 1974), pp. 80-4, 122-7.

25. For years ranging from 1955 to 1962, marital fertility for women 15-49 (measured in births per thousand per year) is reported as follows:

Country	Monogamy	Two Wives	Three or More Wives
Guinea	274	246	222
Mali	264	218	(two and more)
Ivory Coast	261	218	182
Gabon	128	111	99
Central African Rep.	196	168	140
Congo	211	141	(two and more)
Zaire	188	163	114

United Nations, Economic Commission for Africa, *Demographic Handbook for Africa* (1971), p. 85.

polygyny: polygyny is more concentrated on the Coast than in the Interior, and it is more concentrated among populations corresponding to the Raiders of earlier days than among the descendants of the Raided.<sup>26</sup> While the pattern appears surprisingly clear-cut, accepting this contemporary evidence requires a string of assumptions. That is, it must be assumed that marriage patterns established in the slave-trade era have persisted. The old patterns, once maintained by the transfer of women as slaves, must be assumed to be propagated at present by varying differences in the age of marriage of men and women, or by continued transfer of women among ethnic groups and social classes in continuation of the old pattern.<sup>27</sup>

With regard to the age composition of populations, both Table 1 and Table 2, though synchronic, give support to the notion that the population of the Raided was made significantly younger by slave raiding, and that the population of coastal and interior Raiders became older, though to a lesser degree. The population of the Deportees was substantially older than that of their natal societies, as the 0-14 population fell from 50% to 30% of the total among the Deportees. Evidence on the age distribution of slaves crossing the Atlantic suggests that the population was even older

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26. Ibid., p. 86. Thornton has noted the high incidence of polygyny in nineteenth-century Angola. "Slave Trade," p. 425.

27. Augé and Terray have interpreted the modern movement of women from Upper Volta and the interior of Ivory Coast to marry men of the coastal region as the continuation of a pattern set in the days of slave trade. Emmanuel Terray, "Commerce pré-colonial et organisation sociale chez les Dida de Cote d'Ivoire," in Claude Meillassoux, ed., *The Development of Indigenous Trade and Markets in West Africa* (London: Oxford University Press, 1971), pp. 149-50; Marc Augé, "Les Faiseurs d'ombre. Servitude et structure dans la société alladian," in Meillassoux, *L'Esclavage*, p. 456.

than the model has indicated.<sup>28</sup> This would imply either that children were not captured in raids, or that they were retained by the Raiders. In the former case, the effect of the slave trade in reducing the average age of the Raided would have been strengthened; in the latter case, its effect in increasing the average of the Raiders would have been reduced—or, in the extreme case, reversed.

These short-term changes in the age structure cause additional effects on the rate of population growth. For the Raiders, the collection of slaves increases their total population in the short run, and the collection of marriageable women increases their potential for further growth. The rate of population growth, however, is reduced by the age structure which becomes progressively older, as the slaves, who are brought in at a

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28 The following table gives some examples of available evidence on the distribution of slaves by age and sex categories:

	A	B	C	D	E
Children as % of Total	25.0	7.0	24.6	33.9	51
Boys as % Males	26.1	6.9	22.9	24.9	59
Girls as % Females	32.0	7.0	28.7	47.8	37
Females as % Total	36.1	38.2	28.5	39.3	39
Women as % Adults	37.1	38.2	26.9	31.0	49
Girls as % Children	33.2	38.9	33.3	55.3	29

- A. Dahomey, 1713-1720 (12,697 slaves in sample). Jean Mettas, *Répertoire des expéditions négrières françaises au XVIII<sup>e</sup> siècle*, edited by Serge Daget (Nantes: 1978).
- B. English ships arriving in Jamaica, 1791-8 (30,805 slaves in sample). Herbert S. Klein, *The Middle Passage* (Princeton: Princeton University Press, 1978), p. 149.
- C. Slaves arriving in Havana, 1790-1820 (181,909 slaves in sample). Klein, *Middle Passage*, p. 223. I have classified the teenagers in Klein's table as adults here. Most of these slaves came from Angola.
- D. Slaves recaptured after embarkation from the Bight of Biafra, 1821-39 (sample of 24,502). Northrup, *Trade Without Rulers*, p. 239.
- E. Slaves loaded in Gabon, 1833 and 1851 (172 slaves in sample). Patterson, *Northern Gabon Coast*, p. 80.

In two other calculations for ships arriving in West Indian ports, 1791-98, Klein found a percentage of children ranging from 6% of the total (Bight of Benin) to 22% (Sierra Leone), with an overall average of 14%; and he found a percentage of females ranging from 31.6% of the total (Angola) to 42% (Bight of Biafra), with an overall average of 35.3%. For Angola, he found recorded proportions of children among slaves exported ranging from 13% in the 1730s to 2% in the 1760s. Klein, *Middle Passage*, pp. 36, 150.

median age of fifteen to twenty rather than at birth, continue to age.<sup>29</sup> This reduction in population growth is accentuated, as noted above, by the expansion of polygynous marriage. In sum, the population of the Raiders continues to grow; whether the rate of growth remains greater than in the absence of slave imports depends, basically, on whether the number of slaves imported continues to grow.

The impact of mortality on slave trade was unquestionably more complex and more variable than the simple 10% on raiding and 10% on long-distance travel assumed in the model. Because of both epidemiological and sociological considerations, it seems safe to assume that young women suffered the least degree of mortality. Their mortality is low under natural conditions, they were highly prized and likely to benefit from careful treatment, and they were less likely than men to lose their lives in war. Even in the Middle Passage, where the value of male slaves was higher, women suffered a lesser mortality than men.<sup>30</sup> Old people of both sexes and small children of both sexes had a relatively higher mortality, as slave trade brought an intensification of their normally high mortality. For young men, the question is more complex. They were less likely to die of exhaustion and disease than any except young women. At the same time, it is they who were the prime victims in wars, slave raids and slave uprisings. As an additional factor, it is known that in some cases during the nineteenth century all male captives were executed, since their value was low and they presented a threat of resistance.<sup>31</sup>

These considerations suggest that the mortality rates assumed in the model may well be low, especially as regards males, the old and the young. These factors in turn suggest that, for each one percent of the total population exported, the negative effect on the Raided is greater than that shown in the tables, and the relative concentration of marriageable women in the hands of the Raiders is greater than that shown.

With regard to long-term population trends, the implications of Table 1 are that, for the Coast, it is not possible for the slave trade to have been conducted under a stable pattern of raids by one group against another, as the Raided would virtually have disappeared under these conditions. A simple projection of the change in population shown in Table 1 for ten

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29. Unless, that is, the slaves die relatively soon under their new masters. The possibility that slaves in African societies had different vital rates than their masters, while difficult to document, should not be overlooked.

30. Johannes Postma, "Mortality in the Dutch Slave Trade, 1675-1795," in Gemery and Høgendorn, *The Uncommon Market*, pp. 255-7.

31. Claude Meillassoux, "Rôle de l'esclavage dans l'histoire de l'Afrique occidentale," *Anthropologie et Sociétés* 2 (1, 1978): 131.

decades indicates that if the initial ratio of Raiders to Raided were 50:50, at the end of a century they would be roughly 75:25, and that the disparity would be relatively greater if the two populations did not sum to 100% of the regional total.<sup>32</sup> This would suggest that many peoples victimized by the Atlantic slave trade were annihilated. To the contrary, however, the ethnic map of the coastal region, at least insofar as it can be reconstructed from European records, has shown remarkable stability over the past five centuries.<sup>33</sup> We are left to conclude that the Raiders and the Raided each lost people to slavery, that the Raiders and the Raided exchanged roles from time to time, or that the Raiders also sold slaves from within their own societies, despite frequent protestations that such action was illegal.<sup>34</sup>

For the Interior, where the demographic impact of slave exports was perhaps smaller, the equivalent calculation does not yield as great a degree of differential growth between the Raiders and the Raided; over the course of a century, the ratio grows from 50:50 to 60:40.<sup>35</sup> For this case also, it might be well to relax the assumption that the Raiders and the Raided were consistent and separable entities.

The model has been presented as if raiding were the only method of obtaining slaves. In fact kidnapping and judicial procedures were important, if usually subsidiary, mechanisms for obtaining slaves. This fact helps justify the assumed age distribution of the slaves. That is, to the degree that capturing people in a raid tends to cut a uniform swath through the entire population, yielding captives of all ages and both sexes, individual enslavement by other methods permitted more careful selection. Kidnappers could most easily pick out the more mobile (because more economically active) sector of the population; court proceedings and witchcraft accusations could target those likely to yield the highest price. Kidnappers would

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32. Doubling the figures in Table 1 and applying them to a decade, one estimates that the Raiders gain in population by 1.5% in the first decade, and that the Raided lose 6.6%; these figures, compounded, lead after a century to a 75:25 ratio. Calculating on the basis of the number of fertile women—as in note 39 below—yields a more extreme result.

33. P.E.H. Hair, "Ethnolinguistic Continuity on the Guinea Coast," *Journal of African History* 8 (2, 1967): 247-68.

34. Examples of fratricidal wars were common for the Bight of Benin, kidnapping was an important means of enslavement in the Bight of Biafra, and other examples may be cited. See I.A. Akinjogbin, *Dahomey and its Neighbours, 1708-1818* (Cambridge: Cambridge University Press, 1967); Northrup, *Trade Without Rulers*, pp. 69-73; Phyllis M. Martin, *The External Trade of the Loango Coast, 1576-1870* (Oxford: Oxford University Press, 1972), pp. 167-8; Joseph C. Miller, "Imbangala Lineage Slavery," in Miers and Kopytoff, *Slavery in Africa*, p. 216; Carol P. McCormack, "Wono: Institutionalized Dependency in Sherbro Descent Groups," *ibid.*, p. 194; Dunbar, "Damagaram," p. 160.

35. Halving the figures in Table 2 and applying them to a decade, one estimates that the Raiders gain in population by 1.1% in the first decade, and that the Raided lost 2.5%—yielding a ratio of 60:40 after a century.

tend to catch young people, while the courts and witch-hunters would condemn relatively older people, and perhaps more men than women.<sup>36</sup>

Thus far it has been assumed that the export of slaves reduced the net reproduction rate or the rate of African population increase. Now we may reconsider whether this was the case. Some observers have assumed that African populations could adjust to the loss of slaves by increasing their birth rate, thus partially or even wholly offsetting the loss; it has even been suggested that high birth rates in some African societies are an artifact of the slave trade.<sup>37</sup> On closer examination, however, the notion of the Raided replacing themselves entails some difficulties. While the response of families to the loss of small children through famine or epidemic has been documented—families tend to replace lost children with new ones—the problem is not the same in the slave trade. Here the main victims are not small children, but the very men and women who would normally be called upon to replace the lost population: it is only with difficulty that parents replace a lost teenage child, owing to declining fertility with age. Thus, while it would not be surprising to find that age-specific fertility among the Raided increased after a slave raid, it is unlikely that the crude birth rate would increase or even maintain itself. The remaining possibility is that of a longer-term upward adjustment of birth rates among the Raided: this would not overcome the loss of population within a generation, but it might, in comparison with the previous lower birth rate, prevent relative decline of the population in future generations. But even a long-term increase in birth rate has the disadvantage of putting a larger population at risk to future slave raids, so that such a strategy might fail.<sup>38</sup>

Summarizing the projected results of the eighteenth-century export of slaves, we find that the total population of the western coast of Africa and of the northern savanna may have been reduced, and that the

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36. These mechanisms of enslavement presumably entailed a lower mortality than did warfare and raiding. See Northrup, *Trade Without Rulers*, pp. 69-73, 75-6; Wyatt MacGaffey, "Economic and Social Dimensions of Kongo Slavery," in Miers and Kopytoff, *Slavery in Africa*, p. 254; Christopher Fyfe, *A History of Sierra Leone* (Oxford: Oxford University Press, 1962), pp. 8-9. Curtin has noted the preponderance of enslavement by capture in West Africa, as contrasted with the relative importance of judicial enslavement in Angola. Philip D. Curtin, *Economic Change in Precolonial Africa: Senegambia in the Era of the Slave Trade* (Madison: The University of Wisconsin Press, 1975), p. 154.

37. Marion Johnson, "The Atlantic Slave Trade and the Economy of West Africa," in Roger Anstey and P.E.H. Hair, eds., *Liverpool, the African Slave Trade, and Abolition* (Bristol: 1976), p. 30.

38. On this issue it might be fruitful to compare African populations giving up large numbers of slaves with nineteenth-century European populations which produced young adult emigrants for several succeeding decades. See Brinley Thomas, *Migration and Economic Growth* (Cambridge: Cambridge University Press, 1954).

population in 1800 was significantly less than it would have been without slave exports. Let us assume that the net reproduction rate was governed, in the long run, by changes in the numbers of females aged fifteen to thirty. In that case, a projection of the calculations of Tables 1 and 2 over a century indicates that, for the Coast, population declined by some 15% for the region as a whole, with a sharper decline for the Raided. Similar calculations for the Interior imply that total population of the region was held constant, and that the population of the Raided declined.<sup>39</sup>

To turn from hypotheses to real data, we are fortunate to have at least one census with which to address the issue of depopulation. In an article presenting what is to date the most specific data on the demographic impact of slave exports on Africa, John Thornton has analysed two Portuguese censuses of Angola for 1777 and 1778.<sup>40</sup> It is an excellent analysis, yet one that I find too optimistic about the ability of African populations to replace themselves.

The census reveals a population with an excess of women, a dearth of young children, and a relatively old male population. It is thus broadly consistent with the model of the Coast, including both the Raiders and the Raided, although the former are perhaps better covered. Thornton calculates that this Angolan population of roughly 500,000 was able to generate a net addition of 12,000 persons per year and, after accounting for the arrival in Angola of slaves from beyond its borders, was able to export an average of 16,000 slaves per year without net loss in population.<sup>41</sup>

Under these conditions, Thornton asserts that Angola was able to export an annual number of slaves equal to three percent of its population

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39. For the Coast, Table 1 shows a decline of total females aged 15 to 30 from 600 to 589.1 after the raid and export of slaves, a decline of 1.81%. Doubling this to estimate the loss for a decade (see p. 16 above), we estimate a 3.6% loss, or 36 per thousand per decade. If the rate of natural increase is 15 per thousand, then the net loss is 16 per thousand per decade, or over 17% for ten decades compounded.

For the Interior, Table 2 shows a decline of females aged 15 to 30 from 600 to 579.4, or 3.43%. Halving this to estimate the loss per decade (see Table II), we estimate a 1.7% loss or 17 per thousand per decade. This would just cancel out a natural growth of 15 per thousand per decade.

If, on the other hand, we assumed a higher rate of natural increase of, say, five per thousand per year or fifty per thousand per decade, the results of slave exports might be seen as having slowed but not halted total population growth. Much of this difference, however, would be cancelled out by the fact that, by assuming a higher rate of growth, we are at the same time assuming a lower initial population from which a given (and now proportionately larger) number of slaves is to be drawn.

40. Thornton, "Slave Trade."

41. *Ibid.*, pp. 421-4. For comparison, see Figures 1b and 2b (or, alternatively, 1c and 2c) and Table 1.



without experiencing net depopulation. This calculation of net rate of reproduction is conceptually correct, though it is sensitive to a number of possible changes in parameters. If mortality rates in enslavement were higher, or if a larger proportion of women were exported, then such an export rate could easily lead to depopulation.

Although Angola fits the model of the Coast, many exported slaves came from a great distance inland. Let us therefore attempt to disaggregate this coastal region, and consider the probable sub-regional structure of slave prices. We shall divide it into the Littoral and the Hinterland, remembering that Raided and Raiders are to be found in both sections of the region. (The Angolan Hinterland differed from the northern savanna Interior in that its export market was dominated by the demand for male rather than for female slaves.)

In the Hinterland, local demand and prices for male slaves were low, while the local demand for female slaves kept their prices higher than those of males. On the Littoral, the export demand for male slaves kept male prices higher than those of females. At the same time, however, the concentration of purchasing power in the hands of slave merchants on the Littoral meant that the prices of female slaves were higher there than in the Hinterland. Thus prices for both male and female slaves were higher on the Littoral than in the Hinterland, though the differential was far greater for males.

The Hinterland thus exported virtually all its male slaves and perhaps half of its female slaves to the Littoral, and developed a high rate of polygyny.<sup>42</sup> Raids along the Littoral, in contrast, led to export of a relatively large proportion of women and children. Thus the Littoral was at once buying, raiding and selling female slaves, but the net result was a lower rate of polygyny than in the Hinterland. In sum, most male slaves exported from Angola came from the Hinterland, while most female and child slaves exported from Angola came from the Littoral.<sup>43</sup> The drain on the Hinterland population took the form of the export of many men and some women. The drain on the Littoral population, if dominated by the loss of males, included the export of women in larger proportions than from the Hinterland—though this loss was partially mitigated by the import of women from the Hinterland.

Thornton has concluded that the census is representative of the totality of the Raiders and the Raided. But the very high ratio of women to men suggests to me that, elsewhere, families lost large numbers of both men

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42. *Ibid.*, p. 425.

43. See note 28 above for indications on the age and sex of slaves exported from Angola.

and women, and that an important but declining population of the Raided is excluded from the picture. Joseph C. Miller, who supports Thornton's belief that Angola escaped depopulation, has suggested that a gradually expanding perimeter worked its way inland from the Congo-Angola coast over a three-century period, with depopulation at the perimeter, but with stable or growing population on either side of it.<sup>44</sup> Perhaps a test can be devised to distinguish among these possibilities.

Regardless of this issue, however, Thornton's analysis cannot, unless additional assumptions are introduced, be used to argue that coastal populations are now greater than (nor even equal to) what they would have been in the absence of slave exports. Unless the age-specific fertility of African women is increased by slave trade, and as long as some females are exported (they ranged from one fourth to one third of the slaves exported from Angola), then the population can never catch up to what it would have been in the absence of slave exports.

On the other hand, Thornton's prediction of a great surge in the rate of Angolan population growth at the end of the Atlantic trade is surely correct, as the children of the dominantly female population were now allowed to remain.<sup>45</sup> An equivalent surge in population growth, although of a different character, certainly occurred in the nineteenth-century northern savanna, as the export of women slaves from the region ceased.

Thornton's study is revealing in its demonstration of the mechanism by which African populations fueling the slave trade were able to maintain themselves in the face of a heavy demographic drain, and in its demonstration of the effect of slave exports in transforming African social structures. Thornton argues a well conceived case against the notion of African depopulation in the era of the slave trade. On the other hand, as I have attempted to show here, the case for depopulation is also strong.

One cannot, however, project population gains under the hypothetical absence of slave trade without considering other possible checks to population growth. The spectre of the cheerfully pessimistic Malthus is there to remind us that if Africans did not succumb to slavery, they would succumb to something else: epidemics, crop failures and warfare limited population size. Malthus, in his brief discussion of Africa and slavery, noted both the checks on population caused by slavery (along with its accompanying disorder and uncertainty), and the alternative checks

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44. Joseph C. Miller, personal communication.

45. Thornton, "Slave Trade," p. 426.

which would arise should the slave trade be ended.<sup>46</sup> Both must be considered in more detail to obtain an accurate picture of the demographic impact of African slavery.

On one side, Africa lost population not only through the export of and through directly inflicted mortality, but through epidemics caused by additional population movement, through agricultural productivity lost because of abandonment of good but exposed land, and through famine caused by the displacement of population and incomplete attention to agricultural work. (Famine was of course a cause as well as a result of enslavement.) On the other hand, if the population had been allowed to grow in the absence of slave trade, it would have run into the limits on land and productivity. These pressures might, in the optimistic view, have stimulated technical and institutional innovations which would have spurred economic progress in Africa.<sup>47</sup> Alternatively, the same pressures might eventually have precipitated a demographic crisis, in which population would have fallen as a result of epidemic and famine.<sup>48</sup> Indeed, adopting a form of the latter outlook, one could treat the export of African slaves as a sort of institutionalized demographic crisis, or, equivalently, as a morbid sort of safety valve which prevented demographic crises.

Backward projections of African population, despite high error margins, must inevitably form part of this sort of study, in order to permit estimation of demographic rates in earlier times. The initial assumptions of constant rates of natural increase in these backward projections must be questioned and, where possible, modified. If African populations were like others in the world, their growth rates, birth rates and mortality rates varied from generation to generation. The drought and famine of the mid-eighteenth century in the western portion of the northern savanna provide a clear example of an African demographic crisis, and it is likely that a more careful reading of available evidence will permit the rediscovery of other such crises.<sup>49</sup> In addition to determining the timing

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46. Thomas Robert Malthus, *An Essay on the Principle of Population*, 4th ed., 2 vols. (London: 1807), pp. 174-81.

47. For a development of this view, see Esther Boserup, *The Conditions of Agricultural Growth* (London: Aldine Publishing Co., Inc., 1965).

48. Work in progress by Joseph C. Miller, John Thornton and others is exploring this possibility for the Congo-Angola region.

49. Paul E. Lovejoy and Stephen Baier, "The Desert-Side Economy of the Central Sudan," *International Journal of African Historical Studies* 8 (4, 1975): 551-81; Gerald W. Hartwig, "Social Consequences of Epidemic Diseases: The Nineteenth Century in Eastern Africa," in Hartwig and K. David Patterson, eds., *Disease in African History* (Durham: Duke University Press, 1978), pp. 25-45.

and the magnitude of such crises, it remains to determine to what degree the export of slaves provoked crises by spreading disorder, thus reinforcing cyclical trends in African population, and to what degree the export of slaves reduced population pressure, thus smoothing cyclical trends in African population.<sup>50</sup>

#### IV — CONCLUSION: AFRICAN SLAVERY AND THE WORLD ECONOMY

The demographic model suggests conclusions on three main issues: on the size of African population, on its composition, and on the dependence of these factors on outside influences. First, to phrase the hypothesis in counterfactual terms, the population of Africa, which is relatively sparse by world standards, would have been greater today if it had not been for the slave trade. Direct depopulation through forced emigration combined with induced conditions of disorder—which, for example, increased mortality and made it unwise to farm some of the best land—to restrict net population growth. There remains the logical possibility that the export of slaves induced a higher birth rate which eventually counteracted the loss of population, but I do not find the possibility persuasive.

Secondly, the model indicates that the impact of slavery on African patterns of marriage, and on age and sex structures of the population, have been neglected. Most obviously, neglect of the role of women in slavery has caused bias and error in many accounts of both domestic slavery and the export trade.

Finally, the model is built on the presumption that the level of external demand and the changes in external demand were the main factors conditioning the course of slavery on the African continent. If this assumption has yet to be proved, I hope I have shown that it is consistent with many of the characteristics of African slavery. European conquerors, as they strode across the continent in the great days of empire-building, spoke of “opening up” Africa to outside influence: in their view, Africa did not constitute part of the world economy until Europeans were in place to direct the continent’s economic affairs. In fact, Africa was fundamentally and tragically involved in the world market, as is shown especially by the great extension of slavery in the nineteenth century. The immense extent of slavery in the nineteenth century, however, was a recent phenomenon for almost the entirety of the continent, which

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50. The inverse relationship must also be considered: famines stemming from other causes might have induced surges of slave exports, while epidemics may have reduced the number of slave exports. Cooper, *Plantation Slavery*, pp. 126-7.

cannot be projected backward in time. This brutal regime of African slavery—representing, in different senses, both a high point and a low point in the history of the continent—was no simple reflection of African barbarity. To a much greater degree, it was a logical consequence of changes in world trade.