Population Growth and Agrarian Change in the Spanish Caribbean: Evidence from Puerto Rico's *Padrones*, 1765-1815

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INTRODUCTION

The final decades of the eighteenth century marked a pivotal moment in the Spanish Caribbean's relationship with the colonial metropole, Spain, and other vital trading partners in the Atlantic world.[1] Buoyed by an unprecedented rise in Europe's demand for tropical commodities, Spain's Antilles and the surrounding continental lowlands began to produce an unprecedented volume of high-value tropical staples (coffee, sugar, cacao, and others) for sale in European and North American markets. As this economic upsurge reflected a general shift from animal husbandry to agriculture, in many instances peasant production of subsistence crops kept pace with rising exports. Thus, both in areas suitable for sugar cane, coffee, tobacco, cacao, and a handful of other tropical staples, and in zones where the impoverished inhabitants grew bananas, plantains, maize, cassava and other traditional root crops, the outcome of this passage to more intensive modes of land utilization was much the same: the

opening of an agricultural frontier where once there were grasslands and thick forests, and where the sight of hundreds of thousands of heads of cattle once signaled Spain's inability to imitate its European rivals in forging profitable plantation societies based on the labor of African slaves.

Spanish imperial policy had much to do with this shift in agricultural production and land use. Eager to embrace the new economic opportunities of an expanding Atlantic economy and mindful of the military and strategic implications of not doing so, the Spanish Bourbons had adopted since the 1730s new policies to modernize and rationalize the domains of trade (including the slave trade), property rights on land, the military (including local militias), urban administration, fiscal management, and many others.[2] With these moves the Crown wished to expedite the colonies' integration into Atlantic circuits of commodity exchange while keeping them securely in Spanish hands. The latter objective became especially important after the British captured Havana in 1762 during the Seven Years' War, an occupation that demonstrated to the propertied classes of that city the economic benefits of secure access to consuming markets in Europe and to a steady supply of African slaves.[3] In the end, the combination of stepped-up external demand and the promotional policies of the Spanish state yielded results. By the turn of the nineteenth century, Cuba and Puerto Rico were on their way to becoming some of the world's most specialized export-agricultural countries.[4]

The expansion of agriculture and commerce in Spain's dominions in the second half of the 1700s was part of a more general process of Caribbean economic and demographic growth within the Atlantic system.[5] This growth took place through various overlapping channels: a system of commodity trades exchanging colonial staples for metropolitan manufactures and foodstuffs; a specialized trade in coerced laborers, specifically, in this period, slaves from Africa; and a mostly uncoerced migration of Europeans to the New World.[6] Jamaica, the British Caribbean's "sugar colony" *par*

excellence, saw the peak of its development as an export producer and slave society around the midpoint of the eighteenth century.[7] Saint-Domingue, an even larger and more populous French colony, reached its peak in the waning years of the 1780s, on the eve of the French Revolution, by which time the western third of Hispaniola had become the most treasured French possession in the Atlantic.[8] To one degree or another, then, all of the Caribbean region took part in the expansion of overseas trade, agriculture, and immigration—and no doubt because of this, in a remarkable increase in total population, whose rate of growth may have peaked around 1800.

Research on this crucial age in Caribbean history has been uneven. On one hand, the economic history of the region, beginning with the British and French islands' sudden transformation into engines of growth in the seventeenth century (the so-called "Sugar Revolution"), is fairly well understood.[9] The plantation and commercial wealth of these slave societies was chronicled in the eighteenth century by writers like Bryan Edwards, commenting on Jamaica, and Mederie Louis Elie Moreau de Saint-Mèry, on Saint-Domingue, and for generations thereafter by a host of concerned parties: planters and managers, colonial officials, abolitionists, missionaries, naturalists, and many others. About one hundred years ago, these topics also became the object of study by professional historians, and for the remainder of the twentieth century the Caribbean's colonial (typically slave-based) economies were the subject of intense scholarly scrutiny.[10]

The demographic foundations of the Caribbean's eighteenth-century colonial-capitalist expansion, by contrast, have been less studied and are poorly understood. A detailed demographic history of the region or of any of its major parts before the twentieth century is, in fact, yet to be written.[11] Although research has yielded information on gross population totals, the age-sex structure of slaves, and other important baseline knowledge, these works have not been sufficiently specific at times to satisfy the demographic historian's need for detail and breadth.[12] We know, for example, that af-

ter a long period of stagnation or very slow growth, the Caribbean population in the second half of the eighteenth century increased at rates that most likely exceeded those of any large region of the Americas with the exception of British North America. We also know that the growth spurt was widespread, affecting the Sugar Colonies as well as the longer-settled, but much less developed and more thinly settled Spanish territories. One important engine for this growth, the slave trade, has been studied exhaustively. Thanks to an abundant scholarship on this all-important supply mechanism of slave societies, we have a clear picture of how many persons were introduced in each of the Caribbean colonies and what profile this forced "immigrant" groups exhibited in terms of age, sex, and ethnic origin.[13] Scholars have also noted the parallel growth of the free population of color, an element derived primarily from the slave population, of course, but also in part from the European group as well.[14] Such growth appears to have been especially fast during the period that concerns us: the latter third of the eighteenth century and the beginning years of the nineteenth. Finally, for a few islands, such as Cuba, we have begun to collect clues on the degree to which European immigration may have significantly affected the population growth curve in the late eighteenth- and early nineteenth-centuries.[15]

The present study seeks to contribute to a general narrative of Caribbean demographic history during an age of accelerated change. Our primary objective is to trace some of the more important general trends of Puerto Rico's population from 1765 to 1815, using aggregate data collected by the government[16] and uncovered in the Archivo General de Indias in Seville, Spain. A secondary aim is to suggest elements for a hypothesis linking the effects of agricultural growth and other institutional and economic changes on population structure and dynamics. Our sources, a series of census summaries compiled by Spanish officials, are admittedly inadequate to garner the details needed to fully understand the mechanisms of population change. It would be necessary to collect birth, death, and marriage data before attempting this task, and

even this method is bound to present problems not envisioned by the European historical demographers who, a couple of generations ago, proposed ways to use parish data.[17] But putting aside the well-known deficiencies of aggregate or summary census materials, especially those from a pre- or proto-statistical era, we feel we can use them to formulate new questions and arrive at provisional answers. Starting from such questions and hypotheses, one might carry out a more informed study of the late eighteenth-century transition in the Caribbean than has been possible to date. Furthermore, we hope to illuminate the very early stages of Puerto Rico's turn toward a high-fertility, high-immigration demographic regimen, and to insert this case into discussions about similar demographic transitions in the Caribbean, Latin America, and elsewhere.[18] It is in this vein, as a sketch of one colony's socio-economic history in a period of transition, with lessons for comparative study, that this study is offered.

The Transitional Context

The period under scrutiny (1765-1815) brackets a crucial juncture in the relationship between a colony and the imperial systems to which it belonged. It was then that Bourbon reformers aggressively restructured the economic basis which had sustained Puerto Rico's small population through a long period (ca. 150 years) of relative isolation from the mainstream of empire.[19] Taken together, the reforms amounted to a reworking of the colonial bond.[20] They entailed foremost the dismantling of an economy based on open-ranch grazing and the disintegration of its supporting structures—a latifundiary landholding system and pervasive contraband trade—and their substitution by new practices based on agriculture and more conventional (i.e., legal) ties to overseas markets.[21] Agricultural and commercial expansion, an early sign of the new economic order's emergence, was conditioned primarily by external factors: the Bourbon trade reforms, for one, which opened channels through which part of the island's production flowed to market in Europe, and Spain's decision to reinforce the military garrisons in San Juan, which supplied the capital needed for the Puerto Ricans' small

but successful experiment with export production.[22] Internal conditions then reinforced the process. The introduction of coffee in the 1730s, its favorable adaptation to local conditions, and the reputation for quality (and higher prices) the Puerto Rican product obtained in consuming markets raised returns from agriculture far above those from grazing, while demonstrating in the process the viability of a more intensive exploitation of land and labor in agriculture. Coffee also stimulated the colonization of the island's mountainous interior, the most suitable zone for its cultivation but an area once marginal to the cattle economy.[23] By the mid-1810's the transition from a predominantly pastoral to a mixed economy, combining a growing export business with the more traditional cattle-raising and peasant activities, was virtually complete. Relative to the 1770's, production in agriculture had jumped ahead and a significantly greater portion of the island's output was commercialized, while stock raising had undergone a measurable decline.[24]

Changes like these inevitably had a profound impact upon the size, structure and movement of Puerto Rico's population. During the second half of the eighteenth century it grew faster than in any *previous* or *subsequent* period in island history. Further, its racial composition was noticeably altered due to augmented slave importations and, most likely, as we shall see, the high frequency of manumissions. The interplay between fertility, mortality and migration, and its effects upon population growth, also underwent important shifts. The combination of high fertility, relatively low mortality, and short-lived but intense immigration before 1800 produced fast overall growth (see below). Thereafter, the rate of increase appears to have slowed down possibly due to slowed natural reproduction and—contrary to common belief—a reduction in immigration.[25]

THE *PADRONES*: DESCRIPTION AND VALUE

Given its status as a valuable military colony, it is not surprising that Puerto Rico possesses one of the most complete series of *padrones*[26] or aggregate population

tallies (here referred to as “censuses”) yet discovered for colonial Spanish America. Beginning with a census taken in 1765 during Alejandro O'Reilly's *visita* (a high-level fact-finding mission) and ending with the compilation ordered by *intendant*[27] Alejandro Ramírez in 1815, a total of 35 padrones are known to have been compiled in a period of a half-century (others may yet be found in archives). These documents are readily accessible. Some have been published while others, a majority, lie in the thoroughly researched collections of the Archivo General de Indias in Seville. Yet, except for occasional references to population totals, or the publication of census photographs as illustrations, historians have not paid them the attention they deserve.[28] As with any other data from the proto-statistical era, practical considerations suggest caution when using them. One does not often know how or by whom the data were collected nor what safeguards, if any, were used. But it is historians’ mistrust of numbers, not methodological challenges posed by the censuses themselves, that accounts for their under-use. Researchers seeking to understand social structure and social change in the 1765-1815 period are ill-advised to ignore these data. The aggregate population tallies should be treated as an indispensable tool of historical demographic analysis (and social history more generally) and an excellent complement to traditional (“qualitative”) historical sources as well as other forms of demographic microdata.[29]

1765

The half-century under consideration saw the peak of census-taking activity under Spanish rule in Puerto Rico. Until O'Reilly obtained a comprehensive count in 1765 the authorities had not done much to collect population details, although general estimates were offered twice in the sixteenth century and a partial *padrón* (of San Juan only) was made in 1673.[30] O'Reilly's count marked the beginning of the Crown's interest in statistics about the colony’s population, an interest that intensified, as in the rest of Spanish America, during the late Bourbon era preceding the outbreak of rebellion in the continental colonies. This concern about Puerto Rico's population

hinged on two larger interests: the Crown's acute realization of the economic and strategic worth of its Caribbean possessions, and the scientific zeal of Charles III and his ministers, nowhere better illustrated than in the compilation of the national Aranda census of 1787, Spain's first modern population tally.[31] In Puerto Rico there was also an added incentive: the relatively small size of both territory and population, which facilitated the task of collecting information, despite the mountainous topography and the thick forest cover of the interior.

Fittingly, the first major statistical project in eighteenth-century Puerto Rico grew out of strategic concerns. O'Reilly's 1765 visit was prompted by the Crown's anxiety over a possible takeover of San Juan by European rivals, a possibility whose dangerous consequences for the Empire as a whole were driven home by the eleven-month British occupation of Havana in 1762. Given the inadequacy of the standing army, the *visitador* directed his efforts not only at reforming the regular forces—his recommendations triggered the rush of military construction after 1765 that made San Juan one of the tightest security spots in the New World—but also at refurbishing the militia, whose primitive state the envoy noted with alarm.[32] It was with the latter task in mind that O'Reilly ordered the making of a census, complete with partial age-sex distinctions and a rudimentary classification by legal status (free or slave). In various ways this padrón set a precedent for later reports. For one, it divided the island into *partidos* or districts (twenty-two in 1765), a detail which suggests that then, as later, gathering the population figures was a task entrusted to parish priests by themselves or in coordination with the *tenientes a guerra*, the leading civil officials.[33] Secondly, while distinguishing only between free persons and slaves, the census attests to the authorities' recognition of more specific socio-racial divisions, for it reported that the free category comprised "whites, free mulattoes [*pardos*] and free blacks," precisely the groups more explicitly enumerated in later counts. It must also be noted that although the O'Reilly census used extremely broad age categories and did not classify

slaves by age, it is the only one of the 1765-1815 series that sheds light on age distribution.

1779-1802

The next set of padrones used here, taken as a whole, is the most useful source of all for the study of population movements. The series consists of 27 annual censuses spanning the years 1777 to 1803, a collection that for its scope and continuousness may well be unique among the sources of Spanish American colonial history. The padrones were born of a 1776 Royal Order requesting viceroys and executives of *Capitanías Generales* and *Gobernaciones,* such as Puerto Rico, to prepare reports on population, broken down by social status, race, marital status and sex.[34] The reports were to be forwarded annually to Spain but seemingly few, if any, other jurisdictions besides Puerto Rico complied fully. Between 1777 and 1803 the island's officials compiled a full series of annual padrones, of which we have examined 23 covering the years 1779-1795 and 1797-1802, all inclusive (i.e., we are only missing the ones for 1778, 1796 and 1803).

Several features of the data are worthy of mention. First, in all of the censuses the object was the *civil* population, that is, the total population minus the regular army troops; militiamen were, of course, counted.[35] Secondly, whereas the reports were based on an age-sex-race principle like the one for 1765, they introduced a different classification which allows for closer study of racial composition but is not nearly as precise as O'Reilly's on age distribution. The series distinguished whites, Indians,[36] free mulattoes, free blacks, mulatto slaves and black slaves. This arrangement permits the analysis of individual groups or of any relevant combination of them to make the data compatible with other censuses. Thus, to compare the annual statistics with the 1765 padrón, one need only reduce the various free and slave groups to the two basic status clusters (free and slave), decreasing the number of categories from six to two. Unfortunately, however, in the annual censuses of the 1779-1802 pe-

riod each group was subdivided only by sex and by an ambiguous "age" criterion we have interpreted as the difference between dependent (or minor) status and *mayoría de edad* (adulthood or full age, which in the Spanish American context was 25 years of age). This, however, is nowhere made explicit in the reports. For each group, then, there were four subdivisions: adult males and females, and young males and females. Several questions that arise from this procedure are discussed below in the section on age structure and its relationship to fertility and mortality.

While we did not find any explanation of the guidelines followed by officials writing the census reports, the evidence suggests the existence of detailed and precise instructions and to strict, almost mechanical adherence to them by the authorities. In addition to the use of one standard socio-racial classification through the period, the following consistencies stand out: 1) report titles and format, and even footnotes mentioning the exclusion of army troops and summarizing the previous year's total count, remained constant throughout, and 2) the gathering of local data into one comprehensive document was done in most cases in June of the indicated year, and in all cases during the summer months. On the basis of these observations and of the fact that the reliability of censuses is in part a function of the frequency of their collection, we feel that the annual padrones are as reliable as any of the population summaries that exist for eighteenth-century Spanish America.[37]

1815

The last of the padrones being utilized here was the work of intendant Alejandro Ramírez, the colonial envoy who, in close association with Puerto Rico's emerging *hacendados* (owners of large farms or *haciendas*, mainly used to grow export staples), was instrumental in obtaining reforms in the 1810's favorable to the expansion of export agriculture.[38] Ramírez's collection of quantitative data on finances, resources, production and commerce has been well regarded by historians. It appeared on the pages of one of the first newspapers published is the island, the *Diario Económico de*

Puerto Rico (1814-1815). The Intendant's enthusiasm for statistics, evidenced in numerous articles on that subject in the *Diario*, was relentless. His work with economic and social statistics must be considered the first in a line of official writings culminating in the publication of Pedro Tomás de Córdova's monumental *Memorias* in the early 1830's, the second volume of which contains nearly 500 pages of statistics.[39] But while the collection of population data was driven by scientific interest, it was also moved by practical considerations: the need to implement tax measures to alleviate the colonial treasury's precarious situation after the loss of the traditional Mexican subsidies in 1810. From this combination of curiosity and need two padrones resulted, of which we have used one in this study.

This census, dated December 31, 1815, introduced several major changes in the reporting procedure described above, especially in the socio-racial classification system, which was modified to meet new demands and conditions. For reasons that will become apparent later, the Indian community of San Germán had disappeared by 1815; thus, the padrón dropped that category entirely, noting that the Indian class "no longer existed" in the province. Further, the two slave categories (mulatto and black) were at this point merged into one group simply called "slaves." More important, the census classified as a distinct and separate group the large class of *agregados* or squatters of all races, a group whose existence, noted with alarm by the authorities since the eighteenth century, owed much to the excessive concentration of lands fostered by a Spanish policy withholding property rights from the colonists. This policy rendered the landholding system static and rigid. It should be noted that agregados were similarly singled out in a 1776 padrón—not used here because of its many apparent inconsistencies—when the government and landowners were debating the issue of land redistribution and the granting of property rights. The presence of a category singling them out in censuses reflected the authorities' recurring interest in the agregados' growing numbers, an interest closely tied to the hacendados' worries about se-

curing labor. Pressed by their inability to obtain slaves during the turbulent years of the Napoleonic Wars, Puerto Rican hacendados were by the 1810's forming a consensus regarding the use of coercive measures to retain the geographically mobile agregados as laborers in the estates.[40] The data on the agregados' population and geographic distribution that Ramirez's census provided undoubtedly advanced the hacendados' purpose, which culminated in 1824 with the enactment of the first in a long series of laws coercing Puerto Rican peasants, and especially agregados, into the plantation work force.[41]

While the 1815 census, like the annual series, divided each socioracial group by sex and marital status, it built upon that practice by including an enumeration of births, deaths and marriages in each partido during the census year. As will be shown later, those counts fall well below the values of birth, death and marriage rates that we have estimated from other data. Especially suspect are mortality figures, which are surprisingly low in light of the fact that 1814 and 1815 were extraordinarily bad years, marked by a series of droughts, hurricanes and epidemics which devastated several partidos and caused heavy damage in most.[42] In general, though, the data is somewhat useful as an index of regional differentials of the fundamental demographic variables; as with most of our other evidence, its principal value lies in the possibility of comparison with other compatible information, whether implicit or inferred.

Geographic Boundaries

Because partidos were the basic units of analysis, the founding of a handful of new towns and the breaking up of territorial units to carve out new ones is a problem we have had to confront. Between 1779 and 1802, eight new partidos were established in Puerto Rico, all of them out of territory that once belonged to districts existing in 1779. The boundaries between partidos were ambiguous at all times and the process of carving out new partidos introduced an even greater uncertainty. Was a

new district created from within an existing partido, or did it occupy lands once belonging to two or more districts? If the latter, it would not be possible to analyze the movement of population variables by partidos; once a new district was founded from two or more existing ones the latter's population would display an artificial decline. If individual districts had simply been divided to create new ones, then the problem could be avoided merely by adding the population of both and treating the results as one partido, as if the partitioning had never occurred. But no such certainty exists. The problem is further compounded by the need for a fixed number of cases (a case is one partido in a given year) in order to process all 23 censuses together, as a single data file.

After careful consideration of the alternatives, we decided to add the values of each socio-racial category of new partidos to the corresponding values of the original partido that seemingly yielded the most territory for the new creation, a criterion established by comparing modern maps with a 1776 map contained in one of the manuscripts of Abbad's *Historia geográfica*, which displays the boundaries of the 30 original partidos.[43] Then, instead of analyzing the data by partidos, we resorted to looking at regional aggregates when necessary. Six regions were identified and illustrated in Figure 1: San Juan (the urban perimeter only), Bayamón, Aguada, San Germán, Ponce, and Humacao (see Figure 1 for the approximate boundaries between these).[44] The assumption is, of course, that in dealing with larger territorial units we would reduce the margin of error that exists in the analysis of individual partidos. As an added bonus, the procedure has the significant advantage of allowing comparisons of the three data files created for this study: one each for the 1765, 1779-1802 and 1815 censuses.

[Insert Figure 1 about here]

POPULATION GROWTH

Despite fundamental differences in their underlying economic and social histories, the progression of the Puerto Rican population during the first three centuries of

Spanish rule conforms in its broadest strokes to the pattern uncovered for the rest of Spanish America. Historians believe that there was a catastrophic decline in the early decades of the sixteenth century, a slow recovery in the seventeenth and early eighteenth centuries, and a rather steep upsurge in the late 1700s.[45] As in the continental areas, the island's aboriginal population, which Brau has conservatively estimated at 50,000, experienced a sharp decline following its initial contact with the Europeans in 1508, a fall so steep that by 1532, barely two decades after their definitive conquest, only 4 per cent of the original contingent survived.[46] To this would have been added a sprinkling of Spanish colonists (about 700) and some 1,500 African slaves.[47] For the remainder of the century this downward trend continued, albeit less steeply than before. By the 1580's, when officials counted a total of 2,000 persons of all races, the curve may have reached its lowest ebb.[48]

The seventeenth century saw a gradual reversal of the trend and then an appreciable upswing. By the latter part of the century the average annual growth rate (hereafter abbreviated as AGR) may have surpassed the not inconsiderable 1 per cent per annum mark.[49] According to our estimate, by 1700 the total population stood at some 15,000 to 20,000,[50] which, when contrasted with the 1765 total of nearly 45,000, yields an AGR of 1 to 1.25 per cent—a rate probably influenced by the immigration of families from the Canary Islands, an immigrant stream dating from the 1690's and continuing well into the next century.[51] There is evidence to suggest, however, that by the mid-eighteenth century the growth rate had spiked dramatically, far surpassing the 1.0-1.25 estimated AGR for the first six decades. In 1759, according to one bishop's report, the total stood at nearly 39,000 denizens; while six years later it had risen to 45,000, for an implicit AGR close to a striking 3.5 per cent.[52] If these figures are faithful, and there is no reason to believe otherwise, one inescapable conclusion is that in the years before O'Reilly's visit and the surge of economic activity it helped bring about, the rate of population growth had begun to achieve levels charac-

teristic of the 1765-1815 “explosion.” Little evidence exists, however, to substantiate or disprove this claim.

For the period after 1765, however, the evidence is unambiguous: there was a population upsurge of historic proportions. It is that process which will concern us in this paper. This increase was all the more dramatic because it was sustained for thirty-five years at an AGR of 3.55 per cent and fifty years at 3.19 per cent; this, in what many historians once considered a relatively "closed" population, that is, one in which migration supposedly did not play a major role. We shall examine the question of immigration in more detail below. For now it is fitting to turn to the dimensions and dynamic of growth as background to our discussion of the roles of migration, fertility, mortality and nuptiality in the process of Puerto Rico's demographic expansion from 1765 to 1815.

Cycles of growth

Table 1 presents a summary of population totals and AGR’s for Puerto Rico at various five- and fifteen-year intervals for the half century after 1765. An obvious inference from these data is that despite violent fluctuations in the intercensal AGR’s, which range from a low of 2.34 per cent in 1800-1815 to a high of 4.3 per cent in 1780-1785, the cumulative growth rate suffered only minor movement until 1800, decelerating moderately afterward. In other words, population growth was relatively constant between 1765 and 1800 but dampened between the turn of the century and 1815. We therefore posit two stages or phases in the island’s population history in this period. The first, covering the last thirty-five years of the eighteenth century, saw a population increase averaging 3.55 per cent; the second, which began in 1800, witnessed a sharp decrease in the medium-range (in this case, fifteen-year) growth rate, to 2.34 per cent. Significantly, these two stages correspond closely to *economic* cycles identified in the historical literature: a period of rapid expansion stimulated by the receipt of large sums of money via the subsidies (*situados*) from Mexico destined for

the construction and reinforcement of the San Juan garrisons and by a flurry of export activity attendant upon the opening of commercial channels, first with the Barcelona Company (created in 1755 and active until the 1770's) and later with the Real Factoría de Tabacos (the Crown's tobacco monopoly) in the 1780's; and later, a period of stagnation, beginning in the mid-1790's, caused by the interruption of situado remittances, a decline in trans-Atlantic trade during the Napoleonic wars, and disruptions in intraregional trade created by the Haitian Revolution.[53] We do not wish to suggest, of course, that the relationship between intensity of economic activity and population growth was simple and direct. A much more complex relationship was doubtless at work between economic change and population movements, one that we simply cannot only gauge from the summary census data.

[Insert Table 1 about here]

Nevertheless, we should bear in mind that the two phases of population change identified here (1765-1800: highest growth rates, and 1800-1815: slow-down) coincide with two well-known economic cycles. Specific features of each of these cycles, as noted in the historical literature, include, in the first case (up to 1800), large capital inflows and a construction boom in the capital city, increased importation of slave labor, greater commercial opportunities to connect with buyers of export staples, improvements in access to landholding, especially for the poorest rural elements, and immigration of foreign capitalists with skills, resources and connections; and in the second (after 1800), interruptions in trade and navigation, a significant decline in foreign subsidies, diminished immigration (at least for a decade and perhaps more), reduced slave importations, and an interruption in government efforts to break up the open-grazing cattle ranches (*hatos*), replacing them with smaller farms devoted to agriculture and animal husbandry and protected by legal property titles.[54]

Socio-racial Groups

The population growth picture becomes more interesting, if also more complex, when considering growth by socio-racial groups. Figure 2 gives five-year AGRs broken down into the six socio-racial categories recognized in the padrones. These data show, first, that the slave, free black, and white groups all exceeded the overall AGR for the period 1780-1800. Moreover, sharp fluctuations in five-year AGRs were considerable, with variances ranging from 2.42 per cent for Indians to 7.56 per cent for black slaves. Predictably, the range of fluctuation was greatest in the two slave sub-groups; from one year to the next and one quinquennium to another, the number of arrivals via the slave trade fluctuated more sharply than did the number entering uncoerced. Meanwhile, the white, Indian, and free mulatto sub-groups experienced the least instability, although semi-decennial variation in growth trends for all these groups seem high nonetheless. The patterns depicted in Figure 3 show, moreover, that the slave population, which grew at an annual rate of more than 5 per cent between 1780 and 1800, far surpassed the growth attained by non-slaves (3.41 per cent), and that the slaves' exceptionally high rate was approximated only by free blacks, a group whose increase owed to manumission (i.e., movement from the slave category to the free) as well as to natural reproduction. At the same time, the white group grew at a rate of more than 3.5 per cent annually, which suggests either a high natural reproduction rate, a large influx of European immigrants, or a combination of the two.

[Insert Figure 2 and 3 about here]

This breakdown of the general growth pattern by socio-racial groupings strongly suggests that beneath the population's seemingly stable growth (at a very high level of well over 3 per cent per annum; see Table 1) there was, not surprisingly, a good measure of instability. As this was a time of flux in economic, social, and political terms, it was also an era that witnessed population-related turmoil. The erratic growth pattern obtaining for groups of people most likely to be influenced by immigration (whites and

slaves) suggests another conclusion: immigrant streams of one sort or another—uncoerced or coerced—may have played a significant role in shaping the characteristics of growth for these two important population aggregates and consequently, for the population as a whole. From looking at the padrones data alone, therefore, an argument for immigration as a significant growth factor may be tendered.[55]

Differences in the upward movement of the aggregate free and slave categories are more clearly shown in Figure 3, which includes data for the entire period: 1765-1815. Seen in this fashion, intercensal fluctuations in growth appear less abrupt than those obtained for specific socio-racial groups, especially those of the free population, whose greatest variance is only 1.8 per cent although its growth pattern is far from smooth. The slave population, on the other hand, presents a smooth growth curve but a much larger degree of variation (7.4 per cent), as its growth accelerated steadily from 1765 to 1795 and then began to decline until, in the first fifteen years of the nineteenth century, the island slave population *decreased* at a rate of approximately 1 per cent per annum. In spite of attaining higher growth rates than the free population between 1780 and 1800 (i.e., during the "hot" economic cycle), *over the fifty-year period* the slave population grew slower than did the free. From 1765 to 1815, Puerto Rico's free population grew at an annual rate of 3.2 per cent while the slave group expanded at a yearly rate of "only" 2.6 per cent. Note, for comparative purposes, that Cuba's slave population during a similar period underwent a somewhat sharper expansion than Puerto Rico's, attaining the 3.7 per cent mark between 1774 and 1814. Further, in Cuba the first decades of the nineteenth century did not witness the dramatic slowdown seen in Puerto Rico; in fact, in the years 1792 to 1816 the Cuban slave population increased at a rate of 3.4 per cent annually. The difference between the two colonies suggests differences in access to the slave market and possibly, also, differences in the patterns of slave fertility and mortality.[56]

Population and Natural Disasters

A further word about the five-and fifteen-year fluctuations in group-specific AGRs is necessary. We have noted that the sharp peaks and valleys seen in specific socio-racial groupings are attenuated when looking at the larger free and slave categories; but that even in the latter case there are marked growth differences *within* each category, the free and the slave. While striking, fluctuations like these should not be considered excessive, for this was a population subject to the devastating effects of periodical harvest failures, droughts, epidemics, and above all, tropical hurricanes, all of which caused severe hardships. There is not enough information about epidemics and the like to permit speculation about their effects, but it is worth trying to correlate the sequencing of hurricanes, historically the worst natural disasters affecting the island, with population fluctuations in the late eighteenth and early nineteenth centuries.[57] Coll y Tests reports that between 1765 and 1815, no fewer than *sixteen* hurricanes hit Puerto Rico, an excessive number considering that throughout the entire nineteenth century only nineteen such calamities occurred. Most interesting about this record of hurricanes in the late 1700s, though, is its chronological distribution: of sixteen reported, seven took place between 1766 and 1776, another seven between 1804 and 1814, and only two during the longer period in between. That is, hurricanes weighed heavily on the population in the first and last decades of the half-century considered here but virtually not at all in the intervening years. Moreover, the hurricanes of the middle years occurred in 1780 and 1785, so that after the latter year Puerto Ricans were spared from such violent disasters for almost two decades, a rare happening in island history.[58]

Still, what effects the hurricanes may have had on population movements is not altogether clear. To judge from the general growth rates in Table 1, in the earliest years of our period the impact may not been as severe, but they may have had adverse

consequences later on, in the early 1800s. We believe, therefore, that while there is evidence to suggest the moderating effects of hurricanes on short-term population growth by reproduction, the disasters cannot by themselves explain the overall progression. Other factors, immigration most prominent among them, must be imputed. For the purposes of this exercise, we assume that natural disasters lower nuptiality and fertility, and elevate mortality, thereby hindering natural growth. In order for Puerto Rico to have sustained such stunning growth between 1765 and 1780 (AGR of 3.19 per cent) while being buffeted by a succession of hurricanes, new settlers, including slaves, must have arrived to compensate for the spikes in mortality caused by grave natural disasters. Conversely, for the growth rate to have moderated in 1800-1815, under climatological conditions comparable to those of 1766-1776, one plausible inference is that immigration paused or was reduced to a trickle. These assumptions should be borne in mind when discussing immigration, its origins, volume and consequences later in the paper.

To summarize, the padrones data suggest the following points about the dynamics and dimensions of Puerto Rico's population between 1765 and 1815: 1) the population rapidly expanded throughout the period, but two phases are clearly discernible: extremely rapid growth prior to 1800 and a somewhat stifled expansion in the last fifteen years; 2) these tendencies are salient among both the free and slave populations, but the free groups grew slightly faster than the enslaved over the entire period, although not during last couple of decades of the century, when the slave group's growth accelerated notably; 3) short-term fluctuations were acute, but there is no evidence to support the claim that natural disasters, such as hurricanes, played a major role in this; and 4) a significant volume of immigration may be inferred from the growth rates of individual socio-racial groups, which are higher among those groups most likely to be affected by migration of one or another sort (whites, slaves and free blacks). Further support for the critical effect of immigration may also be gleaned

from the growth patterns of the population once the timing of two hurricane-intensive periods is taken into account.

Regional Dimensions of Growth

Another illuminating perspective on the late eighteenth-century population expansion in Puerto Rico is obtained from looking at regional tendencies. This approach exposes marked differentials within the colony's territory and confirms the strong positive correlation already suggested between economic activity and demographic trends. In the following discussion we will try to describe these patterns and pose questions suggested by the data. Again we acknowledge, however, the limited value of the padrones for understanding the multiple demographic and economic mechanisms that may have been at work. Our questions will hopefully incite other researchers to pursue the leads suggested here.

Table 2 and Figure 4 summarize the regional population figures and average annual growth rates for Puerto Rico from 1765 to 1800, the period which saw the fastest population growth of the half century under consideration. A number of features of these data are immediately striking. For instance, in three of the six regions (San Juan, Bayamón, and Ponce), which combined had slightly over half the total population in 1765, the average rate of growth for the 35-year period was significantly lower than the island-wide average of 3.55 per cent, whereas in the remaining three zones (Aguada, San Germán, and Humacao) the AGR was higher than average, in one of them—Humacao—by almost 67 per cent. As one might expect, population growth was not evenly distributed across the colonial geography. Beyond this general pattern, however, the average growth rates tend to fluctuate sharply, no two falling within less than 0.46 per cent of each other over the entire period. Short-term (five-year) rates are even more diverse, ranging from 1.72 (Bayamón) to 7.29 (Aguada) at the minimum in 1780-1785, to a whopping difference of 7.56 per cent in 1795-1800 at the maximum, when San Juan's population increased at a yearly rate of more than 9.5 per cent. In

general, the regions undergoing the fastest overall growth (i.e., Humacao and San Germán) also experienced the steadiest evolution, while San Juan, with the lowest overall AGR, experienced the widest fluctuations.

[Insert Table 2 and Figure 4 about here]

In effect, no other part of the island suffered such sudden population changes as did San Juan, an observation that underlines the possibility that this city, as the administrative and commercial center of the island, may have been subject to periodic, reversible movements of people from the interior, as well as to concentrated arrivals of immigrants. If such was the case, it is not clear how such flows of people may have been instigated by employment opportunities in San Juan, since the peak of labor demand in the eighteenth century—as measured by the sums spent on military construction—occurred between 1766 and 1780, precisely the time when the population declined by approximately 1 per cent annually. An analysis of annual construction spending between 1779 and 1802 fails to substantiate, however, the apparently negative correlation that held between investments in military works and population movements in the previous fifteen years; the curves are quite evidently independent of each other.[59] Thus, aside from internal migration, other factors must be brought to bear on the explanation of the capital city's erratic population curve.[60]

But why place so much emphasis on migration and not on periodic spikes in mortality attendant on economic crises or natural disasters? While evidence to support a claim along these lines could be marshaled, we do not think that the cyclical movement of the city's population may be satisfactorily explained in terms of mortality crises. Certainly San Juan, which rests on an islet surrounded by marshes and insalubrious terrain, was subject to abrupt subsistence crises of the kind that typically affected pre-industrial urban populations. Whenever a hurricane or other similar disaster occurred in the surrounding areas, supplies of food and water were cut off for days, and in those hard times the death rate shot up to crisis levels.[61] But even if deaths

caused by those conditions were to translate into sharp spikes in mortality, how did the city recuperate so vigorously, usually in one or two years' time? The assumption that natural disasters were involved would be plausible only if the demographic curve followed longer cycles, allowing enough time for the population to regain normal levels after each mortality crisis. It is wanting as an explanation for the succession of short cycles revealed in the annual census series covering the final decades of the eighteenth century. In our view, the most plausible hypothesis for the city's odd progression is that its population at any given "peak time" included a large number of transients from the island's interior, who would return to their places of origin as soon as the balance of employment swung in favor of the rural areas. It is likely also that immigrants made up this temporary contingent, having stayed in the capital for a short time before moving on to other locales or leaving Puerto Rico altogether.

For the rest of the island the issue is not yearly fluctuations but rather the acute *regional* differentials in growth that held between 1765 and 1800. In searching for possible answers to these disparities we first turn to differences in settlement patterns. Would longer-settled areas offer fewer opportunities for subsistence agriculture, with concomitant effects on nuptiality and fertility? This could have been the case in two regions: Bayamón, with the highest population density in 1765 (see Figure 1 for an approximate idea of territorial size) and the lowest overall AGR, and Humacao, the least densely settled region in 1765 but the one with the highest average rate of growth. However, the remaining three regions render this hypothesis limited at best. Aguada and San Germán, for example, were heavily populated areas in 1765 and still their population expanded rapidly, surpassing the island-wide AGR of 3.19 per cent. Ponce, on the other hand, was thinly populated at the beginning of the period but its rate of expansion was considerably lower than the average. Therefore, there would not seem to be a direct correlation between population density and velocity of growth.

An *indirect* connection, however, could have existed. Table 3, which compares the value of per capita production in each of the five agricultural regions of Puerto Rico in 1776 with their average annual growth rates between 1765 and 1800, clearly suggests a close correlation between population growth and productivity, as measured at the beginning of the period. The fastest-growing region by population, Humacao, also had by far the highest per capita productivity index, almost twice that of the entire island. The second- and third-ranking regions in productivity also had identical AGR rankings, while Ponce and Bayamón broke the perfect rank-order match, although these two regions ranked in the lowest two echelons for both variables.

[Insert Table 3 about here]

The question that arises from these figures is: What determined productivity? Naturally, one of the major factors involved was soil fertility, and this would have been closely related to the length and intensity of colonization, prime determinants of population density in turn. Beginning in the sixteenth century, Spanish colonizers in Puerto Rico had settled preferentially in the well-watered northern alluvial valleys surrounding San Juan and in the entire western portion of the island, from Aguada to San Germán. Partly because of its "frontier" character and its separation from more settled areas by the rugged Sierra de Luquillo, the eastern region had remained thinly settled in comparison to the rest of the island. The movement to colonize this region began, for all practical purposes, in the early eighteenth century, so that by 1776 most of it was still thinly settled and covered with forest and brush. By contrast, because of its longer history of human occupation and its more intensive settlement, the more desirable flatlands on the northern strip had, by the late eighteenth century, been under cultivation for centuries.[62] Implicit in this contrast is a difference in marginal productivity of the soils, with the Humacao region having an advantage over other areas longer occupied by colonists.

But what about the western regions of Aguada and San Germán? Would not these areas contain similarly exhausted soils? Although some loss of soil fertility would have occurred on account of the long history of colonization in those areas, it seems plausible that their soils had not yet been as worked over as those of the north-central regions, where the most intensive pastoral and agricultural activities historically had been. Because of its proximity to the principal port of San Juan, the northern region had since the sixteenth century witnessed intense cultivation of export crops—first sugarcane on a fairly large scale, then ginger and other commodities.[63] Moreover, cattle raising had struck deeper roots along the northern coast than anywhere else, primarily because demand for cattle products was heaviest in San Juan due to its large contingent of Spaniards (troops and colonial administrators), and because transportation difficulties precluded cattle production for this market beyond a certain distance from it. The San Juan cabildo had tried to force ranchers (*hateros*) throughout Puerto Rico to supply the city with meat by means of a compulsory quota system known as the *pesa*, but the constraints of geography meant that the majority of meat always came from nearby districts.[64] Thus, in 1776 livestock accounted for one half of Bayamón's estimated production, compared to only a quarter in both Aguada and San Germán.[65]

The above discussion has tried to isolate the variables that, taken together, could throw light upon the regional dynamics of population growth in Puerto Rico from 1765 to 1800. Since they are obviously quite interrelated—population density may be both a cause and a symptom of soil exhaustion, and both, in the last analysis, are causally connected to productivity—the most sensible conclusion from the census exercise is that the economic dimension may prove to be a helpful correlate to the demographic trends observed from the padrones, but that aggregate statistics alone will not suffice to prove this. Complex economic factors, mapped over a complex economic geography, seem to have been at work here, and any attempt to view the population ex-

plosion as a function of singular forces is likely to disappoint. Until the puzzle of Puerto Rico's economy during the transition from the cattle-and-contraband period (pre-1800) to the export-agricultural stage of the nineteenth century is pieced together, we will be at a loss to explain regional differentials in population growth.

MIGRATION AND GROWTH

In the preceding discussion of the pattern of Puerto Rico's population curve between 1765 and 1815 we have suggested several reasons why immigration must have been an important factor behind the population explosion. In what follows we intend to further examine this issue. Specifically, we will attempt to establish, to the furthest extent possible, the sequencing of immigration and its gross effects on the observed patterns of population change. Because of the different nature of free and slave immigration, we will deal with each separately, although in the final analysis we will examine their combined contributions in a general discussion on the overall impact of immigration.

Evidence on non-slave arrivals into Puerto Rico during the second half of the eighteenth century is scarce and historical studies on the topic are few.[66] Many decades ago, Tomás Blanco, in his short but significant *Prontuario histórico de Puerto Rico*, summarized conventional knowledge about eighteenth-century immigration, listing eight components or groups, seven of which concerned the free population (the slave trade was the eighth): 1) regular army troops and officers who chose to remain in the island after serving their terms; 2) criminals and exiles from several parts of the Empire brought to work in military construction projects; 3) families from the Canary islands, whose influx dates back to the late 1600s; 4) sailors and passengers who deserted the *flotas* (convoys of Spanish ships) at Aguada, their first stop in the New World; 5) foreign Catholics, many of them experts in sugar manufacture, allowed to settle in Puerto Rico by a 1778 Royal Order motivated by the Crown's desire to foment the Caribbean sugar industry; 6) refugees from the Haitian Revolution; and 7) native

and Spanish-born residents of Santo Domingo who fled that colony during the French and Haitian invasions. In proposing this list, Blanco did not give any indications as to the volume and timing of the migrations.[67]

A number of features of these immigrant waves can nonetheless be inferred from available sources. It is known, for instance, that the number of Spanish soldiers assigned to Puerto Rico was rather small prior to 1765, increased substantially for fifteen years or so thereafter, and fell back down again toward the latter part of the century. In his study of military records, Torres Ramírez found that after the promulgation of a 1776 Royal order allowing native-born whites and mulattoes "of good repute" to enlist in the regular army—they had served thus far only in the militia—native Puerto Ricans increasingly enlisted, for which reason the number of "foreign" troops needed to reinforce or replace the standing army gradually decreased.[68] One might deduce from this that the number of Spanish soldiers staying on the island once their terms expired would have increased in the years following O'Reilly's visit, but that after fifteen or twenty years this number probably dropped significantly. The years 1765 to 1785, then, may well have witnessed the greatest volume of immigration via soldier settlement in the eighteenth century. The actual numbers involved are of course impossible to determine, but we feel 2,000 to 3,000 Spanish males is a reasonable estimate.

Similarly, the influx of criminals and other prisoners from Mexico, Venezuela, Colombia, and Cuba brought as construction workers into San Juan and its environs would have occurred in the early period, since the years of intense construction spending, as mentioned earlier, fell between 1765 and 1785. Indeed, the only recorded instances of shipments of criminals to the island in the eighteenth century are four: 1760, 1765, and twice in 1783. The total number of persons, presumably all males, brought in this fashion was approximately 2,000.[69]

The third immigrant wave that fell in the early decades of the period was that of stowaways and deserters making their first New World stopover at Aguada harbor. Jumping off ships upon arriving at the first New World destination was not a novelty, since Puerto Rico, and particularly its northwest coast, had served as a way-station in the *Carrera de Indias* (the voyage between Spain and the Americas) since the sixteenth century. But by the mid-1700's the number of ships involved, as well as the number of stowaways and deserters, increased markedly—or, at least, officials' reporting of such escapes became more frequent and opposition to them more outspoken. In 1747, for example, a Royal Order dispatched to Puerto Rican governor José Colomo requested his cooperation in capturing deserters (soldiers and sailors) from the squadron of Andrés Reggio, who, it was claimed, had lost most of his passengers and crew in Puerto Rico, Santo Domingo and Cuba.[70] More important still were two incidents of mass desertions that took place in the 1770's, described by Abbad as follows:

> The abundance of food, the hospitality and good treatment found by Spanish travelers and flotistas among the islanders of Puerto Rico; the pleasant conditions of the soil, and fatigue from the journey incline all those seeking to try their luck in the Indies [*por ir a Indias*] to stay in this, the first port, together with many sailors and soldiers who hide under the natives' shelter: so much so that in the Flota of [17]72, under the command of Don Luis de Córdoba, more than 1,000 Spaniards stayed in this island; and nearly as many hid themselves here in [17]76 from the flota of Don Antonio de Ulloa. Proportionately the same occurs with single ships from Spain and the Canaries.[71]

This description leaves little doubt as to the importance of deserters in adding to Puerto Rico's population in the 1770's: as many as 2,000 persons, mostly Spanish males, may have entered the island in that fashion in the span of a few years. Added to the number suspected of migrating about this time from other sources, the total of immigrants for the first twenty years of our period may have been 6,000 at a minimum, a majority of them young European males.

The remaining vectors of immigration recognized by Blanco occurred primarily in the 1790s through the 1810s, and, by all indications, were not as numerically substantial as the three groups already mentioned. Most historians of this period agree

that the number of Haitian and Dominican refugees who settled in Puerto Rico after 1791 was not large, but that they were persons of means and, in the Dominicans' case, "addicted to Spanish sovereignty."[72] These two factors— their high socio-economic standing and their political allegiance to the Crown in a time of crisis— are, in our opinion, the clue to the apparent contradiction between their notorious visibility in the historical record and their relatively low numbers. For if it is understood that many of the refugees brought capital and slaves, established model coffee and sugar plantations, and as prominent individuals actively supported the counter-revolutionary activities of the Crown in the rebellious colonies after 1810, then it is easy to grasp why their presence in the record holds little proportion to their numbers.[73] We estimate at no more than 1,000 the number of refugees who settled in Puerto Rico between 1790 and 1815 as a result of events in Hispaniola, a figure significantly lower than one would think from reading works that praise their contribution to Puerto Rican "progress" in the nineteenth century.[74] Significantly, as José Morales has discovered, many of these refugees, especially among the Haitians, were people of color who had possessed coffee estates on Hispaniola before seeking refuge in Puerto Rico from the convulsions which wracked that island during its turbulent Revolution.[75]

The volume of immigration is more adequately documented for the period beginning in 1800 owed to the efforts of Estela Cifre de Loubriel, who has compiled thousands of profiles of nineteenth-century immigrants.[76] Cifre's data, consisting of a large collection of archival and published references to immigrants, reveals that the first two decades of the century saw a smaller influx of foreigners (Spaniards included) than has generally been believed. She found that of a total of 13,219 immigrant profiles she has created for the entire century, only 847 (6.4 per cent) were for the years 1800 to 1810 and slightly more (1011 or 7.7 per cent) for the following decade. Of those who migrated between 1811 and 1820, however, most did so after 1815, that is, after the

so-called *Cédula de Gracias* relaxed immigration restrictions and offered economic incentives to prospective settlers. Note, moreover, that her samples also include many Haitians and Dominicans who entered after 1800, so that they cannot be simply added to our previous estimate. Equally significant for our purposes is Cifre's discovery that Venezuelan royalists fleeing from the Independence Wars did not arrive in large numbers until after 1815, so that this contingent, otherwise important for its demographic, economic and political consequences, fell outside of the period of our concern.[77]

Taking these considerations into account, we are persuaded that the number of immigrants who entered Puerto Rico between 1800 and 1815 was relatively small. To give a liberal estimate of the net inflow of non-slave persons (in the almost certain absence of out-migration), we offer the figure of 3,000, a number which, if accurate, would be well below the immigration levels of the previous twenty-five years.

Sex ratios as indicators of immigration

The pattern of non-slave immigration outlined in the preceding discussion acquires support from an analysis of sex ratios (the number of males per females in any given situation). The assumption for this exercise is simple: given the anticipated predominance of males among the immigrants, one can assume that when immigration occured, sex ratios rose (more males than females) at least for a brief period, after which, is the event of a reduction or elimination of further arrivals, there would be a tendency toward equalization.[78] This technique, often used in the analysis of slave populations, is inapplicable to demographic systems undergoing out-migration (e. g., most European populations up to the twentieth century) but should be valid for most "frontier" populations such as Puerto Rico's between the sixteenth and nineteenth centuries.

The data on sex ratios of the island's free population presented in Table 4, then, appears to support the claim for measurable immigration during the early years of our period followed by a drop in arrivals after the 1780's. Several observations are in or-

der here. In the first place, the sex ratio for all free people in 1765 suggests that some immigration had occurred prior to that date. Second, between 1765 and 1779 substantial free immigration must have taken place in order to raise the free people's sex ratios from 1034 to 1069 males per 1000 females over a short time span. Third, beginning in the 1780's and becoming more acute after the mid-1790's, a balancing trend, suggesting reduced immigration, is discernible, so that by 1815 the sex ratio was practically below the "normal" sex ratio at birth found among many Caribbean populations.[79]

[Insert Table 4 about here]

Broken down by socio-racial groups, as in Table 5, the data on free people's sex ratios show not so much a decline in the entire aggregate after 1779 as a substantial drop in the ratio of the majority group, the whites. From a high of more than 1100 in 1779-1784, the whites' sex ratio fell a bit during the next ten years and then experienced a sharp drop in 1797-1802. The decline continued until in 1815 the ratio had fallen below 1000, as if out-migration had occurred. The latter observation is consistent with the fact that many Puerto Rican men were conscripted into the Spanish army during the Napoleonic wars and taken overseas to fight. Many never returned. In general, therefore, these data corroborate the suggestion of significant immigration in the earlier years of the period suggested by the descriptive evidence. Likewise, they seem to disprove the claim that heavy immigration occurred between 1790 and 1815. It is safe to say, therefore, that in Puerto Rico's case there was more immigration in the1765-1779 period than in the subsequent thirty-five years.

[Insert Table 5 about here]

Whither Indians and Free Blacks?

Table 5 also highlights other noteworthy patterns within the free category. The outstanding one is, of course, the sudden drop in the Indians' sex ratio, which suggests the occurrence of social dislocations within this group. Their sex ratios indicate

heavy out-migration, but where? Actually, the issue is not all that complex, for the community labeled as "Indian" in the padrones was a marginal one, isolated and confined to one small part of the Puerto Rican territory.[80] So little is known about this community, however, that one can only speculate about its economic life, social organization, and contacts with the larger society. One thing is clear, though: by the late 1700's the so-called Indians were displaying signs of drastic change, perhaps because of the out-migration of its male members, presumably to other locations in Puerto Rico. Still, the Indians who were enumerated expanded their overall numbers at a rate equal to that of the free mulatto group (AGR of 2.9 per cent between 1780 and 1800). This is all the more intriguing since at the turn of the nineteenth century the government ceased to count the Indian group separately. We suppose that the remaining members of this isolated community began to be counted as part of the "free mulatto" aggregate.[81]

The free blacks' sex ratios similarly raise important but ultimately intractable questions, unlikely to be resolved with summary census data. For the most part, the free blacks' sex ratios are lower than the 1050 "normal" level found among European populations and even lower than the average West Indian ratios. But on average for 1791-1795, the ratio increased sharply to 1126, surpassing that of any other free group. The fact that among free blacks there were more females than men *most* of the time is unremarkable, given the possibility that in Puerto Rico, as in other slaveholding societies, female slaves were manumitted more often than were male slaves. The sharp rise in the sex ratios for 1791-1795, however, is difficult to explain, except perhaps in reference to two possible factors: an increase in the manumission rate and a rise in the number of fugitive slaves from the neighboring non-Hispanic islands seeking refuge in Puerto Rico.[82] The first of these is, in our view, the least likely explanation, for two reasons: an increase in the manumission rate would have affected female and male slaves proportionately, so that the sex ratio would have remained unaltered;

and a rise in manumissions would be unlikely *anyway*, given the expansion of labor demand caused by the economic boom preceding the Napoleonic Wars and the parallel increase in slave importations during the early 1790s. In fact, 1791 marked the beginning of the Haitian Revolution, which in a few years' time would wipe out the largest sugar and coffee producer in the world, a development that spurred production of both crops in the Spanish Caribbean.[83] Although production figures are hard to come by, we know that Puerto Rico's exports expanded in those years. This is not to say, of course, that the manumission rate was lower in this island than in other contemporary slaveholding areas; on the contrary, it may well have been higher, if Cuba is to be taken as an example.[84] What this means is that an increase in the manumission rate is unlikely to have caused the sharp rise in the free blacks' sex ratio in the early 1790s.

On the other hand, the incorporation of fugitive slaves from other Caribbean islands, and especially from the Danish colonies of Saint Thomas and Saint Croix, seems like a more supportable hypothesis. Until the early 1800s Puerto Rico was a haven for such escapees.[85] From the mid-seventeenth century Spanish law allowed fugitive slaves to gain their freedom upon entering Spanish colonial territory, provided they embraced Catholicism and swore their loyalty to the Crown. In the eighteenth century, this law attracted numerous refugees into Puerto Rico, to the point that one historian has referred to the island as a "promised land" for Danish West Indies slaves and that one town is the proximity of San Juan, San Mateo de Cangrejos, was settled almost exclusively by them.[86]

The Slave Trade

We now turn to the slave trade and its effects upon the course of the Puerto Rican population between 1765 and 1815. As expected, data on this crucial population growth factor are sketchy and the problems facing the researcher almost insurmountable. In fact, available evidence on the slave trade in the second half of the eighteenth

century is limited to the activities of the Barcelona Company during its most active slave-trading period, covering the years 1766 to 1770. But while useful, even these data do not portray the entire picture of slaving activity in those years, for they do not account for slaves smuggled into the colony—a potentially large number, given the normality of contraband, which Marshall O'Reilly himself had noted in 1765 accounted for a preponderance of all imports.[87]

In the absence of hard data culled from archives, historians have been left to speculate about the dimensions of the Puerto Rican slave trade before the age when expansion of the sugar plantation business opened up a short but intense cycle of slave importations from Africa.[88] Many years ago, Philip Curtin's pioneering work, *The Atlantic Slave Trade: A Census* (1969) presented one such approximation. Curtin's estimate was based on the assumption that the Spanish Caribbean colonies of Cuba and Puerto Rico must have had a similar experience with the slave trade, and that the import curve for both must have been roughly similar. Having examined the overall Cuban slave population, and taking the island's slave trade figures for the late eighteenth and early nineteenth centuries as his key, Curtin inferred that the average rate of natural *decrease* among slaves there may have been close to 0.5 per cent annually, noting that this was "a low rate for the Caribbean at that period, and one that supports the possibility that natural growth had taken place before the 1760's."[89] Assuming that the same pattern of slave fertility and mortality applied to Puerto Rico, Curtin estimated that in order for the slave population to have increased at a yearly rate of 2.7 per cent between 1765 and 1811, nearly 15,000 persons would have had to be imported, adding that "in fact, these imports probably fell within a still narrower period of time [1774 to 1802]," because "Puerto Rican plantation development began somewhat later than the Cuban development of the 1760's, and the population data indicate that the Puerto Rican slave population fell steeply during part of the Napoleonic Wars, indicating that very few slave ships arrived."[90]

Curtin's best guess for the volume of the Puerto Rican slave trade is, however, unsatisfactory. Besides the fact that he bases some of his estimates on bits of erroneous data,[91] his analysis falters on two grounds: first, it does not fit the only import data available, covering 1766-1770, when the Barcelona Company had a monopoly on the slave trade; and second, it does not conform to the detailed overall picture of population size and change reflected in the padrones.

Curtin's calculation cannot be reconciled with import figures that exist for introductions made by the Barcelona Company: a total of 9,450 individuals between 1766 and 1770.[92] If Curtin's estimate of 15,000 slaves brought in between 1765 and 1811 were correct, it would mean that 64 per cent of the total would have fallen within the first six years (1765-1770), when Puerto Rico's plantation development had not yet begun. Needless to say, this is not plausible. But perhaps more significant is what the Barcelona Company data entail about the dynamics of the Puerto Rican slave population. Assuming that the figure of 9,450 total slave imports for the intercensal period 1765-1779 is accurate, and given the average growth rate of the slave population in those years (3.0 per cent), the average annual imports would have been 630 persons and the implied rate of natural decrease would be close to an improbable 6 per cent per year.[93] This rate, which is much higher than the highest observed in other slaveholding societies in the eighteenth century, underscores the error to which generalizations about Puerto Rico's slave population from Cuban data are prone, since local conditions such as epidemics, hurricanes and the slaves' initial health, among many other factors, would have made for substantial disparities. The first fifteen years of our period were surely exceptional—many of the slaves imported by the Barcelona Company were reportedly sick and "below standard"— and thus the rate of natural decrease among slaves may not have been as high as 6 per cent all the time. But the fact that this rate may describe, if in an exaggerated way, the growth regimen in force dur-

ing part of the period in question raises serious doubts concerning the applicability to Puerto Rico of Curtin's Cuban estimates of slave mortality.

With these corrections to Curtin's estimate as background, let us address the volume and timing of slave importations between 1765 and 1815. Taking the 6 per cent negative AGR as base, Puerto Rico would have imported some 4,000 slaves in this period to make up for the decrease and to reach the 2.6 per cent annual growth rate mark. However, this figure is evidently too high, since the sum of Cuban imports during a comparable period was only slightly more than four times that. The expected difference between the two Spanish colonies would be higher than this, given that the Cuban plantation sector developed faster and more intensely than Puerto Rico's and also that Cuba's slave population continued its swift expansion throughout the Napoleonic Wars, when Puerto Rico's began a gradual decline.[94] Moreover, the sex ratios of the Puerto Rican slave population shown in Table 6 strongly indicate that there was intense African immigration between 1765 and 1779 but that thereafter the slave trade may have diminished, although this decline did not follow a smooth curve. And not only are these ratios indicative of a decline in imports after 1779; when compared to those obtaining in other slaveholding areas they appear low, which suggests that the slave trade cannot by itself account for the high growth rates of both the mulatto and black slave groups. The Puerto Rican slaves' sharpest sex imbalance—that for black slaves in the 1779-1784 average—falls well below that obtaining among all of Cuba's slaves in 1817 (a ratio of 1671) and in 1827 (1768:1000), as well as below that of the African-born slaves of British Guiana in 1817 (1728:1000), ten years after the cessation of the trade to that colony.[95] On the assumption that sex ratios of slaves provide a good indication of the critical value of importations in reversing the effects of high mortality, the Puerto Rican data must be interpreted as evidence in favor of a lower rate of African importations, and also as support for the hypothesis of a positive

rate of natural increase among slaves in the late century and early nineteenth centuries.

[Insert Table 6 about here]

This, however, would run counter to our previous observation about the first fifteen years of the period, for which we calculated a high rate of natural decrease. To fit the observed growth rates one could assume that prior to the 1780's slave fertility was somewhat lower than mortality but that the relationship became inverted in later years. The evidence for this is ambiguous. In his study of San Germán parish records, for instance, Adán Szaszdi discovered that

> by the end of the eighteenth century a notable change [in the pattern of slave marriage] occurred, and marriages of slaves belonging to the same owner became more common. In 1797, for example, in just one month there were four such unions, perhaps the result of a fervorous preacher's pleas with slaveholders [to legitimize consensual unions among slaves].[96]

Were this to have been more than an isolated phenomenon, it would suggest the possibility of a *rise* in fertility and thus growth by reproduction. But the evidence does not allow such a sweeping generalization, of course. Indeed, what we can glean from the censuses partially contradicts the assumption of natural growth, since between 1800 and 1815 the slave population decreased at an annual rate of 1 per cent. Assuming that there was a pause in the slave trade in those tumultuous years, that rate would be the equivalent of the slaves' net AGR. If, by contrast, some importations occurred, the rate of decrease (including losses via manumission) would be even higher.

To complicate matters further, David Stark's more systematic study of slave marriage and family formation in the eighteenth century clashes with Szasdi's on the frequency of slave marriages (and implicitly, on slave women's fertility) in the final years of the century. In a couple of important articles, he has tried to reconstruct slave marriage and family patterns, using data culled from parish archives in several scattered partidos.[97] His data and conclusions lend credence to the possibility that in

the eighteenth century slave marriages were more common than historians have assumed, and that even when not married by the Church, slave women probably enjoyed as much stability in their consensual unions as did married women. In comparing birth intervals of children born to married and unmarried slave women, Stark finds that there were no significant differences between the two. From the parish register data drawn from the entire century he concludes that slave unions of either sort were more stable than previously thought. The obvious inference is that such stability would raise fertility and perhaps make the Puerto Rican slaves a self-reproducing group, in contrast to the vast majority of enslaved populations in plantation settings throughout the Americas. If Stark is correct, then, we would need to look at the high positive rates of growth among slaves (and free blacks) as only *partially* dependent on the slave trade. We would also have to revisit the question of why, if high fertility was a plausible occurrence, there appears to have been a negative rate of reproduction over the first fifteen years of the nineteenth century. Clearly, much more research in parish data is necessary to understand the puzzle of Puerto Rican slave demography at this juncture.

Both Curtin's estimates of a fertility-mortality gap, where fertility was higher than mortality, and the above discussion are based, however, on one questionable assumption: that the rate of natural decrease (or increase) can be computed solely on the basis of slave population figures, without regard for the number of persons "lost to" or "absorbed into" other socio-racial categories by manumission. For Puerto Rico in this period, there is also another complicating factor: the annual padrones assigned a racial classification to slaves according to a criterion which could reasonably be interpreted as place of birth (i.e., "black" slaves were the African-born or *bozales* and "mulatto" slaves were island-born, or *criollos*), since few lighter-skinned slaves would have been imported into the island from the most common sending societies of the time. As Herbert Klein and others pointed out many years ago in their critiques of

Curtin's estimates, one must take into account both the overall rates of increase and the rates of manumission in conjunction with slave trade figures to estimate the rates of natural decrease or increase for any given population. Thus, instead of Curtin's formula, $r = m + i$ (where r is the overall growth rate, m is the rate of "immigration" and i the rate of natural increase), a more correct algorithm would be $r = m + i + l$, where l is the rate of manumission prevalent at the time of the censuses.

How to obtain the value of l is virtually impossible except by inferring the average rate of manumission from the growth rates of some of the free groups, particularly the free blacks and mulattoes. The method outlined by Klein appears to be the more logical one, although it is far from foolproof. Referring to Cuba's population in the late 1700s and early 1800s, Klein argues that the difference between the AGR of the free colored population (which was higher than that of the white groups) and the whites population's AGR might be considered an adequate measure of the rate of manumission because, in his words, "[the white population obviously had the highest standard of living in the island [Cuba]," and thus "we may assume that the growth rates for the Cuban free colored could not have been much higher than 2 per cent [a little less than the growth rate for the white group] and that the overall growth rate of more than 3 per cent must have been due therefore to inputs of at least 1 per cent per annum from the slave class."[98] On that assumption Klein estimates that instead of having a negative rate of growth as Curtin argues, the Cuban slave population had an approximate rate of natural increase of about 1 per cent.[99]

Taking into consideration both the "mulatto slave" and free black categories, the application of this procedure to the Puerto Rican census figures of 1780 to 1800—the only ones appropriate for this analysis[100]—yields results similar to Klein's for Cuba. Considering manumission and transfer from one slave category to the other, we found that Puerto Rican slaves had, on the average for 1780-1800, a compound rate of natural increase of 1.76 per cent per annum above the 5.2 per cent overall AGR which we

had discovered before (see Figure 2). This means that is order for the real rate to have been negative, new arrivals would have had to add at least 7.9 per cent per annum on average for the period. The implicit import total would have been 10,600 individuals in those two decades. If, on the other hand, Curtin's negative rate of 0.5 per cent per annum were correct, the number of imports would rise to some 11,200. Assuming, however, a reasonable rate of natural increase of 1 per cent per annum, the rate of importation would be 5.9 per cent and the number of slaves introduced between 1780 and 1800 would total "only" 8,900.[101]

CONCLUSION

The abundance of summary censuses for Puerto Rico between O'Reilly's *visita* in 1765 and the deep reforms enacted in the Cédula de Gracias of 1815 provides a window into the dimensions of population change, with the possibility of better understanding the factors underlying it. We have seen in this paper that the extraordinary burst of growth that occurred over this half century was sustained at extremely high levels for thirty-five years. Although it moderated thereafter, the upsurge over the half century was stunning. The population total—221,000 in 1815, up from 45,000 fifty years earlier—underscores a veritable transformation. From the thinly settled colony Puerto Rico had been for more than a couple of centuries after Conquest, to the high-density population it would soon turn into, surpassing all other large Caribbean territories in the decades to follow—clearly, an historic reversal had taken place. By the end of the nineteenth century, after decades of continued immigration and slave importations, Puerto Rico's population would reach the 1 million milestone—the second island country in the region, after Cuba, to have done so. Even before the U.S. takeover in 1898, a few "informed" observers had begun to talk about this society's "overpopulation problem."[102] Soon these isolated voices would turn into a clatter. By the middle decades of the twentieth century, the "rising Puerto Rican problem," as one lawyer in the U.S. called it, had been the object of countless scientific studies, all fo-

cused on the "extraordinarily high" fertility of island women. Bizarre experiments in population control were already well on their way.[103]

This study of a Caribbean low-density, low immigration demographic regimen as it passed to a high-density, high-immigration regimen has demonstrated once again that aggregate data from a proto-statistical era have their place—and limitations—in historical demography. We have been able to use the remarkable Puerto Rican padrones to reconstruct the ebbs and flows of a Caribbean population at a time of great upheaval. We have exposed a series of characteristics, such as the start-and-stop pattern of both uncoerced immigration and the slave trade, which to a large extent drove the fluctuations observed. In a very tangible manner, moreover, the insights garnered from these sources on immigration point us in the direction of forces originating outside of the island that were quite instrumental in driving population change. Distinct waves of new settlers and slaves were a consequence of imperial (e.g., policy), regional (e.g., the Haitian Revolution) and extra-regional events (e.g., the Napoleonic Wars), whose influence we have acknowledged but have not had the opportunity to assess.

We have also been able to pose new questions, such as whether regional differentials in growth are to be understood as a function of age of settlement and extent of agrarian exploitation, or whether other factors, such as land prices and the institutional mechanisms available to gain access to, and transfer, rights on land, were at work. Our analysis has also prompted questions about the extent to which people under slavery might have been able to reproduce themselves in Puerto Rico, much as they were able to do so in Barbados and, perhaps, Cuba, but in contrast to virtually all the other Caribbean contexts, in which slaves showed negative rates of reproduction well into Emancipation times. The census data suggest that they may well have, but additional research on extant parish records will be necessary to put this and other issues to rest.

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Table 1. Total Population and Annual Growth Rates (AGR's) in Percent Increase per Annum, 1765-1815

Census Year	Total Population	AGR from Previous	Cummulative AGR
1765	44,883	-	-
1780	75,333	3.45	3.45
1785	93,330	4.28	3.66
1790	106,651	2.67	3.46
1795	129,754	3.92	3.54
1800	155,426	3.61	3.55
1815	220,892	2.34	3.19

Note: Percent increase per annum was derived by $r = [1/t \log_e (N_t/N_o)]*100$, where t is the number of years within the period, N_o is the population size at the beginning of the period and N_t is the population size at the conclusion of the period.

Table 2. Population of the Six Regions, 1780-1800

Census Year	San Juan	Bayamón	Aguada	San Germán	Ponce	Humacao	Puerto Rico (Total)
1765	4,506	11,133	9,587	8,900	7,907	2,750	44,783
1780	4,054	17,732	15,199	16,882	12,467	8,999	75,333
1785	4,915	19,631	22,041	20,659	14,814	11,270	93,330
1790	5,935	22,316	23,329	23,855	15,970	15,246	106,651
1795	6,121	23,873	29,416	32,423	18,313	19,608	129,754
1800	9,935	26,590	33,088	37,840	23,450	24,523	155,426

Table 3. Rankings of Productivity in 1776 and Rates of Population Growth for 1776-1800 in the Five Agricultural Regions

Region	Productivity Index[†]	Rank	AGR	Rank
Humacao	8.30	1	5.84	1
San Germán	5.64	2	4.14	2
Aguada	4.27	3	3.56	3
Bayamón	4.21	4	2.82	5
Ponce	3.54	5	3.10	4

[†] In *pesos* per persons. Values were obtained by multiplying production figures given in Abbad of the main agricultural and pastural products by a series of prices and then dividing the total by the number of persons in each region according to Abbad's 1776 census.

Table 4. Sex Ratios (Males per 1,000 Females) of the Free Population, 1765-1815

Years	Sex Ratio
1765	1034
1779-1784	1066
1785-1790	1042
1791-1795	1040
1797-1802	998
1815	1003

Note: Sex ratios are derived by $(P_m/P_f)*1000$, where P_m is the male population and P_f is the female population.

Table 5. Sex Ratios (Males per 1,000 Females) of the Free Population by Socio-Racial Group, 1779-1815

Years	White	Indians	Free Mulatto	Free Black
1779-1784	1091	1049	1047	1010
1785-1790	1071	1006	1016	993
1791-1795	1073	909	1018	979
1797-1802	1016	760	1031	854
1815	995	-	1021 †	968 †

Note: Sex ratios are derived by $(P_m/P_f)*1000$, where P_m is the male population and P_f is the female population.

† Some persons normally counted in these groups formed part of the *agregado* category in 1815. These sex ratios may, therefore, not be absolutely correct.

Table 6. Sex Ratios (Males per 1,000 Females) of the Slave Population, 1765-1815

Years	Slave Mulatto	Slave Black	Total
1765	-	-	1171 †
1779-1784	1031	1356	1190
1785-1790	1057	1226	1144
1791-1795	1036	1238	1137
1797-1802	968	1074	1024
1815	-	-	1144 †

Note: Sex ratios are derived by $(P_m/P_f)*1000$, where P_m is the male population and P_f is the female population.

† The censuses of 1765 and 1815 did not break down the slave population by place of birth.

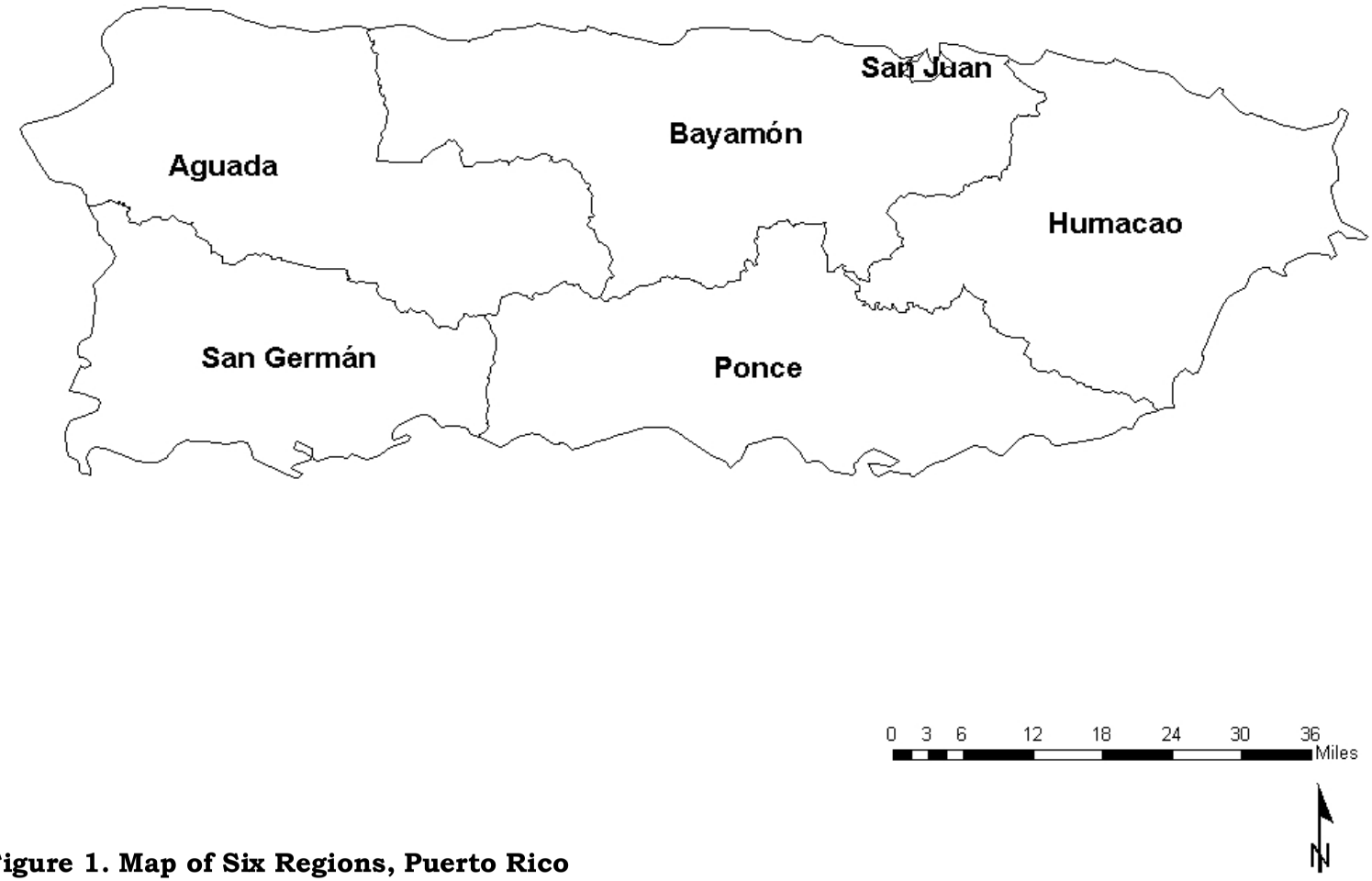

Figure 1. Map of Six Regions, Puerto Rico

Figure 2. AGR's in Percent Increase per Annum by Socio-Racial Groups, 1780-1800

Note: Percent increase per annum was derived by $r = [1/t \log_e (N_t/N_o)]*100$.

Figure 3. AGR's in Percent Increase per Annum by Legal Status, 1780-1800

Note: Percent increase per annum was derived by $r = [1/t \log_e (N_t/N_o)]*100$.

† The "Free" category includes all free persons from each racial group, including White and Indian.

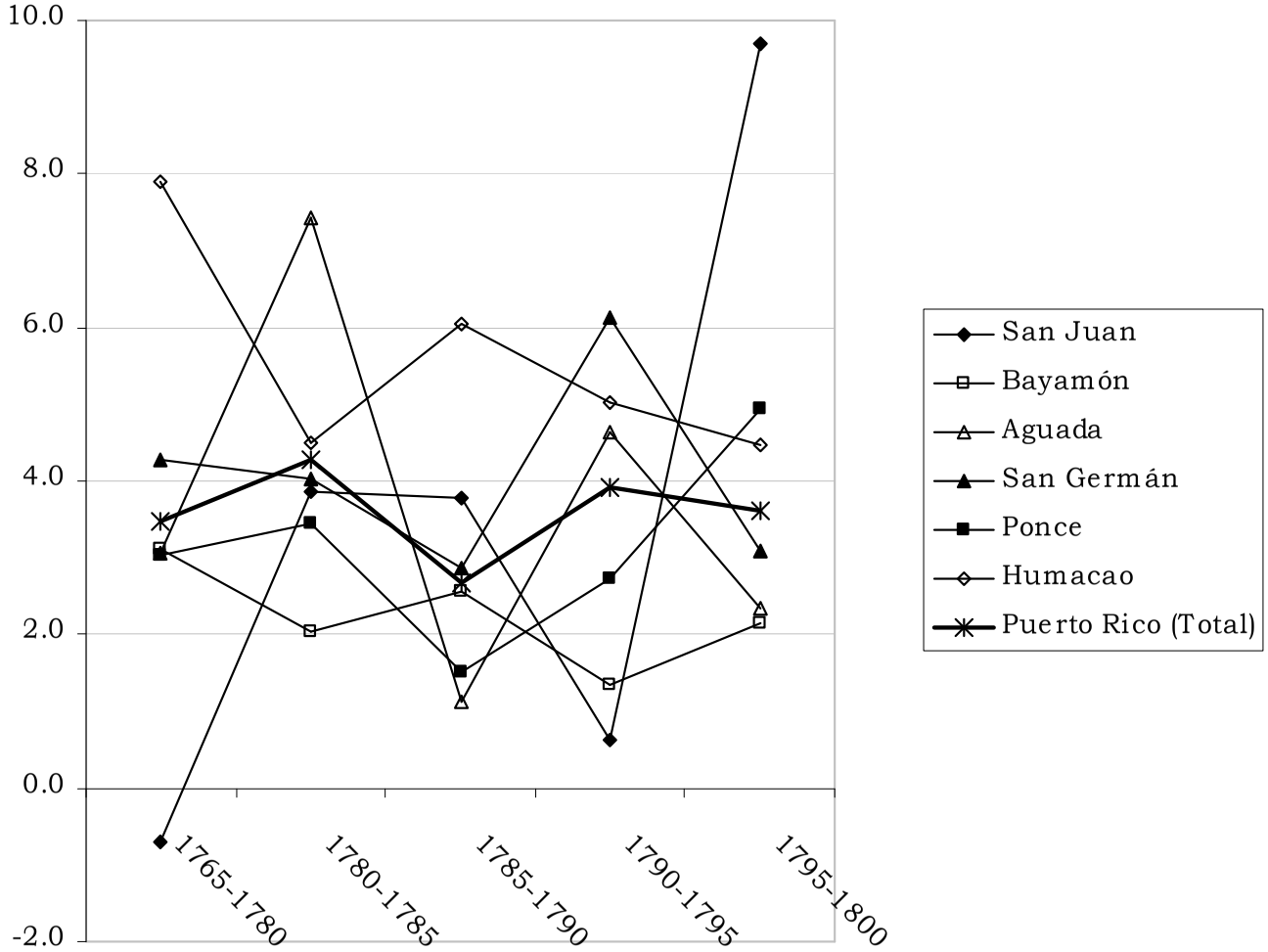

Figure 4. AGR's in Percent Increase per Annum by Region, 1780-1800

Note: Percent increase per annum was derived by $r = [1/t \log_e (N_t/N_o)]*100$.

Notes

1. By the Spanish Caribbean we mean the colonies of Cuba, Santo Domingo, Puerto Rico, and Trinidad, and the coastal lowlands of the viceroyalties of New Spain and New Granada.

2. On Bourbon reformism in the Caribbean, see Antonio Gutiérrez Escudero, "Acerca del proyectismo y del reformismo borbónico en Santo Domingo," *Temas Americanistas* 13 (1997): 17–30, and Allan J. Kuethe, "La desregulación comercial y la reforma imperial en la época de Carlos III: los casos de Nueva España y Cuba," *Historia Mexicana* 41, no. 2 (oct./dic. 1991): 265–92.

3. Juan Jiménez Pastrana, "Balance de la dominación inglesa en La Habana (1762–1763)," *Revista de la Biblioteca Nacional José Martí* 29, no. 3 (1987): 78–97.

4. The other two Spanish Caribbean island colonies, Santo Domingo and Trinidad, did not follow the same course. On Cuba's turn toward the plantation model, see Manuel Moreno Fraginals, *El ingenio: complejo socioeconómico cubano del azúcar*, reprint, 1964 (La Habana: Editorial de Ciencias Sociales, 1978) and Laird W. Bergad, *Cuban Rural Society in the Nineteenth Century: The Social and Economic History of Monoculture in Matanzas* (Princeton: Princeton University Press, 1990). On Puerto Rico's, see Francisco A. Scarano, *Sugar and Slavery in Puerto Rico: The Plantation Economy of Ponce, 1800–1850* (Madison: The University of Wisconsin Press, 1984).

5. On the notion of an "Atlantic System," see the essays collected in Barbara L. Solow, ed., *Slavery and the Rise of the Atlantic System* (New York: Cambridge University Press, 1991).

6. One hesitates to call this a migration of "free" people because so many of the Spanish men who settled in the Caribbean colonies were soldiers, many of whom had been conscripted back in the home country.

7. The somewhat inexact term "sugar colonies" applies to the English-, French- and Dutch-ruled West Indies which participated actively in the plantation trades, especially the British Leewards, Jamaica, and Barbados, the French West Indies (Guadeloupe and Martinique) and Saint-Domingue, and Dutch Suriname. It must be noted that the period under review was not only an epoch of growth, it was also one of declension. After 1791, as a result of a revolutionary conflagration fuelled by the largest slave revolt in History, the French colony of Saint-Domingue, until then the world's largest sugar *and* coffee exporter, essentially suffered an economic collapse. The withdrawal of Saint-Domingue from the circuits of Atlantic trade opened up possibilities for other regional producers, particularly in the historically less cultivated Spanish colonies.

8. For an assessment of the value of Jamaica to Great Britain in this period, see the classic account by Richard Sheridan, *Sugar and Slavery: An Economic History of the British West Indies, 1623–1775* (Baltimore: The Johns Hopkins University Press, 1973) and his more focused "The Wealth of Jamaica in the Eighteenth Century," *Economic History Review* 18, no. 2 (1965): 292–311. See also Peter A. Coclanis, "The Wealth of British America on the Eve of the Revolution," *Journal of Interdisciplinary History* 21, no. 2 (1990): 245–60. On French Saint-Domingue, see Robert Louis Stein, *The French Sugar Business in the Eighteenth Century* (Baton Rouge: Louisiana State University Press, 1988) and C.L.R. James, *The Black Jacobins: Toussaint L'Ouverture and the San Domingo Revolution*, 2nd. ed., reprint, 1938 (New York: Vintage, 1963), ix.

9. For a review of the literature on the Sugar Revolution and an assessment of the term's usefulness, see Barry W. Higman, "The Sugar Revolution," *Economic History Review* 53, no. 2 (2000): 213–36.

10. An important early study for the British areas was Lowell J. Ragatz, *The Fall of the Planter Class in the British Caribbean, 1763–1833: A Study in Social and Economic History*, reprint, 1928 (New York: Octagon Books, 1963). The single most influential statement on the broader implications of Caribbean prosperity was Eric Williams suggestive *Capitalism and Slavery*, reprint, 1944 (New York: Capricorn Books, 1966). On the historiography of slavery in the West Indies, see Francisco A. Scarano, "Slavery and Emancipation in Caribbean History," in *UNESCO General History of the Caribbean*, vol. VI, Historiography (Kingston: UNESCO, 1999).

11. There have been valuable attempts at writing the general population history of individual countries, but none of these treats the eighteenth century in great depth. See, for instance, José Luis Vázquez Calzada, *La población de Puerto Rico y su trayectoria histórica* (Río Piedras: Escuela de Salud Pública, Universidad de Puerto Rico, 1988) and George W. Roberts, *The Population of Jamaica*, intro. by Kingsley Davis (Cambridge: For the Conservation Fund at the University Press, 1957).

12. Slave demography has been studied especially well, thanks in part to the high quality of surviving records. For the British Caribbean, Brian W. Higman's work is unexcelled. See his *Slave Population and Economy in Jamaica, 1807–1834* (Cambridge: Cambridge University Press, 1976) and his massive *Slave Populations of the British Caribbean, 1807–1834* (Baltimore: The Johns Hopkins University Press, 1984). For Cuba, see *Cuban Rural Society in the Nineteenth Century: The Social and Economic History of Monoculture in Matanzas*, and with Fé Iglesias García, *The Cuban Slave Market, 1790–1880*, Cambridge Latin American Studies 79 (New York: Cambridge University Press, 1995). On Puerto Rico's slaves, see David M. Stark, "Discovering the Invisible Puerto Rican Slave Family: Demographic Evidence from the Eighteenth Century," *Journal of Family History* 21, no. 4 (October 1996): 395–418 and by the same author, "Marriage Strategies and Family Formation Patterns Among the Eighteenth-Century Puerto Rican Slave Population," *Journal of the Afro-American Historical and Genealogical Society* 15, no. 1 (1996): 12–26. See also Francisco A. Scarano, "Demografía y esclavitud: tendencias en Puerto Rico," *Revista de Historia* II, no. 4 (julio-diciembre 1986): 79–101.

13. For a general introduction to these findings, see Herbert S. Klein, *The Atlantic Slave Trade* (New York: Cambridge University Press, 1999).

14. See, for example, Edward L. Cox, *Free Coloreds in the Slave Societies of St. Kitts and Grenada, 1763–1833* (Knoxville: University of Tennessee Press, 1984); Jerome S. Handler, *The Unappropriated People: Freedmen in the Slave Society of Barbados* (Baltimore: Johns Hopkins Univiersity Press, 1974); and Jay Kinsbruner, *Not of Pure Blood: The Free People of Color and Racial Prejudice in Nineteenth-Century Puerto Rico* (Durham, N.C.: Duke University Press, 1996).

15. For an assessment of European immigration's impact on the Cuban population, see Pablo Tornero, "Emigración, población y esclavitud en Cuba (1765–1817)," *Anuario de Estudios Americanos* 44 (1987): 229–80. Sherry Johnson has noted the importance of Spanish soldiers who took up residence on the island at the end of their service; she calls this an "invisible immigration." See Sherry Johnson, "'La Guerra Contra los Habitantes de los Arrabales': Changing Patterns of Land Use and Land Tenancy in and Around Havana, 1763–1800," *Hispanic American Historical Review* 77, no. 2 (1997): 190, n. 28. For Jamaica, Trevor Burnard estimates (in the absence of reliable

migration data) that before the American Revolution, the annual stream of migrants from England numbered below 1,000; Burnard, "European Migration to Jamaica, 1655–1780," *William and Mary Quarterly* 53, no. 4 (1996): 774.

16. Because in Spanish America the Church was an integral part of the State, "government" is here understood in a broad way to include the regular Church as well.

17. Mario Rodríguez León has written a useful guide to Puerto Rico's parish registers, with suggestions on their use in population research; Mario A. Rodríguez León, *Los registros parroquiales y la microhistoria demográfica en Puerto Rico* (San Juan: Centro de Estudios Avanzados de Puerto Rico y el Caribe, 1990). For a general introduction to the utility of parish records in historicl demography, see . See Sherburne Cooke and Woodrow Borah's remarks about the use of Mexican parish registers and the problems encountered in applying methods devised for European registers to Latin America's, in *Essays in Population History* (Berkeley and Los Angeles: University of California Press, 1971–73), I:49–52; also Borah's essay, "La demografía histórica de América Latina: necesidades y perspectivas," *Historia Mexicana* 21, no. 2 (December 1971): 312–27. Interestingly, Robert H. Smith shows preference for colonial census material over parish data in his "History" section of Robert S. Bryars and Joseph L. Love, ED, *Quantitative Social Science Research in Latin America* (Urbana: University of Illinois Press, 1973), 14–61.

18. Because in the mid-1900s it was regarded by demographers as a laboratory for the study of fertility, the literature on Puerto Rico's population is enormous. See, for example, Frederick P. Thieme, *The Puerto Rican Population: A Study in Human Biology* (Ann Arbor: University of Michigan Press, 1959) and Vázquez Calzada, *La población de Puerto Rico y su trayectoria histórica*. For a critical view of population studies, see Laura Briggs, *Reproducing Empire: Race, Sex, Science, and U.S. Imperialism in Puerto Rico* (Berkeley and Los Angeles: University of California Press, 2002), 81ff.

19. For a general history of this period, see Francisco A. Scarano, *Puerto Rico: cinco siglos de historia*, 2nd. ed. (México, D.F.: McGraw-Hill Interamericana, 2000).

20. Francisco A. Scarano, "Liberal Pacts and Hierarchies of Rule: Approaching the Imperial Transition in Cuba and Puerto Rico," *Hispanic American Historical Review* 78, no. 4 (November 1998).

21. On the decline of the cattle economy, the dissolution of the primitive landholding system, and the shift toward agriculture, see Francisco Moscoso, *Agricultura y sociedad en Puerto Rico, siglos 16 al 18: un acercamiento desde la historia* (San Juan: Instituto de Cultura Puertorriqueña; Colegio de Agrónomos de Puerto Rico, 1999), and by the same author, "La economía del hato y los campesinos agregados en Puerto Rico, 1710–1815," *Historia y Sociedad* XI (1999): 9–28. The classic treatment of this is in Juana Gil-Bermejo García, *Panorama histórico de la agricultura en Puerto Rico* (Sevilla: Escuela de Estudios Hispanoamericanos, 1970), 232–99. On the cattle and contraband period, see Arturo Morales Carrión, *Puerto Rico and the Non-Hispanic Caribbean: A Study in the Decline of Spanish Exclusivism* (Río Piedras: University of Puerto Rico Press, 1952), 35ff, and Eugenio Fernández Méndez, *Historia cultural de Puerto Rico, 1493–1968*, San Juan (Ediciones El Cemí: 1970), 149–78.

22. Historians have stressed the importance of funds expended on military construction and defense for local capital accumulation. See, for instance, Juan Marchena Fernández, "Ejército y cambio social en la América de fines del XVIII," in *La América española en la época de las luces. Tradición - innovación - representaciones* (Madrid: Ediciones de Cultura Hispánica, Colección Ensayo, 1988), 59–95; Allan J. Kuethe, "Guns, Subsidies, and Commercial Privilege: Some Historical Factors in the

Emergence of the Cuban National Character, 1763–1815," in *Cuban Studies*, ed. Carmelo Mesa-Lago (Pittsburgh: University of Pittsburgh Press, 1986), 123–38; and Johnson, "'La Guerra Contra los Habitantes de los Arrabales': Changing Patterns of Land Use and Land Tenancy in and Around Havana, 1763–1800". For Puerto Rico, see Francisco Martín Rebolo, "Ejército y sociedad en las Antillas, 1700–1810," Ph.D. dissertation, Universidad de Sevilla (1986).

23. On the consequences of the spread of coffee cultivation, see Gil-Bermejo García, *Panorama histórico de la agricultura en Puerto Rico*, 190–204; Fray Iñigo Abbad y Lasierra, *Historia geográfica, civil, y natural de la isla de San Juan Bautista de Puerto Rico* (Río Piedras: Editorial de la Universidad de Puerto Rico, 1970), 160–61; *Actas del Cabildo de San Juan Bautista de Puerto Rico*, 16 unnumbered vols. (San Juan: Ayuntamiento de San Juan, 1949-1968), *1774-1777*: 303; Alejandro O'Reilly, "Memoria sobre Puerto Rico," in Alejandro Tapia y Rivera, *Biblioteca histórica de Puerto Rico* (San Juan: Instituto de Cultura Puertorriqueña, 1970), 624-661. The importance colonial officials placed on coffee can be gleaned from a 1770 report by governor Miguel de Muesas to his superiors in Spain, in which he reported measures taken to direct the flow of island coffee through legal channels. Miguel de Muesas to Julián de Arriaga, May 13, 1770, Archivo General de Indias (hereafter, AGI), Santo Domingo, 2300.

24. This computation is based on an 1812 agricultural census found in the Archivo General de Puerto Rico.

25. On immigration at the turn of the nineteenth century, see Estela Cifre de Loubriel, *La inmigración a Puerto Rico durante el siglo XIX* (San Juan: Instituto de Cultura Puertorriqueña, 1964). Also see John Luis Antonio Passalacqua, "La inmigración corsa al partido de Coamo hacia fines del siglo XVIII y principios del siglo XIX," *Revista de Historia* III, no. 5–6 (enero-diciembre 1987): 97–138 and Jorge L. Chinea, "Race, Colonial Exploitation and West Indian Immigration in Nineteenth-Century Puerto Rico, 1800–1850," *Americas: A Quarterly Review of Inter-American Cultural History* 52, no. 4 (1996): 495–519.

26. Here used interchangeably with the term "censuses." See Cook and Borah's relevant discussion in *Essays in Population History*, I:41–42.

27. *Intendentes* or intendants were novel colonial officials introduced by the Spanish Bourbons in the 1770s who consolidated managerial and fiscal functions.

28. Both Pedro Tomás de Córdova and José Julián Acosta, two important nineteenth-century authors, detailed population totals for the late eighteenth and early nineteenth centuries, especially those of 1778-1803. A contemporary of Acosta, J. Jimeno Agius, also engaged in a short study of population trends suggested by the earliest available data, i.e., the padrones of the second half of the eighteenth century. See Pedro Tomás de Córdova, *Memorias geográficas, históricas, económicas y estadísticas de la Isla de Puerto Rico* (San Juan: Oficina del Gobierno, 1831–33); Acosta, "Notas" to the 1866 edition of Fray Iñigo Abbad y Lasierra, *Historia geográfica, civil y natural de la Isla de San Juan Bautista de Puerto Rico. Nueva edición, anotada en la parte histórica y continuada en la estadística y económica por Jose Julián Acosta y Calbo* (San Juan: Imprenta y Librería de Acosta, 1866); and J. Jimeno Agius, "Población y comercio de la Isla de Puerto Rico," *Boletín Histórico de Puerto Rico* 5 (1918): 279–315. An example of the use of the censuses for illustration purposes may be found in Bibiano Torres Ramírez, *La isla de Puerto Rico, 1765–1800* (San Juan: Instituto de Cultura Puertorriqueña, 1968), 60.

29. Willigan and Lynch's observations on the value of Italian "enumeration of souls" (*stati d'anime*), in .

30. Salvador Brau, *Historia de Puerto Rico*, reprint, 1904 (San Juan: Ed. Coquí, 1966), 70–71 and 11; the "relación geográfica" for Puerto Rico, comnonly referred to as the "Memoria de Melgarejo," in Germán Latorre, ed., *Relaciones geográficas de Indias (contenidas en el Archivo General de Indias): la Hispanoamérica del siglo XVI: Colombia, Venezuela, Puerto Rico, República Argentina* (Seville: Tipografía Zarzuela, 1919), 35-61.

31. Richard Herr, *The Eighteenth-Century Revolution in Spain* (Princeton: Princeton University Press, 1958), 86–88; Massimo Livi-Bacci, "Fertility and Population Growth in Spain in the Eighteenth and Nineteenth Centuries," in D.V. Glass and Roger Revelle, eds., *Population and Social Change* (London: E. Arnold, 1972), 173–84.

32. O'Reilly, "Memorias," 654-661; Bibiano Torres Ramírez, *Alejandro O'Reilly en las Indias* (Seville: Consejo Superior de Investigaciones Científicas, 1969), 86–88. Some historians consider that upon completion of the garrisons in San Juan in the late 1700s that city became the strongest military outpost in the New World. See J.H. Parry, *El imperio español de ultramar* (Madrid: Aguilar, 1970), 278.

33. Salvador Brau, "Fundación de pueblos en Puerto Rico: apuntes de un cronista," *Boletín Histórico de Puerto Rico* 7 (1920): 79–88.

34. Cook and Borah, *Essays in Population History*, 1:43; Brau, *Historia de Puerto Rico*, 199, and Richard Konetzke, *América Latina: la época colonial*, 2nd. Ed. (México: Siglo XXI, 1989), 89.

35. On the concept of a "civil population," see T.H. Hollinsgworth, *Historical Demography* (Ithaca: Cornell University Press, 1969), 14.

36. Brau refers to the Indian community of late eighteenth-century Puerto Rico as follows: "Esos indios, cuya existencia se había comprobado oficialmente, no eran los procedentes de cruzamientos y que existían confundidos en la clasificación de *pardos libres*, sino tipos de raza pura, descendientes de aquellos que emancipados por Carlos V, procuraron alejarse de sus opresores. Instalados todavía en 1570, en terrenos próximos al San Germán de Guadianilla, de allí se remontaron a lo más agrio de la sierra, en sitio que por tal vecindario, se llamaba *La Indiera*." Blanca Silvestrini, "Contemporary Puerto Rico: A Society of Contrasts," in *The Modern Caribbean*, ed. Franklin W. Knight and Colin A. Palmer (Chapel Hill: University of North Carolina Press, 1989), 199–200.

37. See Hollingsworth's extensive discussion of pre-statistical population counts in Hollingsworth, *Historical Demography*, 65–108. There were a few arithmetic errors in the padrones. We use the arithmetically correct figures.

38. For a description of Ramírez's work and of the institutional reforms he helped usher, see Lidio Cruz Monclova, *Historia de Puerto Rico (siglo XIX)*, 6th ed. (Río Piedras: Editorial Universitaria, 1970), 1:*passim*.

39. *Diario Económico de Puerto Rico*, facsimile ed., introd. by Luis González Vales, reprint, 1814–15 (San Juan, 1972) and Córdova, *Memorias geográficas, históricas, económicas y estadísticas de la Isla de Puerto Rico*, vol. 2. See also Isabel Gutiérrez del Arroyo, *El reformismo ilustrado en Puerto Rico* (México: Asomante; El Colegio de México, 1953) and her essay, Isabel Gutiérrez del Arroyo, *Historiografía puertorriqueña, desde la Memoria de Melgarejo hasta el Boletín Histórico*, Ciclo de Conferecias Sobre la Historia de Puerto Rico, Instituto de Cultura Puertorriqueña (San Juan, 1969).

40. Francisco A. Scarano, "Congregate and Control: The Peasantry and Labour Coercion in Puerto Rico Before the Age of Sugar, 1750–1820," *Nieuwe West-Indische Gids/New West Indian Guide* 63, no. 1–2 (1989): 23–40. See discussions among members of the Ponce city council about the need for coercive labor measures in Ilia Del Toro Robledo, trans. and ed., *Actas del cabildo de Ponce, Puerto Rico, 1812–1823* (Ponce: Gobierno Municipal Autónomo de Ponce & Comisión Puertorrriqueña para la Celebración del Quinto Centenario del Descubrimiento de América y Puerto Rico, 1993).

41. On the process of consensus-building by hacendados, also see the "Informe de Don Pedro Irizarri, alcalde ordinario de San Juan sobre las instrucciones que debían darse a Don Ramón Power, diputado por Puerto Rico ante las cortes españolas para promover el adelanto económico de la Isla. Año 1809," in *Crónicas de Puerto Rico, desde la conquista hasta nuestros días (1493–1955)*, ed. Eugenio Fernández Méndez, reprint, 1957 (Río Piedras: Editorial U.P.R., 1969), 345–72. Irisarri accused agregados of laziness and "irrational" economic behavior and urged that they be forced to become either landowners in their own right, or wage-earners on existing farms. This modality of thought was essentially that employed later in the century to justify harsh labor-coercion laws. See, for instance, Labor Gómez Acevedo, *Organización y reglamentación del trabajo en el Puerto Rico del siglo XIX: propietarios y jornaleros* (San Juan: Instituto de Cultura Puertorriqueña, 1970), and Sidney W. Mintz's two classic articles, "Labour and Sugar in Puerto Rico and Jamaica, 1800–1850," *Comparative Studies in Society and History* I (1958–59): 273–83 and "Slavery and Forced Labor in Puerto Rico," in *Caribbean Transformations*, reprint, 1974 (Baltimore: The Johns Hopkins University Press, 1984), 82–94.

42. *Diario Económico de Puerto Rico*, II:8 (Aug. 11, 1814), 62-63, and *BHPR*, 5:342-348.

43. Abbad y Lasierra, *Historia geográfica, civil, y natural de la isla de San Juan Bautista de Puerto Rico*, GIVE PAGE NUMBER.

44. The region of Bayamón included the original partidos of Bayamón, Río Piedras, Cangrejos, Toa Alta, Toa Baja, Vega, Manatí, and Arecibo, as well as the district of Vega Baja, first counted in 1797; the region of Aguada included the partidos of Aguada, Utuado, Tuna, Pepino, Moca, Aguadilla, Añasco, and Ricón; San Germán encompassed San Germán, Mayagüez, Cabo Rojo, and Yauco; Ponce's region included Ponce, Coamo, Guayama, Cayey, Peñuelas (after 1792), and Juana Díaz (after 1798); Humacao consisted of Humacao, Caguas, Fajardo, Loíza, Yabucoa (1792), Juncos (1792), Naguabo (1793), Luquillo (1798), and Maunabo (1800).

45. For a discussion of Latin America's demographic history in a global context, see Reinhard Marcel R., André Armengaud, and Jacques Dupaquier, *Histoire génerale de la population mondiale*, 3rd. ed. (Paris: Montchrestien, 1968).

46. Tomás Blanco estimated the aboriginal population at an even smaller number (30,000): "Anotaciones sobre la población puertorriqueña," *Ateneo Puertorriqueño* 4, no. 2 (abril-junio 1940): 99–108.

47. Julio Damiani Cosimi, *Estratificación social, esclavos y naborias en el Puerto Rico minero del siglo XVI: la información de Francisco Manuel de Lando : ensayo de cuantificación y transcripción paleográfica*, Cuadernos de Investigación Histórica, no. 1 (San Juan, Puerto Rico: Departamento de Historia, Centro de Investigaciones Históricas, Universidad de Puerto Rico, Recinto de Río Piedras, 1994).

48. Salvador Brau, *Puerto Rico y su historia* (Valencia: Ed. Coquí, 1894), 311–12. For another, higher, estimate of the original Indian population, see Ricardo Alegría, *Historia de nuestros indios* (San Juan, 1950), 2. The 1580s estimate in the "Memoria de Melgarejo," in Germán Latorre, ed., *Relaciones geográficas*. See also Ricardo Alegría, "Plan para repoblar la Isla de Puerto Rico con indios araucas (arauacos) de América del Sur, año 1580," in *Arturo Morales Carrión: homenaje al historiador y humanista*, ed. Rícardo Alegría (San Juan: Centro de Estudios Avanzados de Puerto Rico y el Caribe, 1989), 67–80.

49. For a similar assessment of population trends in seventeenth-century Cuba, see Alejandro de la Fuente, "Población y crecimiento en Cuba (siglos XVI y XVII): un estudio regional," *European Review of Latin American and Caribbean Studies [Netherlands]* 55 (1993): 59–93.

50. Assuming that the proportion of the island population that lived in San Juan was constant (about 10 per cent in 1765), Puerto Rico's population would have been about 17,500 in 1673 and some 20,000 in 1700. Brau, *Historia de Puerto Rico*, 155. David Stark [M.] and Teresa de Castro, "The Militia Muster Rolls Compiled by Gabriel Gutiérrez de Riva as Tools for Reconstructing Puerto Rico's Population in 1700," *Boletín de la Sociedad Puertorriqueña de Genealogía* VIII, no. 1–2 (April 1996): 77–114.

51. On immigration from the Canaries, see Gil-Bermejo García, *Panorama histórico de la agricultura en Puerto Rico*, 231–32, and Manuel Alvarez Nazario, *La herencia lingüistica de Canarias en Puerto Rico* (San Juan: Instituto de Cultura Puertorriqueña, 1972), 44–48.

52. "Memorial con que el Illmo. Sor. D.D. Fr. Manuel Jiménez Pérez dio cuenta a Su Majestad de todos los acontecimientos y providencias que tomó en su Santa Pastoral Visita, extensiva a los anexos de esta Diócesis.--Año de 1774," *Boletín Histórico de Puerto Rico* 7 (1920): 36–48, reprint, 1774, and O'Reilly, "Memoria."

53. Gil-Bermejo García, *Panorama histórico de la agricultura en Puerto Rico*, 169–84; Torres Ramírez, *La isla de Puerto Rico, 1765–1800*, 71–109; Córdova, *Memorias geográficas, históricas, económicas y estadísticas de la Isla de Puerto Rico*, 3:124ff; Arturo Santana, *Puerto Rico y los Estados Unidos en el período revolucionario de Europa y América (1789–1825)*, Ciclo de Conferencias sobre Historia de Puerto Rico, Instituto de Cultura Puertorriqueña, San Juan (1972).

54. On the economic history of this period, see Moscoso, "La economía del hato y los campesinos agregados en Puerto Rico, 1710–1815"; Scarano, "Congregate and Control: The Peasantry and Labour Coercion in Puerto Rico Before the Age of Sugar, 1750–1820"; Scarano, *Sugar and Slavery in Puerto Rico: The Plantation Economy of Ponce, 1800–1850*, ch. 1; and Scarano, *Puerto Rico: cinco siglos de historia*, chs. 16–19.

55. Another aspect of the group growth rates in Table 3 that should concern us is the apparently negative connection that between the two slave categories: in each five-year term, a very large increase in one of the groups seems to be accompanied by an abnormally low increase in the other. This leads us to question the possibility of extreme overlap of categories separated by only slight differences in skin color, such as between the two slave groups, the free mulattoes and whites, and the free blacks and free mulattoes.

In order to test the validity of census categories, we performed a direct or Pearson correlation analysis, a procedure that measures the degree to which two variables "move together" and expresses this relationship by means of a coefficient ranging from -1.0 (a perfectly negative correlation) to 1.0 (a perfectly positive

correlation, as between a variable and itself). The result may be regarded as a measure of the degree of association between the variables in question. We assumed that for any given partido, if the distinction between pairs of socio-racial groups were loosely drawn, and if some people were classified in one category at one time and in another category at another time, the correlation coefficient for these groups would be negative for that partido. We obtained one correlation matrix for each of the 30 districts on the basis of the 1779-1802 data. In addition to the 'sensitive" pairs of variables described above, we obtained a matrix of correlations for an "incompatible" pair, whites-black slaves, to serve as a baseline for the other results.

The correlation indices tended to uphold the validity of the census categories as self-contained units. In no less than 25 partidos the correlations between free mulattoes and free blacks were positive (a majority were in the higher, 0.5 to 1.0 range), while in 24 partidos the mulatto-black slave correlations were also positive, fully half falling in the upper range. Interestingly, the fewest positive correlations were obtained between whites and free mulattoes, a detail which suggests that the lines dividing these groups might not have been as rigid as those separating mulattoes and blacks, both frees and slave. Note, however, that in spite of the above, in nearly three-fourths of the island's districts (22 of the 30) the Pearson coefficients were positive and that this rules out the possibility of too much overlap between those groups. Furthermore, in our "control" pair (whites-black slaves) we found, act surprisingly, that positive correlations existed in 90 per cent of the districts. In conclusion, the correlation analysis left no questions in our minds regarding the integrity of socio-racial categories in the annual census series. For a discussion of the use of correlation to determine reliability of early enumerations, see .

56. Philip D. Curtin, *The Atlantic Slave Trade: A Census* (Madison: University of Wisconsin, 1969), 30–34. The contrast between the two colonies reflects the more vigorous plantation development in Cuba between 1789, when the Spaniards opened their colonies to foreign slave traders, and 1815, the end of the Napoleonic wars. See Franklin W. Knight, *Slave Society in Cuba During the Nineteenth Century* (Madison: University of Wisconsin Press, 1969) and Scarano, *Sugar and Slavery in Puerto Rico: The Plantation Economy of Ponce, 1800–1850*.

57. The best treatment of the overall effects of hurricanes on a Caribbean society is Louis Pérez, Jr.'s work on mid-nineteenth century Cuba. Unfortunately, Perez's focus is on how the "times of stress" provoked by such disasters give insight into the "character of nationality." Pérez, Louis Pérez, Jr., *Winds of Change: Hurricanes and the Transformation of Nineteenth-Century Cuba* (Chapel Hill: University of North Carolina Press, 2001), 12. For a wonderful treatment of one of Puerto Rico's worst killer hurricanes, see Stuart B. Schwartz, "The Hurricane of San Ciriaco: Disaster, Politics, and Society in Puerto Rico, 1899–1901," *Hispanic American Historical Review* 72, no. 3 (August 1992): 303–34.

58. Cayetano Coll y Toste, "Huracanes habidos en Puerto Rico," *Boletín Histórico de Puerto Rico* 5:342-348. For a suggestive account on the impact of hurricanes on a Caribbean society, see Pérez, *Winds of Change: Hurricanes and the Transformation of Nineteenth-Century Cuba*.

59. For the purposes of brevity, the analysis of construction spending is not presented in this paper.

60. We do not rule out labor demands within the city as a possible factor. Military construction spending may not be an adequate gauge of such demand after all. Other factors arising from the rural economy, such as fluctuations in the rural labor market,

might also have propelled rural dwellers out of the countryside and driven them to San Juan in search of work. More research would need to be done on the economic and demographic relations between the City and its hinterland to determine the origin of the fluctuations.

61. For a description of the hardships endured by city folk in the wake of a hurricane, see the *Actas del cabildo de San Juan, 1730-1750*, 143-144.

62. Contemporary observers noted this difference. In his detailed notes about Puerto Rico's towns and villages in the 1770s, for example, Fray Iñigo Abbad y Lasierra observed how much more cultivated the valleys west of San Juan were and how sparsely colonized and more newly cultivated the eastern zone was. See *Historia geográfica, civil, y natural de la isla de San Juan Bautista de Puerto Rico*, 109, in which Abbad notes the exceptional fertility of the valley around the town of Fajardo, and attributes this fertility to the novelty of their exploitation.

63. Eugenio Fernández Méndez, *Historia cultural de Puerto Rico, 1493–1968* (San Juan: Ediciones El Cemí, 1970), 119–78 and Gil-Bermejo García, *Panorama histórico de la agricultura en Puerto Rico*. See also the controversy that ensued in 1550 over the island's "best lands" (i.e., those closest to San Juan), in Francisco Moscoso, *Lucha agraria en Puerto Rico, 1541–1545: un ensayo de historia* (San Juan: Ediciones Puerto; Instituto de Cultura Puertorriqueña, 1997) and Alfonso Múnera Cavadía, *El fracaso de la nación : región, clase y raza en el Caribe colombiano (1717–1821)* (Bogotá: Banco de la República; Ancora Editores, 1998), 1:200 ff.

64. The *Actas del cabildo* are full of references to the workings of this coerced meat market, to which councilors paid particular attention. See also Benjamín Rivera Belardo, "The Supply of Mean and Fish to the City of San Juan de Puerto Rico," mimeographed, Columbia University, 1971. For similar problems in the highly fortified Caribbean city of Cartagena in the Viceroyalty of New Granada, see Enrique Marco Dorta, "Ganadería y abastecimiento en Cartagena de Indias (1766)," *Revista de Indias* XXX (1970): 475.

65. Abbad y Lasierra, *Historia geográfica, civil, y natural de la isla de San Juan Bautista de Puerto Rico*, censuses of population and production in 1776. However, this is far from being conclusive evidence, since *per capita* livestock production is higher in Aguada and San Germán than in Bayamón. The former regions merely had a higher output, and so cattle raising was only *proportionately* less important there than in the region closest to the Capital.

66. Salvador M. Padilla Escabí, "El poblamiento de Puerto Rico en el siglo XVIII," *Anales (Universidad Interamericana, Recinto de San Germán, Nueva Serie)* 1, no. 2 (1985): 95–132; Passalacqua, "La inmigración corsa al partido de Coamo hacia fines del siglo XVIII y principios del siglo XIX"; Angel López Cantos, "Emigración canaria a Puerto Rico en el siglo XVIII," in *VI Coloquio de Historia Canario-Americana* (Las Palmas: Excmo. Cabildo Insular de Gran Canaria, 1984), 91–114; and the following articles by Jorge L. Chinea: "The Spanish Immigrant Joseph Martín de Fuentes: A Self-Styled Reformer, Imperial Watchdog and Nativist in Puerto Rico at the End of the Eighteenth Century," *Revista Mexicana del Caribe* VI, no. 12 (2001): 85–109; "A Quest for Freedom: The Immigration of Maritime Maroons Into Puerto Rico, 1656–1800," *Journal of Caribbean History* 31, no. 1/2 (1997): 51–87; and "The Control of Foreign Immigration in the Spanish American Colonial Periphery: Puerto Rico During Its Transition to Commercial Agriculture, c.1765–1800," *Colonial Latin American Historical Review* 11, no. 1 (2002): 1–33.

67. Tomás Blanco, *Prontuario histórico de Puerto Rico*, reprint, 1935 (San Juan: Instituto de Cultura Puertorriqueña, 1970), 44–45.

68. Torres Ramírez, *La isla de Puerto Rico, 1765–1800*, 189–91.

69. See Cifre de Loubriel, *La inmigración a Puerto Rico durante el siglo XIX*, XXV, and Torres Ramírez, *La isla de Puerto Rico, 1765–1800*, 190.

70. *Boletín Histórico de Puerto Rico*, 5:80.

71. Abbad y Lasierra, *Historia geográfica, civil, y natural de la isla de San Juan Bautista de Puerto Rico*, 133.

72. Cifre de Loubriel, *La inmigración a Puerto Rico durante el siglo XIX*, XXVII.

73. In 1799, the outgoing bishop of San Juan, Fray Juan Bautista de Zengotita Vengoa, after visiting much of the island noted with alarm that there were many "recently emigrated" foreigners and that "there is hardly a country from which they haven't come." He warned parish priests to be vigilant about these foreigners' religious habits. The implication is that many of the recent arrivals were not Catholic and hence, that not all were refugees from Haiti, since most of these would have been of that religion. "Testimonio de los Espedientes de la Visita Practicada por el Illmo. Sor. Dn. Fr. Juan Bautista de Zengotita Vengoa de su Obispado de San Juan de Puerto Rico," AGI Santo Domingo, 2527.

74. It *is* true, however, that Frenchmen and creoles from Haiti and Louisiana contributed significantly to the expansion of coffee and sugarcane production, as they had considerable expertise in those areas. What is at issue here is whether the expansion of the export sector may be attributed solely to their presence; we, of course, do not think so. See José Morales, "The Hispaniola Diaspora, 1791–1850: Puerto Rico, Cuba, Louisiana, and other host societies" (University of Connecticut at Storrs, 1986).

75. Morales, "The Hispaniola Diaspora, 1791–1850: Puerto Rico, Cuba, Louisiana, and other host societies."

76. In addition to *La inmigración*, see: Estela Cifre de Loubriel, *La formación del pueblo puertorriqueño: la contribución de los catalanes, baleáricos y valencianos* (San Juan: Instituto de Cultura Puertorriqueña, 1975); *La formación del pueblo puertorriqueño: la contribución de los vascongados, navarros y aragoneses* (San Juan: Instituto de Cultura Puertorriqueña, 1986); *La formación del pueblo puertorriqueño: la contribución de los gallegos, asturianos y santanderinos* (San Juan: Instituto de Cultura Puertorriqueña, 1989); and *La formación del pueblo puertorriqueño: la contribución de los isleño-canarios* (San Juan: Instituto de Cultura Puertorriqueña, 1995).

77. Cifre de Loubriel, *La inmigración a Puerto Rico durante el siglo XIX*, LXXVI. On the Dominican immigrants, see also Fernando Pérez Memén, "Panorama histórico de las emigraciones dominicanas a Puerto Rico," in *Los inmigrantes indocumentados dominicanos en Puerto Rico: realidad y mitos*, ed. Juan Hernández Cruz, Estudios Sobre la Sociedad y Cultura Puertorriqueña, Nueva Serie (San Germán: Centro de Publicaciones, Universidad Interamericana de Puerto Rico, 1989), 7–33. Cifre de Loubriel, *La inmigración a Puerto Rico durante el siglo XIX*, LXXVIOn the Venezuelan immigration, see Ivette Pérez Vega, "El efecto económico, social y político de la emigración de Venezuela en el sur de Puerto Rico (Ponce), 1810–1830," *Revista de Indias* XLVII, no. 181 (1987): 869–85 and by the same author, "Las oleadas de inmigración sobre el sur de Puerto Rico: el caso de las sociedades mercantiles creadas

en Ponce (1816–1830)," *Revista del Centro de Estudios Avanzados de Puerto Rico y el Caribe* 4 (enero-junio 1987): 114–23.

78. The reason for this is that as the original migrants die off, their offspring expectedly would have a more or less equal sex ratio, and thus in time a balance would be obtained.

79. For a discussion of Caribbean sex ratios at birth, see George W. Roberts,*The Population of Jamaica* (Cambridge, 1957), 74-76.

80. See note 36, above. On the "Indian" community in the mountains of San Germán partido, later to be part of the Indieras of Maricao, see Manuel Alvarez Nazario, *El influjo indígena en el español de Puerto Rico* (Río Piedras: Editorial Universitaria, 1977), pp..

81. For a contemporary's views on how Indians or *mestizos* (mixed descendants of Europeans and Indians) would gradually be counted as mulattoes, see Fray Iñigo Abbad, *Viage a la América*, edición facsimilar, ed. Carlos Arcaya (Caracas: Banco Nacional de Ahorro y Préstamo, 1974), unnumbered ms. facsimile, when discussing the partido of Añasco.

82. Jorge L. Chinea, "A Quest for Freedom: The Immigration of Maritime Maroons Into Puerto Rico, 1656–1800".

83.

84. Herbert S. Klein, *Slavery in the Americas: A Comparative Study of Virginia and Cuba* (Chicago, 1967), 194-196.

85. Neville A.T. Hall, "Maritime Maroons: *Grand Marronage* from the Danish West Indies," *William and Mary Quarterly* 42, no. 4 (1985): 476–98 See also Jorge L. Chinea, "A Quest for Freedom: The Immigration of Maritime Maroons Into Puerto Rico, 1656–1800".

86. Luis M. Díaz Soler, *Historia de la esclavitud negra en Puerto Rico*, reprint, 1953 (Río Piedras: Editorial Universitaria, 1970), 232–37; Waldemar Westergaard, cited in *ibid*, 233.

87. Torres Ramírez, *Alejandro O'Reilly en las Indias*.

88. See Scarano, *Sugar and Slavery in Puerto Rico: The Plantation Economy of Ponce, 1800–1850*.

89. Curtin, *The Atlantic Slave Trade: A Census*, 32.

90. Curtin, *The Atlantic Slave Trade: A Census*, 32–34.

91. Curtin assumed that Díaz Soler's figures on the Puerto Rican slave population were accurate. The Puerto Rican scholar was incorrect in stating, however, that in 1754 the island's "African population" was around 17,500 and that it declined to 13,333 in 1802. Actually, in 1794 all slaves (mulatto and black) numbered 17,822 while in 1802 that figure was 24,591; in the latter year it was the number of slaves deemed to be "black" that actually totalled 13,333. On the basis of this confusing information Curtin believed that the slave population actually had declined between 1794 and 1802, when it grew at an annual rate of 4.03 per cent. Curtin, *The Atlantic Slave Trade: A Census*, 34, table 7; Díaz Soler, *Historia de la esclavitud negra en Puerto Rico*, 98–99.

92. *BHPR*, 9:122.

93. Curtin, *The Atlantic Slave Trade: A Census*, 32n.

94. Estimates of Cuban slave imports in Curtin, *The Atlantic Slave Trade: A Census*, 32. These calculations were based on figures provided by Hubert H.S. Aimes, *A History of Slavery in Cuba, 1511-1868* (New York, 1907) and Alexander von Humboldt, *Personal Narrative of Travels to the Equinoctial Regions of the New Continent... 1799-1804*, 7 vols. (London, 1814-29), vol. 7.

95. Curtin, *The Atlantic Slave Trade: A Census*, 41; Roberts, *The Population of Jamaica*, 232.

96. Adán Szaszdi, "Los registros del siglo XVIII en la parroquia de San Germán," *Historia*, new ser., I, 1 (January 1962):51-63.

97. Stark, "Discovering the Invisible Puerto Rican Slave Family: Demographic Evidence from the Eighteenth Century" and "Marriage Strategies and Family Formation Patterns Among the Eighteenth-Century Puerto Rican Slave Population".

98. Herbert S. Klein, "North American Competition and the Characteristics of the Slave Trade to Cuba, 1790 to 1794," *William and Mary Quarterly*, 3rd. ser., XXVIII, 1 (January 1971), 86-102.

99. Ibid., 100n.

100. See the descriptions of the 1765 and 1815 censuses, above.

101. Notice that instead of using the whites' AGR as a yardstick, we utilized the lowest AGR of all for this period, that of free mulattoes (2.9 per cent). The fact that there was some immigration into the white class precluded the use of that group's rate of natural increase as a basis for our calculations. Also, had we considered only the number of persons "transferred" from the slave class into the free black group—in other words, had we not calculated the number who passed from the black slave to the mulatto slave classifications–, while the number of persons involved would have been smaller, the implied number of importations would have been much larger concurrent with a still positive rate of reproduction.

102. Francisco Del Valle Atiles, *El campesino puertorriqueño; sus condiciones físicas, intelectuales y morales, causas que las determinan y medios para mejorarlas* (Puerto-Rico: Tip. de J. González Font, 1887).

103. Annette B. Ramírez de Arellano and Conrad Seipp, *Colonialism, Catholicism, and Contraception: A History of Birth Control in Puerto Rico* (Chapel Hill: University of North Carolina Press, 1983); Laura Briggs, "Puerto Rican Reproduction and the Mainland Imaginary: The Problem of 'Overpopulation' in the 1930s," *Revista/Review Interamericana* 27, no. 1–4 (December 1997): 79–92.