# RESEARCH REPORTS AND NOTES

## RECENT TRENDS IN QUANTITATIVE HISTORY: COLONIAL LATIN AMERICA*

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In 1968, in an article prepared for the American Historical Association Ad Hoc Committee on Quantitative Data (but not published until 1972), I discussed materials, opportunities, problems, and priorities for quantitative research in Latin American colonial history.[1] Specifically, that article included a discussion of the evolution of quantitative studies on colonial Hispanic America, a description of the data available, possible topics for research, opinions on the future of quantification in the field, and an extensive bibliography. The present article is intended to complement that earlier piece—to discuss new factors giving impetus to quantitative history, to list some of the major contributions since 1968 in Latin American colonial history, to revise some old views, and to offer some new suggestions.

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NEW STIMULI TO QUANTITATIVE HISTORY

That quantification has assumed a far more significant place among historians generally cannot be denied. Since 1968, for example, the sharp increase in the number of books on quantification and quantitative history has occurred—if I might be pardoned a quantitative term—in geometric proportions. Emphasizing methodology and methodological questions, some of these works have been tailored for the novice eager to practice or to understand quantitative techniques.[2] Other books have provided model studies based on quantitative research and analysis bearing on specific historical topics within traditional fields.[3] Even "readers" in quantitative history have appeared for digestion by undergraduate and graduate students.[4] At the same time journals such as *The Historical Methods Newsletter, Computer and the Humanities*, and the *Journal of Inter-Disciplinary History* have continued their concentration on quantitative methodology and problems.

Another impetus to quantification came in 1972 with publication in English of Fernand Braudel's *The Mediterranean and the Mediterranean World in the Age of Philip II.*[5] Heralded in the publisher's blurbs as the work of another Gibbon, Spengler, or Toynbee, the book was greeted by historians in the United States with great fanfare. In fact, editors of the *Journal of Modern History* dedicated a full issue to Braudel's work, calling his book "a majestic monument of twentieth-century historiography."[6] All this panoply aroused new interest in Braudel's approach to history—his preoccupation with long-term reality (*structure*); his focus on the immutable or semi-immutable forces which shape human history; and most important, Braudel's insistence on measuring those things that can be measured and on using statistical method to reduce our ignorance of the past, a position well defended by a disciple of Braudel, the distinguished Spanish historian Jaime Vicens Vives:

> Unless we resort to statistical method as our primary instrument, collective life cannot be deciphered. In history, statistics is no mere accumulation of data; it is an art of applying percentages and constants, averages and coefficients. It defines clearly how many times men repeat the same offense, without necessarily implying that these men would condemn whatever it is they are doing. Statistics establishes those geographic sites in which the greatest number of major events have taken place. Above all it expresses numerically the material and spiritual interests of humanity, which are what count in history. Thus, it does not bother me to repeat that statistics is "essential for the determination of values, fortunes, and mentalities" and that "unless this is approached through a minute analysis of prices, salaries, political trends, and cultural tendencies, it is possible to understand nothing."[7]

Still a third recent landmark in quantitative history came with the publication of *Time on the Cross*.[8] In this two-volume work, the authors



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Robert Fogel and Stanley Engerman—Cliometricians, say the pundits—used vast amounts of statistics, statistical analysis, and the computer to launch an all-out assault on what they set up as the traditional interpretations of slavery in the pre-Civil War United States. Here it is not important to analyze their conclusions but to point out that their statistical tables, algebraic equations, and quantitative methodology caused considerable furor. "Massa's in de Cold, Cold Computer" proclaimed the headlines in one slick news magazine, while a distinguished scholar wrote in *The New York Review of Books* that the work of Fogel and Engerman had set off "a new period of slavery scholarship and some searching revisions of national tradition."[9]

## RECENT CONTRIBUTIONS IN QUANTITATIVE HISTORY ON COLONIAL LATIN AMERICA

Although no historian of colonial Latin America has yet produced a work like that of Braudel or Fogel and Engerman, quantitative history has gone on apace. My previous article described or mentioned the contributions of Jean Pierre Berthe, Pierre and Huguette Chaunu, and Frédéric Mauro in France; Antonio Domínguez Ortiz, María Encarnación Rodríguez, and Jaime Vicens Vives in Spain; Günter Vollmer in West Germany; Peter Bakewell and David Brading in England; Alvaro Jara and Rolando Mellafe in Chile; Nicolás Sánchez Albórnoz in Argentina; Enrique Florescano and Bernardo García Martínez in Mexico; García Chuecos and Eduardo Arcila Farías in Venezuela; Guillermo Lohmann Villena and Manuel Moreyra Paz-Soldán in Peru; and, among others in the United States, Dauril Alden, Woodrow Borah, Bradley Benedict, David Cook, Sherburne Cook, Earl J. Hamilton, Clarence Haring, Paul Hoffman, Walter Howe, James Lockhart, John Lombardi, Clement Motten, Lesley Bird Simpson, and Robert S. Smith. To this list we can now add a number of significant contributions. In his brilliantly researched work on slavery in colonial Peru to 1650, for example, Frederick Bowser used statistics gleaned from manuscript sources, including head-tax revenues, to estimate the Peruvian slave population and the average prices paid for slaves of different ages.[10] Sherburne Cook and Woodrow Borah have long led the way in demographic research in colonial Hispanic America. Since 1968 they have published two volumes of essays on Mexico and the Caribbean, volumes indispensable for the historian and demographic researcher. The books reaffirm some old positions, propound some new findings, and describe the methodology of the *école Berkeley.*[11] That regional studies can profit from the use of quantitative data is clear also from the work of William



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Taylor who has used such materials to reinforce his conclusions concerning landholding patterns in colonial Oaxaca.[12] Peter Bakewell's book on the mines of Zacatecas also reaffirms the value of quantification by demonstrating that the dramatic population decline in Mexico may not have influenced mining production at all.[13] A topical study, Ward Barrett's book *The Sugar Hacienda of the Marqueses del Valle*, casts new light on the sugar industry and landholding patterns.[14]

The flow of articles using statistical data and quantitative techniques has also increased. In his study of the *cartas cuentas* of Buenos Aires to analyze viceregal financial structure at the end of the eighteenth century, Herbert Klein has used a synchronic approach by taking only one year, 1790, which only whets one's appetite for what might be done with time series for the same treasuries.[15] Both Asunción Lavrín and Brian Hamnett have used quantitative data effectively to demonstrate the Bourbon assault on the economic power of the church in Mexico at the opening of the nineteenth century.[16] With his article on the costs of defending Florida, 1565-1585, Paul Hoffman has provided just a small morsel from his larger study on the costs of Caribbean defense in the sixteenth century.[17] Bradley Benedict has done the same in his analysis of the fate of Jesuit estates in Chihuahua, a small sample from his more ambitious project on the Jesuit *temporalidades* in Mexico.[18] If the articles described so far have been based on new manuscript discoveries, David Brading and Harry E. Cross have pulled together a variety of *published* statistics on mining to generalize on mining techniques, labor systems, capital structure, and production in Mexico and Peru.[19] Susan Soeiro has undertaken an exercise in what might be termed "women's history," but which is also, for our purposes, "quantitative history." She has used quantitative data to analyze the social and economic role of the convent in colonial Bahia, 1677-1800, to show that at least one nunnery served the secular ends of the elite of that Brazilian city.[20] A recent issue of *Historia Mexicana* dedicated solely to Mexican colonial demography testifies to the strong interest in quantitative studies in Mexico.[21]

For the most part, all the works listed above rely on data already in numerical form in the original documents. Some historians, however, have created their own series of statistics from materials not originally numerical. For example, in his collective biography of the men who went to Peru with Pizarro, *The Men of Cajamarca*, James Lockhart has built up an impressive array of data on age, occupation, origin, marital status, rewards, ultimate fate, and a host of other characteristics of this select group of *conquistadores*.[22] Stuart Schwartz has done much the same in his analysis of the members of the Bahia court.[23] Focusing on social changes and class mobility, David Brading's perceptive article on the elite in late colonial Mexico is built on the same kind of statistical materials created from micro data.[24] In a somewhat different vein, Stephanie Blank's analysis of patron-clientele relationships and kinship patterns in seventeenth-century Caracas relies both on social science models and quantification. Her attachment to social science and its jargon is clear from her conclusion: "Consanguinal, affinal, and ritual kinship provided the basis for the social integration of the many diverse types of people who composed the population of the city."[25] Finally, of all the projects attempting to examine the collective characteristics of groups or individuals, the joint effort of Mark Burkholder and Dewitt S. Chandler is perhaps the most ambitious. These two scholars have set out to examine the characteristics of *all* the *oidores* and *alcaldes* of *all* the colonial *audiencias* from 1680 to the end of the colonial period. Some of their findings have already been published.[26]

Here it may be well to mention some ongoing research projects utilizing quantitative data. Magnus Mörner, for example, proposes the compilation of numerical data to reinforce his work on tenant labor in Cuzco beginning in the eighteenth century.[27] Like Susan Soeiro, Elli Burkett is fusing an interest in both women's and quantitative history by using statistical data to analyze the effect of economic changes on the status of women in colonial Peru. For her ethno-historical study of Cochabamba at the end of the eighteenth century and beginning of the nineteenth, Brooke Larson is relying on accounts, tribute records,and censuses from Spanish, Argentine, and Bolivian archives and is using micro data and notarial records from the same *fondos.* In an attempt to measure the effectiveness of the *proyectistas'* commercial reforms, Kelly Ainsworth has assembled a mass of statistics for port traffic in the eighteenth century similar to that compiled by the Chaunus for the sixteenth and early seventeenth century. Long neglected by scholars in the field, Bolivia is finally getting the attention it deserves. Among others, William Jowdy is using tribute records and computer analysis in his study of the La Paz area at the end of the sixteenth century. Peter Bakewell has amassed a great deal of numerical data, some of it painstakingly developed from the sources, for his study of Potosí to 1650. For the same region, Judith Reynolds Bakewell has developed an impressive price series and indices to implement her social history of Potosí in the sixteenth century. In Spain, Ramón Serrera is studying the effect of reform in eighteenth-century Guadalajara on mining, grazing, and agriculture and uses statistical materials from the cartas cuentas to reinforce his conclusions. The same is true for his compatriot, José Hernández Palomo, who is analyzing the economic importance for colonial Mexico of the manufacture and trade in strong drink—*pulque,* *aguardiente de caña*, and *vino mescal*. A young Mexican investigator, Álvaro López Miramontes, is focusing his attention on statistics demonstrating production in the mine of Bolaños in the eighteenth century.

Over all, one might argue that the quality and quantity of studies based on quantitative data for colonial Latin America has increased. Yet, compared to colleagues in other areas, we have lagged somewhat in our use of quantitative techniques. To my knowledge, except for the work of Sherburne Cook and Woodrow Borah, no book or article has yet appeared on colonial Hispanic America using more than just the elementary sort of statistical analysis—running five-year averages, simple line graphs, percentages, averages, and the like. No scholar in the field has as yet ventured into print using coefficients of correlation, regression analysis, factor analysis, or mathematical models. This may be our good fortune, yet fellow practitioners laboring on nineteenth- and twentieth-century Latin America and our colleagues in other fields have done so.[28] Significantly, too, only one Latin American colonial historian responded to a questionnaire recently sent out by the American Historical Association Committee on Quantitative Data.[29]

The growing body of quantitative studies on colonial Hispanic America is not the only manifestation of interest in this area of research and analysis. Other developments should encourage additonal effort in the field. One of these was the formation in 1971 of CELADE, El Centro Latinoamericano de Demografía. Based in Santiago de Chile, the Center has focused on collection and analysis of all sorts of demographic data, including those for the colonial period. CELADE has already elicited suggestions on sources from the scholarly community, published a number of papers, provided a general bibliography on historical demography and methodology, and held a working conference in 1973.

In Mexico, the Departamento de Investigaciones Históricas of the Instituto Nacional de Antropología e Historia is promoting quantitative, economic history with its new series of raw historical statistics on New Spain, "Fuentes para la historia económica de México." Directed by Enrique Florescano and Isabel Gil, the project calls for a series of volumes on mining, commerce, agriculture, and the colonial financial structure both for the viceroyalty in general and regions within it, emphasizing the late eighteenth century. The first volume has already appeared: *Descripciones económicas generales de Nueva España, 1784-1817.*[30] Under the auspices of the Instituto Mexicano de Comercio Exterior, Florescano also proposes a separate series on Mexican trade, 1750-1910. He projects publication of a series of volumes containing descriptive documents on Mexican trade and raw trade statistics. He also plans to reprint in Spanish a series of volumes on Mexican commerce, primarily for the colonial period. These include Clarence Haring's *Trade and Navigation between Spain and the Indies in the Time of the Hapsburgs*, the analytical portions of Pierre and Huguette Chaunu's *Seville et l'Atlantique* bearing on Mexico, Woodrow Borah's *Early Colonial Trade and Navigation between Mexico and Peru*, and William L. Schurz's *The Manila Galleon*. In the same way as the INAH "Fuentes," publication of these statistical materials should stimulate more quantitative history.

In the United States there have been some hopeful signs that the future of quantitative research on colonial Latin America is not being ignored. Informally, a few members of the newly constituted Statistics Committee of the Conference on Latin American History have already begun discussions on the possibility of compiling a series of statistical handbooks for the colonial period. At the same time, Lewis Hanke is supervising a project to microfilm all significant viceregal papers for Peru and Mexico to 1700. Included in his plans are the cartas cuentas for the *cajas* of Lima and Mexico City and other quantifiable data.

## OBSERVATIONS, SECOND THOUGHTS, PONTIFICATIONS

After six years, I would like to reinforce some old views, revise some others, and offer some new suggestions. My first obligation, based on additonal experience in the archives, is to reiterate the wealth of quantitative materials available to us in the archives of Spain and Latin America. One cannot emphasize strongly enough how plentiful and complete these data are. For example, in compiling the cartas cuentas of the *Caja de Lima*, 1580-1820, I am only missing nine years—1664, 1696-99, 1804, 1805, 1811, and 1817. For the *Caja de México*, 1664-1816, I lack only nine years—1693-95, 1698-1701, 1724, and 1813. Even the fire which ravaged the Contaduría Section of the Archivo de Indias in 1924 has not prevented reconstruction of the Mexican cartas cuentas for the seventeenth century. For the regional treasuries of colonial Latin America the accounts are available in equal plentitude. The abundance of trade statistics has already been demonstrated by the Chaunus for the period to 1650. Now Kelly Ainsworth indicates that similar data are available for the eighteenth century in even greater detail and quantity. For their collective biography of the colonial oidores Mark Burkholder and Dewitt Chandler are proving that it is possible to compile a vast amount of information on the judges' characteristics.

A second obligation is to repeat an earlier plea for workshops in quantitative techniques specifically for Latin American historians working with Latin American data. Such workshops could serve two ends. First, they could be used as a training ground in statistical and quantitative methods. Second, and even more important, these workshops could hold working conferences, which would enable groups of scholars to bring their collective expertise to bear on data sets being compiled. Conferences like these would help us reap the benefit of suggestions from interested, knowledgeable peers, suggest new avenues of research and analysis, and hopefully maximize the effectiveness of our analyses.

An example from my own research should help to clarify my position. I have been laboring over the cartas cuentas of Lima and Mexico. On the income side these accounts show entries for such revenues as *tributos, alcabalas, quintos, media anatas, mesadas, azogues, prestamos,* and *almojarifazgos*. On the outgo side they list monies spent for war and defense (*guerra*), *salarios, situados, censos,* and the like. Trying to determine changes in the type and size of the royal revenues for Lima, I decided to compute percentages for the income being generated within nine general categories. In all, over five hundred different entries had to be placed within one of these nine categories on the income side—mining and minting, commercial and agricultural activity, royal monopolies, subsidiary treasuries outside Lima, monies carried over from previous years, extraordinary income, exactions on the Indians, sale of offices and assessments on clerical and civil officials, and miscellaneous income. As a way of determining how revenues were spent, nine categories were established for the outgo side. These included expenses for support of the clergy, mining and minting, collecting sales and agricultural taxes, salaries of administrators, war and defense, remittances to Spain, extraordinary outlays, administrative costs of royal monopolies, and miscellaneous expenditures. These were chosen arbitrarily to suit personal predilections and needs. With the benefit of the collective expertise of other scholars, however, far more sophisticated categories might have been established, even universal categories for other scholars working with the cartas cuentas to facilitate comparative study and the use of canned computer programs. Perhaps it is far too sanguine to suggest that we share our sets of data; unlike the natural and physical scientists we are not accustomed to joint consultation and cooperation. Yet quantitative research is the sort of investigation that lends itself to cooperative effort; and needs it.

On some other issues, experience has led me to revise some earlier views. For example, I am no longer willing to argue that we should fix priorities in compiling and publishing raw statistics on the colonial period in Hispanic America. Why emphasize New Spain and Peru when a sensitive regional study may reveal as much concerning the colonial reality? Peter Bakewell, Jacques Barbier, David Brading, Brian Hamnett, and William Taylor have all shown that it might be well to let the scholar's interests and talents dictate what is collected and published.[31] Also, I am no longer so enthusiastic about a central data bank. At least half of the quantitative research now being carried on does not rely on a computer; in fact most of the computations can be done with handy pocket calculators. This means that a great deal of the data being collected will simply not be in machine readable form. Data sets developed for computer analysis should, of course, be placed in data banks, but whether they repose in Madison, Ann Arbor, or Gainesville is not so important. Simply an appropriate note in the Research Inventory of the *Latin American Research Review* on the location and make-up of the data set would be enough. Also, we should publish as much data as possible, even the computerized data; it is not enough to place our statistics in a data bank. Both Spanish and Latin American scholars have pointed out that machine-readable data have no real value for them since they do not have access to computer facilities, nor is it likely that they will in the foreseeable future.

Closely related to this problem of how to store or publish data sets is that of according proper recognition to those who compile them. Accumulation of statistical materials from manuscript sources is no Grub Street enterprise; it demands considerable expertise in paleography, colonial administrative structure, colonial finance, and a host of other areas. Such work cannot be left to the novice. Even the "cleaning" of data sets to insure their accuracy cannot always be left to an assistant and takes time away from other scholarly endeavors. Thus, time spent in compiling statistical materials should have the same rewards for the scholar as the book or article he adds to his vita in the dean's office. Compilation of data sets should be recognized and recompensed in the same way as other more traditional scholarly activity.

Another problem has grown more serious since 1968—the polarization between quantifiers and non-quantifiers. Historians with a humanistic orientation have tended either to ignore the quantifiers; to disparage them as the ruination of a noble, humanistic discipline; or to dismiss them from the community of historians and place them in a Cliometric enclave all their own. Some of the causes of this estrangement lie with the quantifiers themselves. Many have taken on a messianic aura and superior air and parrot the view of Jaime Vicens Vives that quantification will lift us out of the realm of vague, intuitive speculation into a new world of more precise measurement and analysis of historical change. They antagonize the non-quantifiers with their esoteric methodology and language. A recent article in the *Hispanic American Historical Review*, for example, introduced such terms as "Rotated Factor Matrix," "Q-Analysis," and the "Riker Coefficient of Significance."[32] Still another article in the same journal states that PERON $= A + B_1X_1 + b_2x_2 \ldots b_kK_k$ and notes a method called "multiple regression."[33] Quantifiers, however, have every right to use such terminology; and is it their fault if their reader cannot comprehend? Serious scholars have the obligation of learning what such terms mean; they may open the way for more meaningful understanding of historical reality and more perceptive analysis. To dismiss or disregard the language or method of quantification is sheer obscurantism.

Two things may help prevent further polarization. First, non-quantifiers should be more open and receptive to quantitative and statistical methods, retraining themselves if necessary to comprehend the contribution being made by the quantifiers. Scholars learn new languages when it proves essential for their research; they could do the same with statistical method. Second, quantifiers should consciously try to make their work as jargon-free as possible, to play down technical terms and method, and to emphasize results. Besides, most non-quantifiers do not understand the methodology and terms in the first place and are not qualified critics. Also, quantifiers might point out more than they do that quantification cannot altogether replace traditional types of historical research and is in no way a substitute for it. Qualitative questions in history cannot always be answered by quantitative methods. Quantification is simply one way of getting at historical truth. In the end quantitative research poses just as many questions as it answers; but most important, without it, some vital questions might never have been asked in the first place.

## NOTES

1. "Quantification in Latin American Colonial History," in Val R. Lorwin and Jacob Price, eds., *The Dimensions of the Past: Materials, Problems, and Opportunities for Quantitative Work in History* (New Haven: Yale University Press, 1972), pp. 431-501.
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9. See *Time* (17 June 1974), p. 98; and C. Vann Woodward, "The Jolly Institution," *The New York Review of Books*, 21: 6 (2 May 1974).
10. Frederick P. Bowser, *The African Slave in Colonial Peru, 1524-1650* (Stanford, Cal.: Stanford University Press, 1974).
11. Sherburne F. Cook and Woodrow Borah, *Essays in Population History: Mexico and the Caribbean*, 2 vols. (Berkeley: University of California Press, 1971 and 1974).
12. William B. Taylor, *Landlord and Peasant in Colonial Oaxaca* (Stanford, Cal.: Stanford University Press, 1972).
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15. Herbert Klein, "Structure and Profitability of Royal Finance in the Viceroyalty of the Rio de la Plata in 1790," *Hispanic American Historical Review*, 53: 440-69 (August 1973).
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21. See particularly, David A. Brading, "Los españoles en México hacia 1792"; Elsa Malvido, "Factores de desploblación y de reposición de la población de Cholula (1641-1810); and Günter Vollmer, "La evolución cuantitativa de la población indígena en la región de Puebla (1570-1810), *Historia Mexicana*, 23: 126-44, 52-110, 43-51 (July-September 1973).
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29. McGreevey, "Recent Materials . . . ," p. 80.
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31. See Bakewell, *Zacatecas* and Taylor, *Landlord and Peasant;* and Jacques Barbier, "Elites and Cadres in Bourbon Chile," *Hispanic American Historical Review,* 52: 416-35 (August 1972); David A. Brading, *Miners and Merchants in Bourbon Mexico, 1763-1810* (Cambridge: Cambridge University Press, 1971); and Brian Hamnett, *Politics and Trade in Southern Mexico, 1750-1821* (Cambridge: Cambridge University Press, 1971).
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