Guano, Credible Commitments, and Sovereign Debt Repayment in Nineteenth-Century Peru

CATALINA VIZCARRA

Peru's experience with sovereign debt during the guano boom is one of the most remarkable in the nineteenth century. Despite the country's ongoing political instability and poor capital market reputation, the price of Peruvian bonds soared shortly after settlement in 1849, and the country enjoyed relatively low credit risk until the 1870s. This article discusses the incentives Peru and its creditors faced, and explains how Peru's extraordinary performance in financial markets was founded on its credible commitment to service its debt with the guano proceeds.

The Peruvian guano boom was an extraordinary phenomenon in nineteenth-century economic history. Guano had accumulated for centuries in large deposits on arid islands off the Peruvian coast. Beginning in the 1840s, Peru exported much of this guano to Europe and the United States, where it was used as a fertilizer. Such was the scale of the guano trade that it transformed Peru—a failed state with a record of fiscal irresponsibility—into a leading borrower in the London capital market. Peru accumulated a huge foreign debt because investors viewed its bonds as extremely low risk instruments. From 1849 to 1875 the country maintained a stellar record of debt service, and its bonds were among the most highly valued Latin American securities.

In this article, I examine how Peru was able to take advantage of the guano boom to transform itself in the eyes of creditors. I argue that the spectacular magnitude of the revenues that guano generated was perhaps necessary, but it was certainly not a sufficient condition for this transformation. The key factor was that Peru specifically pledged guano

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Catalina Vizcarra is Assistant Professor, Department of Economics, University of Vermont, 332 Old Mill, 94 University Place, Burlington, VT 05405. E-mail: Catalina.Vizcarra@uvm.edu.

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revenues to service its foreign debt, and that this pledge was credible to bondholders. In an era when such special pledges of security were common, but frequently violated, the credibility that guano gave to Peruvian paper is remarkable. Two circumstances were particularly important. Guano revenues were earned from exports, mostly to the United Kingdom, and the Peruvian government contracted with a British merchant house to manage the country's guano exports and simultaneously service its foreign debt with the proceeds. The geographic location was important because the collection of revenues was outside the jurisdiction of the Peruvian government. The employment of a respected British merchant house was equally important because an organization that had invested heavily to build its reputation in London would not forsake it for any temporary gain from colluding with the Peruvian government to defraud the bondholders.

The security of this commitment to repay is underscored by the fact that the price of Peruvian bonds was insensitive to the country's political instability. Peru, like many Latin American countries, was plagued by violence and warfare for decades following independence. During the twenty-five years corresponding to the height of the guano boom (1850–1875), there were fourteen changes in government, and ten of these changes followed a civil war or uprising. The fact that creditors lent so much to such an unstable country, and that bondholders would consistently value its debt highly, stands in stark contrast with the conventional wisdom that political instability hinders the expansion of credit.[1] In what follows, I explain why successive Peruvian governments found it in their interest to service the foreign debt, and why foreign creditors were indifferent to Peru's political woes. I begin by presenting evidence from financial markets on Peru's debt burden, and on the performance of Peruvian bonds during the guano boom. Then I describe how guano transformed the Peruvian economy and government finances, and explain Peru's motivation for settling its defaulted debt. Later I discuss why creditors willingly lent on such a large scale to Peru and Peru's incentives to faithfully service its debt. Lastly, I present statistical evidence in support of my arguments. I conclude with a discussion of the lessons of the Peruvian experience for the literature on sovereign debt.

[1] This is a common view in the literature. See, for example, North and Weingast, "Evolution"; Stasavage, *Public Debt*; Maurer, "Internal Consequences"; Maurer and Gomberg, "When the State is Untrustworthy"; Marichal, "Construction of Credibility"; Summerhill, *Inglorious Revolution*; and Haber, North, and Weingast, *Political Institutions*.

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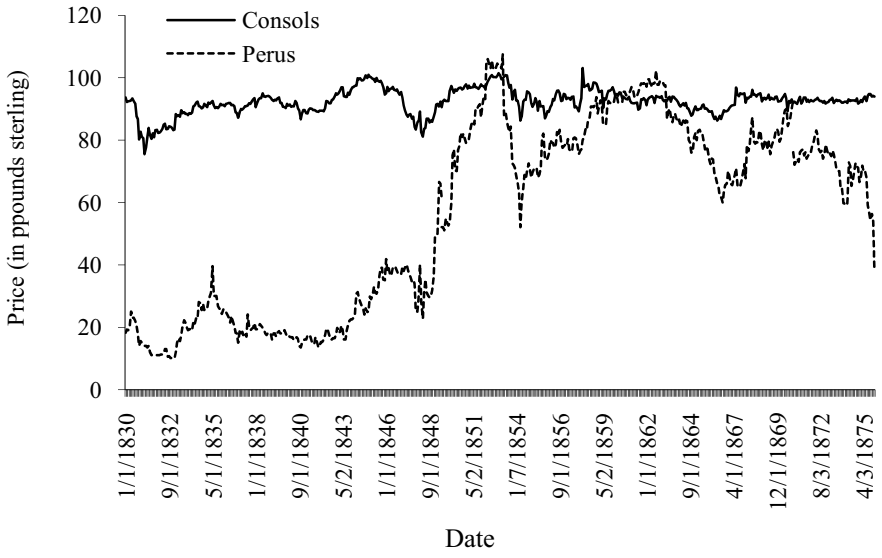


FIGURE 1
BOND PRICES, 1830–1875

Note: The particular Peruvian securities used in the Peruvian series are the major issue traded in London at any given point in time.
Source: Consols: *Course of the Exchange*. Perus: *Course of the Exchange* (1830–1844); and the *Economist* (1845–1875).

PERU AND THE LONDON CAPITAL MARKET, 1822–1890

The origin of Peru's foreign debt goes back to the 1820s, during its war for independence from Spain. Like many other revolutionary governments in Latin America, Peru floated bond issues in London to finance military expenses. Virtually all of these governments defaulted by 1826, with the exception of Brazil.[2] In the case of Peru, two loans were issued, one in 1822 for £1.2 million and another in 1825 for an additional £616,000. The government defaulted in 1826 and remained in default until 1849. During this time Peruvian paper traded at extremely low prices, often less than 20 percent of par (Figure 1).

In 1849 Peru reached an agreement with the bondholders to begin payments on the outstanding principal and to issue bonds for the accumulated interest. Under the scheme, the principal of the old loans was converted into new "active" bonds for a total of £1,759,100, 25 percent of the interest was written off, and the remainder of the

[2] Dawson, *First Latin American*; Marichal, *Century of Debt Crises*; Neal, "Financial Crisis of 1825"; De Paiva Abreu, "Brazil as a Debtor"; and Summerhill, *Inglorious Revolution*.

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accumulated interest (£1,854,700) was floated as "passive" bonds, which would not begin to pay interest until April 1852.[3] Peru adhered to the terms of the settlement, and starting in 1853 successive Peruvian governments accessed fresh loans for a variety of purposes—debt conversion, general expenses, war finance, and railway construction.

Table 1 presents all foreign bond issues floated by the Peruvian government in the nineteenth century, including the dates, amounts, issue prices, and interest rates. In 1853 Peru contracted for four separate loans, three in London and one in Paris. The largest of these loans effectively converted all active foreign bonds into a new series, reducing the interest rate from 6 percent to 4.5 percent. The other loans, also made at 4.5 percent, were earmarked for the conversion of the domestic debt. They greatly increased Peru's foreign debt, from approximately £3.5 million to over £7.5 million. Peru floated another large issue in 1862, about half of which was dedicated to paying off older bonds. Later during war with Spain in 1865, it was able to place a loan in Europe for £10 million and another in the United States in 1866 for a smaller amount. In the late 1860s Peru, like many other countries at the time, began a major campaign of railway construction. Three loans were issued that dramatically expanded its foreign debt from around £10 million to £33 million. Then, in December 1875 Peru defaulted on its entire foreign debt, and did not settle for nearly fifteen years, when railroads and other assets were placed in the hands of the bondholders through the creation of the Peruvian Corporation in 1890.[4] In sum, the Peruvian experience in foreign capital markets in the nineteenth century consisted of a twenty-five-year stretch of faithful debt service and frequent borrowing, both preceded and followed by decades of complete penury and default. The twenty-five years of solvency correspond to the height of the guano boom.

During this period, Peru's foreign debt was exceptional for two reasons. First, despite Peru's ongoing political instability and poor capital market reputation, the price of Peruvian bonds soared shortly after settlement in 1849, and the country enjoyed relatively low credit risk until the 1870s (Figure 1). Second, Peru accumulated a great deal of debt, becoming the largest solvent debtor in Latin America.

[3] The active bonds paid a 4 percent interest since April 1849. The interest rate on these bonds, however, was scheduled to increase by 0.5 percentage points annually until reaching a ceiling of 6 percent in April 1853. The passive bonds paid an interest of 1 percent a year starting in April 1852. This rate was scheduled to rise by 0.5 percent annually up to 3 percent in April 1856.

[4] Miller, "Making of the Grace Contract."

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TABLE 1
LOANS TO PERUVIAN GOVERNMENT
(1822–1872)

Date of Issue	Agent	Loan	Amount (pounds sterling)	Issue Price	Coupon Rate (percent)	Amortization (percent)	Increase in Total Debt (pounds sterling)
1822	Fry and Chapman	War finance	1,200,000	88.82	6.0	1.16	1,200,000
1825	Fry and Chapman	War finance	616,000	78	6.0	1.0	616,000
1849	Casa Murrieta	Debt settlement	3,613,800: 1,759,100* 1,854,700**	na	4.0–6.0* 1.0–3.0**	1.0* starting 1856 0.5** starting 1856; raised to 3.0 in 1855	None
February 1853	Murrieta and Hambro & Sons	Renegotiation 1849 Active bonds	2,600,000	85	4.5	2.0 5.0 in 1855 8.0 in 1858	620,447
May 1853	Montané (Paris)	Conversion of domestic debt into foreign debt	800,000 (20,000,000 in francs)	na	4.5	8.0 in 1862	800,000
May 1853	Uribarren	Conversion of domestic debt into foreign debt	1,800,000	na	4.5	1.0	1,800,000
1853	Hegan	Railroad Tacna-Arica	403,100	na	4.5	1.0	403,100
1862	Heywood, Kennard & Co.	Renegotiation and paying off old debts	5,500,000	93	4.5	8.0	2,308,374
1865	Thomson, Bonar & Co.	Conversion, War Finance	10,000,000	83.5	5.0	5.0	3,000,000
1866	U.S. interests	Jointly with Chile. War with Spain	289,760 ($2,000,000)	na	7.0	na	289,760

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TABLE 1 - CONTINUED

Date of Issue	Agent	Loan	Amount (pounds sterling)	Issue Price	Coupon Rate (percent)	Amortiza-tion (percent)	Increase in Total Debt (pounds sterling)
1869	Thomson, Bonar and Co.	Railway construction	290,000	71.0	5.0	2.0	290,000
1870	J.H. Schroder	Railway construction	11,920,000	82.5	6.0	2.0	11,920,000
1872	J.H. Schroder and Stern Brothers	Railroads, conversion	22,130,000	60 to 75	5.0	2.0	13,700,000

* represents active bonds.
** represents passive bonds.
Sources: Most importantly, Dancuart, *Anales,* various volumes. See also Fenn, *Compendium,* various years; the *Times*, various years; Mathew, "First Anglo-Peruvian Debt"; Palacios Moreyra, *La deuda*; Tantaleán, *Política económico-financiera*; and Wynne, *State Insolvency*, vol. 2.

Figure 2 plots the yield spreads of the most important Brazilian, Chilean, and Peruvian sovereign bonds against the British consol for the years 1830 to 1875.[5] The Peruvian series shows a sudden, dramatic improvement in 1849, when debt settlement occurred. During the guano boom, when all three countries were in good standing, Peruvian yield spreads were frequently below 2 percent, at or below the levels achieved by Brazil and Chile, a striking result considering that Brazil and Chile were the most stable countries in the region, and had excellent reputations among bondholders.[6]

In Table 2, I compare the external debt for Latin American countries in 1830, 1855, and 1875. In 1855 and 1875, Peru's external debt was rivaled only by Mexico's, but nearly all of Mexico's debt accumulated after 1830 was due to the capitalization of unpaid interest on old loans

[5] For illustrative purposes, I include calculations of the yield spread for these countries even when they were in default (Peru before 1849 and Chile before 1842), actual yield spreads were undefined because no interest payments were being made. I discuss Brazil and Chile because the other major Latin American debtors—Mexico, Colombia (New Granada), Ecuador, and Venezuela—did not service their foreign debts for more than a short period until quite late in the century. Argentina became a nation in the second half of the nineteenth century, and absorbed Buenos Aires' revolutionary debt.

[6] This was true for Brazil throughout the nineteenth century and for Chile after it settled its revolutionary debt in the early 1840s.

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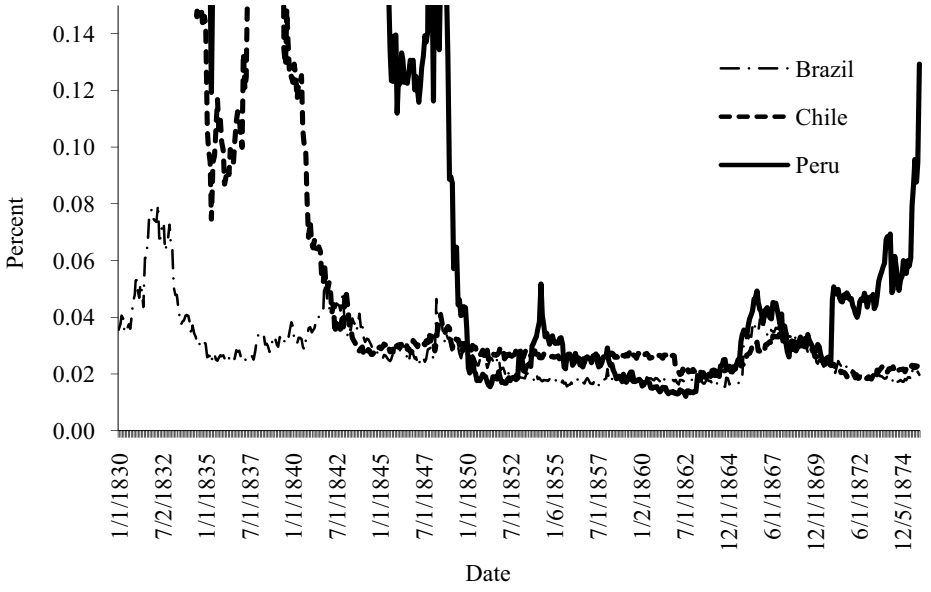


FIGURE 2
YIELD SPREADS VERSUS CONSOL, 1830–1875

Note: The particular Latin American securities used are the major issue of each country traded in London at any given point in time.
Source: Consols: *Course of the Exchange*. Peru, Brazil, and Chile: *Course of the Exchange* (1830–1844), and the *Economist* (1845–1875).

during Mexico's several failed attempts to settle its debt.[7] Peru, in contrast, issued millions of pounds in new loans after its successful debt settlement. Indeed, among those countries that had defaulted on their independence loans, only Argentina (Buenos Aires), Chile, and Peru took out significant new foreign loans before 1875.

Not only was Peru's debt bigger than that of other Latin American countries, the ratio of its external debt service to government revenue was also comparatively large. Table 3 shows the external debt service ratio for Latin American countries in 1830, 1855, and 1875. Debt service ratios also are shown for countries in default so that one can compare the debt burdens of solvent and defaulting debtor nations. Obviously, these ratios are hypothetical, representing what the ratio would have been if the country had been servicing its debt. Note that in

[7] Mexico also issued new debt during the empire of Maximilian, but this debt was not recognized after his defeat. See Costeloe, *Bonds and Bondholders*; and Marichal, *Century of Debt Crises*.

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TABLE 2
LATIN AMERICA'S EXTERNAL DEBT
(millions of pounds sterling)

Country	1830	1855	1875
Argentina/Buenos Aires	*1.0*	*1.0*	13.0
Brazil	4.5	5.9	19.5
Chile	*1.0*	1.4	7.1
Colombia/New Granada	*3.3*	*6.5*	2.1
Ecuador	*1.4*	*1.4*	*1.8*
Mexico	*6.4*	*10.2*	*27.9*
Peru	*1.8*	7.3	33.0
Venezuela	*1.9*	*3.4*	*6.6*

Notes: Figures in 1830 refer to original loan capital, virtually all of which was unpaid. The original Gran Colombia loans are allocated 0.5 to Colombia (New Granada), 0.285 to Venezuela, and 0.215 to Ecuador per an 1834 agreement. Figures in italics denote that the loans were in default. For countries in default, these figures do not take into account interest in arrears unless they were converted into bonds as part of past settlement that had subsequently lapsed. This occurred in the case of Colombia, Ecuador, Mexico, and Venezuela. The 1875 figures refer only to Argentine Republic debt. The Buenos Aires revolutionary loan and capitalized interest arrears under the plan of 1857/58 were assumed by the Argentine Republic, but provincial loans of Buenos Aires, Entre Rios, and Santa Fe of the 1870s are not included. These amount to about three million pounds sterling.
Sources: Investor's Monthly Manual (30 January 1875); Fenn's *Compendium* (1855, 1876); The Corporation of Foreign Bondholders, *Fourth Annual Report of the Council of the Corporation of Foreign Bondholders* (1876); Dawson, *First Latin American*; Marichal, "Construction of Credibility"; and Summerhill, *Inglorious Revolution*.

both 1855 and 1875, Peru had the highest debt service ratio of any solvent debtor. In 1855 servicing the external debt was 18 percent of government revenues, and in 1875—on the cusp of default—it had ballooned to 40 percent. Given the relatively low risk premium of Peruvian securities, these comparatively high debt service ratios suggest that creditors must have had an especially high degree of confidence in Peru's ability and commitment to service its debt. In the following sections, I explain how Peru's extraordinary performance in financial markets was founded on its credible commitment to service its debt with the guano proceeds.

A RESOURCE BOOM

During the late colonial period, Peru's economy was dominated by mineral extraction, primarily for export, and agriculture, which was largely for domestic consumption. By the time of its independence in 1825, mining, although still important relative to other industries,

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TABLE 3
RATIO OF EXTERNAL DEBT SERVICE TO GOVERNMENT REVENUE

Country	1830	1855	1875
Argentina/Buenos Aires	*0.15*	*0.07*	0.30
Brazil	0.14	0.09	0.14
Chile	*0.21*	0.08	0.25
Colombia/New Granada	*0.51*	*0.28*	0.23
Ecuador	*0.72*	0.09	*0.05*
Mexico	*0.16*	*0.17*	*0.36*
Peru	*0.27*	0.18	0.40
Venezuela	*0.52*	*0.18*	*0.08*

Notes: Debt service includes interest and sinking fund payments, as specified in the contracts and reported in the sources listed below. Actual debt service may have been more, if additional bonds were redeemed, or less, if sinking fund or interest payments were in default. Figures in italics denote that the debt was in default. The actual dates used are as follows: Argentina: 1830, 1857, and 1875; Brazil: 1830, 1855, and 1875; Chile: 1833, 1855, and 1875; Colombia: 1832, 1855, and 1875; Ecuador: 1830, 1855, and 1875; Mexico: 1830, 1855, and 1875; Peru: 1830, 1855, and 1875; and Venezuela: 1832, 1858, and 1875. Argentine debt service in 1875 does not include service on provincial debt. The ratio for Brazil in 1830 is total foreign debt service to government expenditures.
Sources: *Investor's Monthly Manual* (30 January 1875); Fenn's *Compendium* (1855, 1860, 1876); Amaral, "La deuda pública"; Berlung, "Public Debt"; Burgin, *Economic Aspects*; Carmagnani, "Finanzas"; Dawson, *First Latin American*; Levy, "Brazilian Public Debt"; Mathew, "First Anglo-Peruvian Debt"; Memoria de la Hacienda de Nueva Granada; Resumen de la Hacienda Pública de Chile; Rodríguez, *Search for Public Policy*; and Tantaleán, *Política económico-financiera*.

was a shadow of its former self.[8] The new republic had a population of approximately two million, but the majority of the population consisted of Indian peasants who lived in the highlands and relied on subsistence agriculture. A small elite resided primarily on the coast, mostly in the capital, Lima. The elite specialized in plantation agriculture, mining, and commerce. There was no banking system, and credit markets were thin, and dominated by personal connections. Foreign commerce consisted of the exchange of minerals for luxury manufactures with Europe, and agricultural trade with Chile and Bolivia. The discovery of guano impacted greatly this small and weak economy.[9]

The existence of deposits of guano on islands near the Peruvian coast had been noted by travelers for some time. Agricultural chemists conducted experiments with Peruvian guano and found it contained significant quantities of nitrogen and phosphorus that made it an especially useful fertilizer, with major advantages over other manures,

[8] Peru declared independence in 1821, but became effectively independent only in 1825.

[9] For an overview of the Peruvian economy at the time, see Cavieres and Contreras, "Políticas Fiscales," pp. 277–359. Also see Gootenberg, *Between Silver and Guano*; and Hunt, "Growth and Guano" and "Price and Quantum Estimates."

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as well as bone and dried blood.[10] Large deposits were found on the Chincha Islands, a group of three uninhabited islands about 20 kilometers off the coast of Peru, and less than 200 kilometers from Callao, the main port of Lima. Under Peruvian law, they were property of the state, and because of their isolated location, with a modicum of naval presence they were not difficult to protect from poachers. Thus, legal tradition and geography made the enforcement of a government monopoly possible.

The extraction of guano required very little capital investment. It mainly involved digging the guano and transporting it to chutes that led from the island's cliffs into the holds of ships that were anchored nearby. However, it could take over one month to load a ship, and during the heyday of the trade in the 1850s and 1860s, there were often more than fifty ships loading at any given point in time. The length of loading time and the voyage meant that the cost of transport was substantial.[11] Procurement of vessels and coordination of sales, foreign warehousing, and marketing were also costly and demanded a certain degree of expertise that the Peruvian government lacked.

As a consequence, the state contracted with "consignees" who managed the export to and marketing in the various foreign markets.[12] The largest and most lucrative contract was for the British market, and the consignee was a highly reputable British merchant house, Anthony Gibbs and Sons, until 1862.[13] Gibbs earned commissions as well as a cost-plus arrangement for freight, loading, and storage.[14] After 1862 the consignment system was modified so as to permit Peruvian nationals to enjoy more of the rents, but the key role in Britain remained in the hands of a U.K. firm of high standing, this time Thomson, Bonar, and Co.[15]

Although the principal foreign market for guano was Great Britain, the United States and France were also important markets. Figure 3

[10] Mathew, "Peru and the British Guano Market," p. 113.

[11] Transport of guano to foreign markets was estimated at about £4 17s per ton, around 70 percent of total costs. See Mathew, *House of Gibbs,* p. 29 and "Primitive Export Sector." See also Levin, *Export Economies.*

[12] A summary of the main terms of the Peruvian guano export contracts during the guano age is available in Rodríguez, "Historia de los contratos." Most of the actual contracts are in Dancuart, *Anales,* various volumes.

[13] Gibbs received exclusive rights to the British market in 1849.

[14] See Levin, *Export Economies*; and Mathew, *House of Gibbs.*

[15] The firm had ties to William Gladstone, then Chancellor of the Exchequer, who became Prime Minister in 1868. Thomson and Bonar remained in the trade until the expiration of their contract in the early 1870s.

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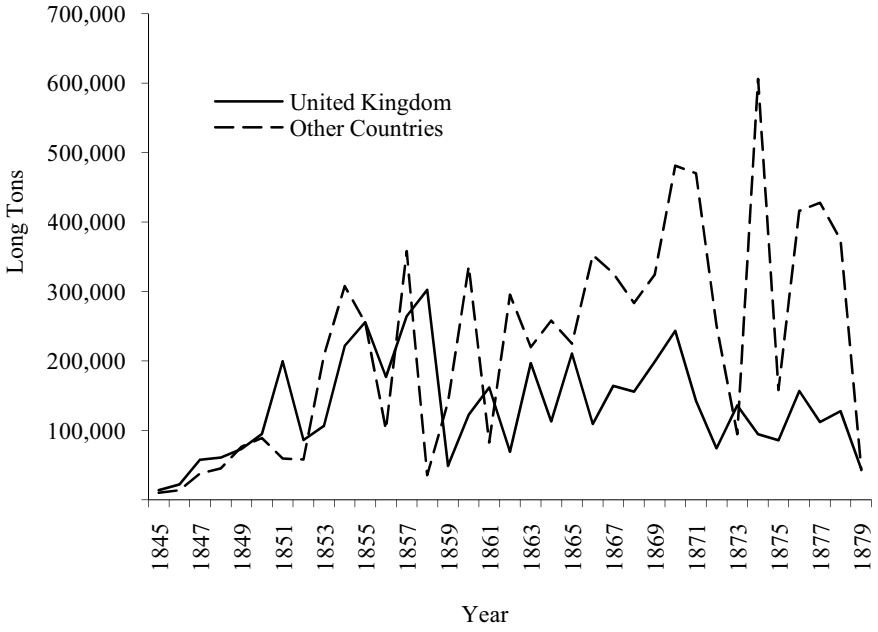


FIGURE 3
PERUVIAN GUANO EXPORTS

Sources: Mathew, *House of Gibbs*; Hunt, "Price and Quantum Estimates"; and Rodríguez, "Historia de los contratos."

shows Peruvian guano exports between 1845 and 1879. The erratic nature of the data series is deceptive—the flow of revenues to the Peruvian government was much less variable because of the holding of stocks by consignees in the importing countries. Unfortunately, outside of some data for Britain, little direct evidence exists on actual guano sales.

The value of Peruvian guano exports to Britain, which was the destination for between one-half and two-thirds of all Peruvian guano exports, rose dramatically between 1847 and 1860, and it routinely exceeded two million pounds sterling per year. Prices were relatively stable. The Peruvian government set a minimum sales price that was usually binding.[16] As a consequence, fluctuations in guano export revenues mirrored fluctuations in the quantity exported. Because Peru did not publish trade statistics between 1847 and 1877, the value and

[16] For most of the period, guano was priced at around £12 per ton. See Mathew, *House of Gibbs*, p. 29.

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relative importance of guano exports can only be estimated. Charles Fenn estimated Peru's total exports at £2.92 million, of which £1.56 million was estimated as guano. Estimates based upon U.K. trade statistics indicate that between 1854 and 1871, the height of the guano boom, guano constituted on average 60 percent of the value of all Peruvian exports to Britain.[17]

A REVOLUTION IN PERUVIAN PUBLIC FINANCE

Before guano, Peru was stricken by regional, class, and ethnic tensions. These factors contributed to extreme political instability. From 1821 until 1845, caudillo warfare dominated Peruvian politics, leading to over fifty changes in government and seven constitutions.[18] Reflecting the turbulent political atmosphere, statistics on government revenue and expenditures are scarce. Customs revenue and an Indian head tax—a holdover from the colonial era—were the two largest sources of revenue. Expenditures exceeded revenues throughout the period.[19] In particular, military expenditures were sometimes as much as £450,000 a year.[20] Budget deficits were often covered through "emergency loans" from domestic merchants. Although these were promised to be repaid from future customs and other revenue, many of these loans remained unpaid until the 1860s. The exact amount of this credit will probably never be known, but estimates have put them at around 3 million pesos (£600,000) between 1821 and 1845, large but much less than the revolutionary war bonds floated in London that totaled £1.816 million.[21]

The Peruvian state's guano monopoly was a revolution for government finance. As is shown in Table 4, guano exceeded customs revenue beginning in the early 1850s, from then until the late 1860s it accounted for two-thirds or more of total government revenue. In the mid-1850s, when guano income exceeded two million pounds sterling

[17] United Kingdom trade statistics with Peru were taken from various volumes of Fenn's *Compendium*, citing U.K. Board of Trade figures.

[18] The most severe conflicts were in the late 1830s, when a Peruvian-Bolivian confederation was defeated by Chile, and an exceptionally violent period of civil war from 1841–1845 in which the presidency changed hands nine times.

[19] For a discussion of the ruinous state of government finances in the period, see Gootenberg, *Between Silver and Guano* and "Merchants, Foreigners, and the State."

[20] There are no systematic data available on such expenses until the first public budget was issued under President Castilla in 1845. Military expenditures in his first year in office were around 2.239 million pesos (£450,000), the lowest of the guano era.

[21] Gootenberg, *Between Silver and Guano*, pp. 169–171.

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TABLE 4
PERUVIAN GOVERNMENT REVENUES AND EXPENDITURES
(thousands of pounds sterling)

	1831	1847	1852	1857	1862	1866	1872	1877
Total revenue	662	1,001	1,739	3,731	3,990	4,026	4,491	3,064
Guano	—	—	659	3,059	2,797	2,713	2,121	1,291
Customs	280	401	622	417	651	781	1,483	1,377
Indian head tax	164	265	267	—	—	—	—	—
Total expenditure	995	1,192	1,676	3,272	3,941	3,912	11,884	4,176

Sources: 1831: Tantaleán, *Política económico-financiera,* appendix tables 4 and 5; and 1847, 1852, 1862, 1866, 1872, and 1877: Hunt, "Growth and Guano," pp. 299–300. Hunt's figures have been adjusted by subtracting loans and advances from total revenue. Repayments of advances to consignees and Dreyfus in 1872 have been subtracted from expenditures. These adjustments account for differences with his figures for 1862, 1872, and 1877; 1857: Fenn's *Compendium*, 1863, pp. 295–96. Figures were converted to pounds sterling at the rate of 5:1.

per year, Peru reduced import tariffs and abolished the Indian head tax. Tariff revenue still grew because imports were growing rapidly during the period. Government revenues nearly doubled between 1847 and 1852, and doubled again by the early 1860s.

The state's expenditures expanded in tandem with guano income (see Table 4). Military expenditures and debt service accounted for large portions of the increase. A major reason for the rising military expenditures was that political instability continued to afflict the country. As mentioned above, during the height of the guano boom there were fourteen changes in government, most of which followed a civil war or uprising.[22] Control over guano revenues was a double-edged sword. On the one hand, it permitted the government to pay off supporters, and to finance a large military. On the other, guano revenues were a prize, increasing the private gains to those parties who were able to seize control of the state. The fact that creditors lent so much to such an unstable country, and that bondholders would consistently value this debt highly is a testament to the credibility of the debt service commitment, which raises the issue of the incentives Peru and its creditors faced.

DEBT SETTLEMENT: THE CARROT AND THE STICK

In January 1849 the Peruvian government reached a settlement with British bondholders. Guano provided the means to resume payment on

[22] Palmer, *Peru*, pp. 37–40; and Basadre, *Historia de la República del Perú*, various volumes.

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the debt, and the basis for serving new loans, but why did Peru wish to emerge from default and incur new debt?

With respect to the settlement, there are two possible explanations for why Peru settled its foreign debt. First, Peru might have feared that the British government would intervene either by seizing guano cargos abroad or by otherwise disrupting the guano trade. Second, Peru could have anticipated some kind of reward if it did settle.

There is no evidence in support of the first hypothesis. The literature persuasively suggests that the British did not threaten Peru with any military or trade sanctions. It was certainly the case that after the relatively high levels of guano exports in 1847 and 1848, the bondholders felt that Peru had the ability to pay, but not the will. The bondholders had been pressing the British government for assistance for years, and in 1847 they renewed their campaign.[23] They passed a series of resolutions in July of that year, including a formal request to the British government for aid, stating that *". . . it appears abundantly evident . . . that there exist within the territories of [Peru] ample resources in the article of guano alone to provide for the liquidation of its foreign debt; and that consequently the government is bound by every principle of public faith and national honour to proceed to that stipulation without further delay."*[24]

The possibility of British intervention—even seizure of the islands—was openly discussed in Peru. Peruvian Finance Minister Del Río in his *Memoria* in 1847, expressed the government fears that *". . . until the foreign debt is settled, the remission of guano abroad . . . could bring major complications that we must avoid."*[25] It is unlikely, however, that such fears were decisive. Studies on this precise issue concluded that the Foreign Office communicated its displeasure to the Peruvian government, but that no threats were issued. As W. M. Mathew puts it: *". . . Foreign Office documents show that British pressure was relatively weak . . ."*[26] Mathew's view is consistent with the findings

[23] The most recent attempt to resume payment on the foreign debt occurred in January 1842, when the Peruvian government approved a decree that promised half of guano proceeds to the British bondholders. The decree was never enforced. Exigent circumstances existed—the Peruvian government fell and there were numerous changes of government in the next few years, and the guano revenues were nowhere near the level that initially had been forecasted. The 1842 decree can be found in Dancuart, *Anales,* vol. 3, chap. 2, p. 155. See also the letter of G. R. Robinson, chair of the Committee of Spanish-American Bondholders, to the *Times*, dated 26 February 1847 and 13 March 1847.

[24] *Times*, 24 July 1847.

[25] Del Río's *Memoria* is reproduced in Dancuart, *Anales*, vol. 4, p. 107. One event that might have motivated this statement is the U.S. invasion of Mexico, which occurred at the time.

[26] Mathew, *House of Gibbs*, p. 234. For a comprehensive and exhaustive analysis of this

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of other scholars who have pored over British Foreign Office archives, concluding that there was no policy on the part of the British government of backing up bondholders with military, economic, or diplomatic threats.[27]

The evidence suggests, instead, that Peru settled its debt because of the promise of a significant reward. The big prize was renewed access to international capital markets. At the time, British and Continental bondholders were able to exert pressure on delinquent debtors through a simple institutional device: the leading European stock exchanges would not list any new issue proposed by a defaulting state.[28] Peru's president at the time, Ramón Castilla (1845–1851) unequivocally expressed the rationale for settlement: *". . . to revive the credit which the Republic lost in Europe almost at the same time as it came into existence."*[29] Peru's growing financial needs were cited as reasons for renewing access to international credit markets. In spite of the riches brought by guano, Peru's fiscal emergency, which became more acute as a result of the violent wars that preceded Castilla's rise to power, remained a severe constraint on state building. When Castilla assumed power, customs and the mint were mortgaged for over 700,000 pesos. In the 1840s the state received a total of around 5.5 million pesos in guano revenues, mostly in the form of cash advances (i.e., short-term loans advanced by the consignees and backed by guano), which only satisfied one-tenth of Peru's budgetary needs.[30] In 1847 the government tried to obtain loans from the domestic merchant elite to manage the financial crisis—they refused.[31]

A careful account of flows of guano revenues from the time of settlement (1849) to the end of Castilla's first presidency (1851) shows that the government received net flows (all in the form of cash advances from the consignees) for as much as £344,400.[32] These advances were

point, see Mathew, "First Anglo-Peruvian Debt."

[27] See Tomz, *Reputation and International Cooperation*, pp. 143–53; and Platt, *Finance, Trade, and Politics*, pp. 34–53.

[28] Borchard, *State Insolvency,* p. xxiv.

[29] From his examination of British Foreign Office materials, Mathew concludes that Peru's settlement was motivated by its desire to "open the way to fresh borrowing." See Mathew, *House of Gibbs*, p. 234.

[30] Gootenberg, *Between Silver and Guano*, p. 122.

[31] An additional reason to raise fresh loans was the fear of a Spanish invasion of the continent. See Mathew, *House of Gibbs*, p. 80.

[32] From the December 1847 contract with Gibbs, £90,000. From the October 1849 contract, with the same house, £94,400, and from the May 1850 contract, again with Gibbs, £160,000. See the contracts in Dancuart, *Anales*, vol. 4, chap. 5, with the exception of the 1850 one which was never published. See Mathew, *House of Gibbs,* for details on the 1850 contract, pp. 104–05.

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conceded at lower interest rates than in the presettlement years.[33] On the other hand, the government payments to the bondholders were about £202,768 in the same period.[34] That is, settlement did not pose a negative flow of income or any additional risk of losing power. On the contrary, it allowed the Peruvian government to borrow at lower interest rates and opened up the prospects of receiving long-term loans for the first time since the 1820s.

ESTABLISHING A CREDIBLE COMMITMENT: THE GUANO-DEBT CONTRACTS

In 1852 the Peruvian Congress authorized its representative in London to negotiate the terms of a new debt issue. An agreement was reached in early 1853, and the prospectus for the debt issue was advertised on February 26. The loan redeemed the 1849 active bonds that were scheduled to take on an interest of 6 percent in April 1853, and still yielded a net capital inflow of over 600,000 pounds sterling. The issue, priced at 85 pounds sterling, came at a lower rate of interest (4.5 percent instead of 6 percent), and annual sinking fund payments of 2 percent were committed.[35] Thus, the 1853 bonds represented new debt. So why did bondholders believe Peru's promise to repay?

The Peruvian government needed to persuade the bondholders that it was capable of servicing the debt and that it would choose to do so. Insofar as ability to pay, Peru's main source of government revenue was the proceeds from the state guano monopoly, which were explicitly pledged to service the debt in each bond contract. The ability of Peru to maintain high levels of export revenues depended on the extent of its guano deposits and whether or not it faced serious competition from abroad. Surveys of the Chincha Islands were conducted in the 1850s,

[33] Mathew, *House of Gibbs*, p. 101.

[34] This amount results from adding 50 percent of the guano revenues produced from January 1850 to April 1851 (which according to the guano debt contract belonged to the bondholders) to the interests paid in 1849. The 50 percent of guano revenues can be estimated as follows: Sales between January 1850 and April 1851 were around 135,068 tons. Considering that the price per ton was £9 and that costs per ton were £6, total net revenues amounted to £405,204. If we subtract consignees' commissions (which were £71,666), we end up with a net total of £333,537. So the total payment to the bondholders was £166,768 (50 percent of guano revenues) plus the £36,000 of interests paid in 1849, which yield a total of £202,768. The estimation of consignees' commissions is derived from Mathew, *House of Gibbs*, p. 104.

[35] *Times*, 26 February 1853. The interest rate charged on Peruvian bonds was the same as that on a smaller Brazilian issue in 1852, and less than the 6 percent three million pound Ottoman loan of 1854—the first of a long series by that country. The Brazilian loan was priced at 95 percent and the Ottoman loan at 80 percent. The figures are from Clarke, "Debts of Sovereign," pp. 314–15.

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and the surveyors included foreign observers. In 1851, for example, it was estimated that the guano deposits were of around 26 million tons, which would last—at current export rates—until the year 2112. In 1853 the deposits were estimated at a total of around 12.5 million tons. The grimmest view calculated the Chincha deposits at about 6–8 million tons, which still implied the guano deposits would last for about twenty years.[36]

Concerning the possibility of outside competition, the most significant new discoveries, the Lobos Islands, were also claimed by Peru. No comparable guano deposits were found, nor were they likely to be. The exceedingly arid climate and the nutrient-rich Humboldt current made the Peruvian coast an ideal location where guano could accumulate. Many locations had one of those two key characteristics, but not the other. As a result of Peru's dominance of the guano market, guano's privileged place among fertilizers, and rising fertilizer demand abroad, investors in the late 1840s and early 1850s felt sure that Peruvian guano would yield a considerable stream of revenue for many years.[37]

It was one thing to convince creditors that Peru had the resources to pay; it was quite another to convince them that it would repay. The problems confronted by governments in establishing credible commitments with creditors are well known. Sovereign contracts are not subject to third-party enforcement. Thus, unless lenders (often in combination with the sovereign) orchestrate a credible threat to levy a sufficiently large penalty in case of government default, the promise to repay is not credible. Theoretically, a sovereign can commit to honor his financial obligations in two ways. One is by building a reputation. Reputation effects imply that a default is penalized either through a future credit boycott or higher interest rates on future loans reflecting a default risk premium.[38] Alternatively, the government can commit by orchestrating an increased penalty for default over and above the threat of credit restrictions. Those penalties (or sanctions) can take several forms. They can emanate from domestic political institutions that punish the ruler if he should repudiate the debt, as in the emblematic case of Great Britain; from ad hoc contracts that explicitly link debt

[36] See the *Times,* 17 October 1853; Statement of E. Escobar de Bedoya, Attaché to the Legation of Peru in Paris, New York, the *Times*, 23 November 1853. Also see Dancuart, *Anales*, vol. 5, p. 18; and Mathew, *House of Gibbs,* p. 146.

[37] For an overview of the guano market and discussion of British perceptions, see Mathew, "Peru and the British Guano Market."

[38] See Eaton and Gersovitz, "Debt with Potential Repudiation." Also, for an historical study on the role of reputation effects, see Tomz, *Reputation and International Cooperation*.

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repayment to sanctions radiating from a complementary (nonlending) relationship, as in Hapsburg Spain; or from foreign government diplomatic or military pressure, as with early twentieth century U.S. imperialism in the Caribbean.[39]

In the case of Peru, the sanction in play was not a byproduct of superior political institutions or a result of any formal threats of British intervention. In what follows, I suggest that the penalty for default—which was willingly contracted into by the Peruvian government—was the threat of a major loss in government income due to the disruption in the guano trade in case of government default.

The linkage of the guano trade to debt service was simple and effective. Recall that because Peru did not possess the expertise and connections needed to sell guano in European markets, it relied on consignees for the guano trade—namely the British House of Gibbs until 1862. Castilla admitted to the British Charge d'Affaires in October 1849, however, that his main reason for persisting with Gibbs was his wish to establish Peru's credit on a firm basis.[40]

The basic terms for the debt settlement with the bondholders were agreed upon in January 1849.[41] In a newly drafted guano consignment contract, Peru appointed Gibbs as the *financial agent* for the service of the debt and made it responsible for withholding a large portion of guano income (originally 50 percent of proceeds from the British market) for debt servicing. The issuer of the new bonds was the House of Murrieta, with which the government signed a complementary contract in April 1849.[42] Guano revenues were collected by Gibbs in

[39] See Bulow and Rogoff, "Sovereign Debt"; Weingast, "Political Foundations"; North and Weingast, "Evolution of Institutional Governing"; Conklin, "Theory of Sovereign Debt"; and Mitchener and Weidenmier, "Supersanctions" and "Empire." Also see Weidenmier, "Gunboats"; and Fratianni, "Government Debt."

[40] As mentioned above, Gibbs was involved in the guano trade since the early 1840s. Notwithstanding, it is only with the 1849 contract that Gibbs acquired exclusive rights for a good portion of the European market. Their control of the trade increased during the 1850s. In 1861 their contract expired and the trade was handed to Peruvian capitalists, who in turn relied on another British merchant house for their agency in Great Britain—Thomson and Bonar. The Peruvian government signed a new (sales) contract with the House of Dreyfus in the late 1860s, which took effect after the expiration of the consignment contracts. Dreyfus was also appointed as the state's financial agent and received monopoly rights to sell guano in all of Europe and its colonies with the exception of Cuba and Puerto Rico.

[41] A law passed by Congress in March 1848 gave Castilla the authority to settle the British foreign debt. The Peruvian government representatives met with the representatives of the bondholders on January 4, 1849. Both contracts (the contract with the bondholders and the contract with Gibbs) were negotiated on January 1849 and signed January 31, 1849. The contracts can be found in Dancuart, *Anales*, vol. 4, pp. 33–39. Also, see Basadre, *Historia de la República*, vol. 3, chap. 2, p. 20.

[42] In addition, Murrieta obtained a consignment contract for the Spanish market.

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Britain and handed shortly after to Murrieta. The operation was clean and did not involve meddling by the Peruvian government.[43]

It was not uncommon at the time for governments to pledge government revenues—usually customs revenues—for the payment of interest and sinking fund obligations. The original Peruvian loans were in fact "secured" by such a promise. In a number of Latin American cases, however, such pledges were ignored at the government's convenience.[44] Notwithstanding, guano had the potential to be superior collateral because guano revenues were collected at the point of sale abroad. A bondholder quoted in the *Times* in April 1857 said exactly as much: *"The security of the guano is unquestionable, and from its local situation is beyond the reach of any Government in Peru to control . . . and it must be borne in mind that the proceeds are received in England and not in Peru."*[45] In assessing the history of Peru's credit, Fenn observed in 1876 that, *"Above all, in distinction from other securities hypothecated by foreign states, the transfer was so easy, the Peruvian revenue being, as it were, collected in Europe—that Peru grew in favour with European capitalists."*[46] Fenn's reference to the same argument advanced twenty years earlier suggests that this perspective was probably shared by a large number of bondholders, and greatly bolstered the confidence of lenders and investors alike.

The location of the guano trade was not the only factor that enhanced Peruvian standing with creditors, however. Equally important was that Peru trusted the debt service to a firm with an excellent reputation within the British financial community. A firm with substantial reputational capital would be less likely to collude with a foreign government and defraud the bondholders because it could cost them

[43] The process was similar for subsequent issues of Peruvian debt. Many of the issuers were close financial collaborators of Gibbs. Montané, for example, one of the issuers of the 1853 loans, had important financial ties with Gibbs. Montané was a major Gibbs partner in the guano trade in the 1840s. See Mathew, *House of Gibbs*, p. 81.

[44] Three examples are illustrative. New Granada's (Colombia's) pledge of revenues from the salt monopoly fell by the wayside when the government abolished the monopoly. Venezuela pledged customs revenue for a number of foreign and domestic debts that vastly exceeded the capacity of customs to generate revenue. The government preferred to allocate scarce funds to domestic debt, and even much of that was suspended during civil wars and rebellions. Ecuador pledged customs from Guayaquil, and the collection was administered by a French agent. But these payments were suspended when Guayaquil was blockaded by the Peruvian navy, and later occupied by rebel forces. Although these interruptions were temporary, eventually the Ecuadorian government simply suspended the French agent's operations and appropriated the customs revenue with impunity. See Fenn, *Compendium*, various volumes, as well as coverage in the *Times* and the *Economist*.

[45] *Times*, 23 April 1857.

[46] Fenn, *Compendium,* 1876, p. 387.

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their network. Mathew illustrates the importance of such a network for Gibbs: "*. . . Gibbs' base was the London money market and therein they were attempting, with substantial long-run success, to build up a large acceptance business. Progress in this field had to do with the marketability of one's name and reputation."*[47] Mathew adds: *". . . the fact that the funds due to them* [the bondholders] *came from a reputable London merchant house and not from exposed government coffers in Lima gave them great confidence in Peruvian paper."*[48]

Still, could the Peruvian government not simply renege on its consignment contract with Gibbs, default on its debt, and find an alternative outlet for the guano trade? Finding an alternative merchant house with expertise in the guano trade and the capacity for raising capital for transportation, and storage was not an easy task. By their experience, Gibbs had developed a considerable advantage in these departments and finding an adept consignee willing to handle such a capital intensive business (and capable of raising capital from the British financial community) would have been challenging. In any event, any abrupt change in the guano arrangements would have implied an interruption in the flow of guano income—the government's lifeline, which in the context of political instability could have toppled the government because of Peru's dependence on guano revenues and its complete inability to save. The Peruvian foreign minister, Gómez Sánchez, implied as much in a letter to a British government official, "*. . . the obligations of the government with each one of the consigners are so complicated and so important that if they were to attempt to make an immediate change in this respect, the entire nation would be placed in a crisis which perhaps it could not overcome although it might exercise all its energy."*[49]

The government's options were further limited by the fact that there was no alternative to guano. At the onset of the guano boom in the early 1850s, Presidents Echenique and Castilla radically reformed the tax system. Some of the key changes included massive reduction in tariffs, commercial treaties with foreign countries, and the abolition of the *tribute* (Indian head tax). Tariffs and the head tax comprised close to 70 percent

[47] Mathew, *House of Gibbs*, p. 242.

[48] Mathew, *House of Gibbs*, p. 233. In addition, Gibbs was a bondholder itself. It had acquired and speculated with Peruvian bonds for years since its first involvement in the guano trade in 1842. Furthermore, because Gibbs was a legal entity in Britain, it could reasonably fear a lawsuit, as later occurred when Peru defaulted in 1875. The costs of litigation and the risk of liability, even if a relatively low probability outcome, could ruin even a large merchant house because of the funds at stake. For a brief introduction to the legal battles between bondholders and guano consignees, see Wynne, *State Insolvency*, vol. 2, pp. 127–136.

[49] Quoted in Mathew, "Foreign Contractors," pp. 619–20.

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of government income in the pre-guano era. Reimposition of the head tax or raising tariffs would have entailed political negotiations that could have been time-consuming and perhaps have unintended political consequences. There is well-documented evidence of major resistance to any tax reforms (reimposition of these measures) in the period.[50] Furthermore, a fall in guano exports would cut into imports, so that even with an increase in tariff rates, positive effects on revenue would be uncertain. This meant that, at least in the short term, there was no alternative to guano. The penalty for default—an interruption of the guano trade—therefore carried with it large financial costs. Historians have typically interpreted Peru's tax reforms of the 1850s as motivated by domestic political considerations, but the credible commitment problem offers another possible explanation. By increasing dependence on guano, Peru made its commitment to the bondholders more credible because it could not risk interrupting the guano trade. No Peruvian government could take such a risk. Consequently, Peru's notorious political instability did not weaken the credible commitment to repay its foreign debt. Because of the nature of the guano security, the identity of the government was of secondary concern.

EVIDENCE FROM FINANCIAL MARKETS

If Peru's commitment to service its debt was credible, there should be a statistically and economically significant increase in Peruvian bond prices (and a decrease in yields) coincident with the onset of the guano-debt contracts. I provide evidence to assess this prediction, and to determine whether political events mattered. I do so by testing for multiple endogenous structural breaks in the means of the Peruvian yield and yield spread (versus consol) series using the methodology of Jushan Bai and Pierre Perron.[51] The Bai and Perron methodology involves a dynamic programming search algorithm to calculate the optimal number and timing of breaks. A key parameter is the interval length—or minimum period of parameter stability. I fix this length at three years so as to eliminate relatively transient events.[52]

[50] For a succinct overview of the political economy of tax reforms, see Pike, *Modern History*.

[51] Bai and Perron, "Estimating and Testing," pp. 47–78 and "Computation and Analysis," pp. 1–22.

[52] The results that I report below are robust to alternative interval lengths in that the largest (most economically significant) changes in the means of the series are identical irrespective of interval lengths, although more breaks are detected that indicate quite small movements in the means. Those results are available upon request.

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TABLE 5
BREAKS IN PERUVIAN BOND YIELD SERIES, JANUARY 1830 – DECEMBER 1878

Break Months (*Ti*)	Boundary Months for 95 Percent Confidence Interval	
May 1833	April 1833	September 1833
August 1836	June 1836	December 1836
November 1839	January 1839	April 1840
September 1843	August 1843	October 1843
December 1848	November 1848	January 1849
November 1870	July 1870	January 1871
December 1875	November 1875	January 1876

Parameter	β_i	*t*-statistic
β_1	0.445	69.63
β_2	0.250	38.04
β_3	0.323	49.28
β_4	0.363	60.18
β_5	0.191	37.08
β_6	0.058	23.16
β_7	0.088	16.76
β_8	0.369	54.00

$R^2 = 0.97$
$F = 2182$
$N = 588$

Notes: Yields are calculated by dividing the coupon rate by the bond price. The Bai-Perron procedure determines the optimal number of breaks, their timing, and estimates of parameters (bond yields) that minimize the residual sum of squares given a minimum period of parameter (bond yield) stability (set at three years in our sample). When applied to the Peruvian bond yield series, seven break points are determined, with 95 percent confidence intervals as shown in the upper panel of Table 5. The lower panel provides the parameter estimate (estimated bond yield) in each interval bounded by breaks. Thus, for example, β_1 corresponds to the estimated bond yield from January 1830 to April 1833, and is 0.445 (44.5 percent). β_2 is the estimated bond yield from April 1833 until June 1836 (25 percent), and so on.
Sources: The prices of Peruvian bonds are from the London secondary market, and are quoted from the *Course of the Exchange* (before 1845), and the *Economist* thereafter. See Bai and Perron, "Estimating and Testing," pp. 47–78 and "Computation and Analysis," pp. 1–22.

The procedure selects seven breaks in the Peruvian series, each significant at the 1 percent level. The breaks are identical in the yield and yield spread series. For simplicity, I focus on the yield series. The results are presented in Table 5. The first three break points coincide with military and political events in Peru, but during each corresponding interval the "yield" remains very high (bond prices remain very low).[53]

[53] The first break point window corresponds with the resumption of normal diplomatic relations with Great Britain; the second comprises the formation of the Peru-Bolivian Confederation under Marshal Andrés Santa Cruz, and the outbreak of a war between the confederation and Chile. The third event window contains Chile's defeat of the confederation and the confederation's dissolution.

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The fourth break point, which occurs in 1843—around the beginning of the period of guano exports—results in a substantial decline in Peruvian bond yields from 36 percent to 19 percent. The fifth break corresponds precisely with the debt settlement agreement, and the parameter estimate falls from 19 percent to 5.8 percent. What is remarkable about the data is that no further breaks are detected until twenty years later, in 1870/71, when the procedure detects a break indicating an increase to nearly 9 percent in the yield. This break corresponds to the very large 1870 loan and increased concern over guano reserves, and it is a signal that the guano debt contracts were no longer seen as credible by investors. The final break in the series corresponds with Peruvian default. Overall, the statistical evidence of low and relatively stable yields strongly supports the view that investors regarded highly Peru's contractual commitment to repay its debt over the height of the guano boom.

Further discussion of the yield series is illustrative of the factors to which the bondholders were most sensitive. Figures 1 and 2 show that during the guano age, the price of Peruvian bonds remained high (the yield spread low) except for three relatively short interludes: 1854/55, 1865–1867 and after 1871. During the first episode, the yield spread of Peruvian bonds versus the consol increased from about 2.5 percent in 1853 to a peak of 5.1 percent in April 1854. By July 1854 it had fallen to 3.3 percent and it hovered in the 3 percent range until August 1855, when it abruptly fell again to 2.3 percent. The increased yield spread during this period reflects the concern of bondholders of the Peru's £2.6 million loan of 1853 (the Murrieta loan that was in large part a conversion of the original revolutionary debt to a lower interest rate), when they learned the details about the new loans that Peru had taken out. These Uribarren and Montané loans, totaling another £2.6 million, were a conversion of domestic Peruvian debt into external debt. This conversion was unexpected and highly controversial, considered by many a payoff of domestic political allies, as the government-recognized domestic debt included not a small amount of highly questionable claims.[54] Still relatively early in the guano boom, some bondholders expressed doubt about the adequacy of the guano revenues to cover the sudden increase in the debt burden. Others complained that the issues were diluting the value of their investments, even if guano was available in sufficient quantities to secure the loan.[55]

[54] Quiroz, *La deuda defraudada*.
[55] *Times*, 6 August 1855.

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Peru took steps to address both complaints. It permitted surveys of the deposits by foreign observers, deemed independent. A report by Admiral Moresby of the Royal Navy was publicized in the *Times* on 25 March 1854, which estimated the Chincha Island deposits at 7 million tons, less than one-third of the 26 million ton estimate several years earlier and almost one-half of the 12.5 million ton estimate by French engineers released in December 1853. The release of Moresby's report coincides with the highest yield spread during this period. As a consequence of the increased debt burden and reduced estimates of guano reserves, British bondholders began to clamor for an increase in the sinking fund on the Murrieta 1853 bonds, and on the 1849 passive bonds. Negotiations ensued, and on 7 August 1855 the bondholders accepted a Peruvian proposal from 25 July 1855 to increase the sinking fund on the former from 2 percent to 5 percent, and on the latter from 0.5 percent to 3 percent. This announcement corresponds precisely with a sudden rise and stabilization of Peruvian bond prices.[56]

The second episode during which the yield spread on Peruvian bonds rose was 1865/66, which corresponds to a conflict between Spain and Peru. The conflict originated when the Spanish ordered a naval expedition to seize the guano-rich Chincha Islands.[57] The islands were seized between April 1864 and January 1865. In January 1865 Peru and Spain signed the Vivanco-Pareja Treaty. Under the terms of the treaty, Spain withdrew from the islands in exchange for an indemnification. Many considered the treaty as an affront to national honor and shortly after, in January 1866, Peru declared war on Spain. Importantly, the perception in Britain was that Peruvian possession of the Chincha Islands was threatened.[58] Yield spreads over the 1864–1868 period peaked precisely during the war, at between 4.5 percent and 5 percent. After Peruvian victory was secured, by mid-1866, bond prices began to recover and the yield spread initiated a downward trend. It is not surprising that yields did not fully return to the prewar level, because Peru had contracted for a very large increase in debt in order to fight the war (see Table 1).

The final period of increased yields coincides with the massive increase in debt in 1870 and 1872, and with the increasing realization that the prime guano deposits of the Chincha Islands were nearly exhausted, and that deposits on other islands were not of the same

[56] *Times*, 8 August 1855.

[57] See Pike, *Modern History*, p. 115, for a brief description of the events that provoked the Spanish invasion.

[58] See, for example, *Times*, 4 March 1865 and 23 February 1866.

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quality. The first jump in the yield spread occurred with the issue of 1870, which debuted on the exchange in December 1870 at a price of 76 percent (yield 4.6 percent), about twice the yield of the 1865 bond a month earlier. The second increase occurred shortly after the 1872 bond issue, to over 5.5 percent, and then a very rapid deterioration in the second half of 1875 as default became imminent. The massive increase in the debt burden was clearly a major factor contributing to the declining confidence of Peruvian bondholders, but a decline in the guano market also coincided with the increase in debt. Peru sought to allay fears about the exhaustion of the Chincha Islands by providing surveys claiming more guano there and on other islands. Over the period 1871–1875, the *Times* contained numerous reports speculating on the size of Peruvian guano holdings. The Corporation of Foreign Bondholders noted that Peruvian surveys did not "provide for any authentication of the results by bondholders." Their reports note the increasing anxiety among bondholders about the true extent of Peru's remaining guano deposits, requests by the corporation for independent surveys to be conducted, and insistence that the bondholders maintain priority over all other creditors in their claims on revenues earned from the guano that was left.[59] In 1874 a British Parliamentary Paper brought together information from the most recent British surveys. They confirmed that the Chincha deposits were nearly exhausted and were unable to corroborate Peruvian claims about the size and richness of deposits on the other islands.[60]

The delicate balance of guano revenues, a manageable debt burden, and the contractual commitment was unraveling. The Peruvian president, Manuel Pardo, in his message to Congress in 1874, stated as much: "*My predecessor, Balta, formed the idea to convert our guano into railways. In two years, he contracted for nine railways to cost 125 million dollars—say 24 million pounds sterling, which money being raised by foreign loans, the Dreyfus guano contract for 8.5 million dollars per year would pay the interest. Such enormous loans soon crippled us, as the railways were unproductive . . . then came failures and suspensions and all the troubles that have reduced Peru to her present wretched condition.*"[61] Peru attempted to access foreign credit in order to nationalize its nitrate of soda industry, thereby converting it into a government monopoly capable of servicing its debt and financing

[59] First, second, and fourth reports of the Council of the Corporation of Foreign Bondholders (1873, 1874, and 1876).

[60] *Economist*, 9 May 1874, 558–59; and *Times*, 31 July 1874 and 7 August 1874.

[61] *Economist,* 24 April 1875, 483–84.

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the government. Foreign creditors refused to assist. With the stream of guano revenues declining, the penalty for default built into the guano debt service arrangement was no longer binding. Peru defaulted in January 1876.

The review of these episodes shows that the main risk that concerned bondholders was the size of the debt burden relative to the expected stream of guano revenues. The major factors influencing Peruvian bond prices were news about the debt level, and about the size and control over the guano deposits. What is remarkable about the evolution of the bond series is the relative unimportance of internal politics. Perhaps the best way to illustrate the irrelevance of political instability is to cite a letter from a British bondholder to the *Times: "With respect to the [disturbed] internal state of Peru . . . It is not of the slightest importance to the English bondholders. Did their security rest upon no other foundation than the internal resources of Peru and the honesty of her government, I do not believe there is a single holder of the stock who would value it at 10 percent (. . .) but the security of the guano is unquestionable, and from its local situation is beyond the reach of any government in Peru to control."* [62]

In sum, the evidence shows that in the bondholders' view the guano debt contracts provided a credible commitment to service the debt. The evidence also suggests that investors were indifferent to much of the internal instability that scholars argue held back Peru's broader development.

CONCLUSIONS

Peru's experience with sovereign debt during the guano boom is one of the most remarkable in the nineteenth century. The country emerged from postindependence bankruptcy to become Latin America's largest debtor. Its bonds commanded a high price in the London market and earned a yield at or inferior to the bonds of the countries most well regarded for fiscal probity in Latin America.

The Peruvian experience is particularly instructive for modern economic theories of sovereign debt. It demonstrates that natural resource booms have the potential to be leveraged for the accumulation of debt, but that such leverage is not automatic. In the case of Peru, it required the creative construction of contractual linkages between exports and debt service. The Peruvian case also shows that

[62] *Times*, 23 April 1857.

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hypothecation of state revenues need not be "cheap talk," but in the right circumstances can be credible. Three circumstances were important. The guano revenues were collected in a geographic location where it was next to impossible for the Peruvian government to seize them. The foreign merchant house acting as consignee and agent had strong incentives not to collude with the Peruvian government to suspend payment and seize the proceeds of guano sales. Finally, unilateral suspension of the contractual mechanism by the Peruvian government would have led to a disruption of the guano trade, and of the revenue stream, which its chronically unstable governments depended on for one-half or more of its revenues. With no good alternatives to guano, the commodity was indispensable for defense against foreign and domestic enemies. Thus, in a twist, the financial and military vulnerability of Peru's unstable governments actually contributed to the country's creditworthiness.

With respect to the debate about the roles of sanctions versus reputation, the Peruvian case is a hybrid. The sanction in play was not the formal threat of military or commercial retribution from foreign governments. Although Peru was subject to the threat of commercial disruption in the event of default, this risk was willingly contracted into by the debtor government as a means of generating credit. Insofar as reputation is concerned, Peru's successive military and quasi-civilian governments won little respect in Europe, but through the guano debt contracts Peru nevertheless was able to "borrow" against the excellent reputation of Gibbs and later of Thomson and Bonar.

The guano windfall ushered in an era of relative prosperity for many in Peru, particularly those among the elite. Those who point to the guano boom's positive impacts note that access to foreign capital and the flow of guano revenues facilitated the creation of Peru's first banks, and of investment in cotton, nitrates, and sugar. However, the perception among many Peruvian scholars and citizens alike is that the prosperity of the guano period was ephemeral, and that it did not leave a positive legacy insofar as the Peruvian economy or its political institutions.

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