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«A COMMONWEALTH WITHIN ITSELF».
THE EARLY BRAZILIAN SUGAR INDUSTRY, 1550-1670

POR

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Este ensayo examina los contornos básicos de la economía del azúcar en Brasil entre 1550 y 1660, cuando se convirtió en la principal productora de dicho artículo en el mundo atlántico. Comienza analizando el amplio espectro que situó al país en el contexto del sistema comercial euro-americano, para estudiar luego las condiciones locales y los desafíos específicos de la tierra, el trabajo y el capital a los que hizo frente la industria cañera brasileña temprana y que le confirieron un carácter y unos contornos peculiares. Finalmente investiga la rápida expansión del sector hasta 1620 y las razones por las que su crecimiento se estancó, incluso antes del ascenso de nuevos competidores en el Caribe después de 1650.

PALABRAS CLAVES: *Brasil, Portugal, Holanda, siglos XVI-XVII, azúcar, mercado, factores de producción.*

The first contacts with Brazil did not generate much interest in Portugal so long as that distant shore was seen only as a place to obtain dyewood or tropical curiosities. By the 1530s, however, the introduction of sugar cane and the beginnings of a sugar industry had begun to transform Brazil, especially its northeastern coast, into a colony of settlement. The sugar estates, by their nature and by their socially and «racially» segmented populations, eventually determined much of the structure of the colony and of its society. Cuthbert Pudsey, an Englishman who visited Brazil in the early 17th Century captured the social character of the sugar mills, the political authority of their owners, and the way in which the mills themselves served as the poles of colonization:

«Now they invent mills to grind the sugar reed, their slaves to plant and preen their reed which need be planted once in seven years. Founders to cast their kettles, masons to make furnaces, carpenters to make chests, another part is busy to erect churches. Every mill [has] a chapel, a schoolhouse, a priest, a

barber, a smith, a shoemaker, a carpenter, a joiner, a potter, a tailor, and all other artificers necessary. That every mill is as a Commonwealth within [it]self and the lord of the mill Justicer and Judge within himself»¹.

In its origins, the sugar estates did much to structure the nature of the colony and to determine its social trajectory, and the health of the sugar industry set the parameters of the colony's success.

This essay will examine the basic contours of the Brazilian sugar economy in the century from c. 1550-1660 during which it became the Atlantic world's primary producer of sugar. It begins in broad focus placing Brazil within the context of the Atlantic trading system and then narrows that focus to examine local conditions as well as the specific challenges of land, labor, and capital that faced the early Brazilian industry, and gave it its particular character and contours. Second, it will suggest how this industry expanded rapidly until c. 1620, and then why that expansion slowed even before the rise of new competitors in the Caribbean after 1650.

BRAZILIAN SUGAR IN ATLANTIC FOCUS

The Brazilian coast presented excellent conditions for the production of sugar. Sugar could be grown in a variety of soils but large areas of dark clay soils, the famous *massapé*, were accessible along the rivers near the coast. Sugar cane is a perennial, but its yield of juice diminishes with each cutting. It was said that cane planted in *massapé* could be cut for seven to ten years without replanting, and some *senhores de engenho* even bragged of cane cut for thirty or even sixty years, but such conditions were rare. Eventually, by the late 17th Century much cane was planted in the sandier upland soils away from the coast, but *massapé* was always the preferred land for sugar cane before 1650. The Recôncavo of Bahia and the *varzea* or riverside lowlands of Pernambuco had both the appropriate soils with large areas of *massapé* and the advantage of rivers like the Capibaribe, Ipojuca, and Berberibe in Pernambuco and the Subaé, Cotegipe, and Sergimerim in Bahia that supplied water to power the mills and provided for easy transport to the port. Access to water transport was particularly important because in the rainy months the *massapé* became an impassable quagmire. The coast of northeastern Brazil also had appropriate rainfall, receiving between 1.000 and

¹ C. PUDSEY, *Journal of a Residence in Brazil*, N. PAPAVERO and D. MARTINS TEIXEIRA (eds.), *Dutch Brazil* [series], 3 vols., Petrópolis, 2000, vol. III, p. 25. Pudsey's impression was not singular. Frei Vicente do Salvador, Brazil's first historian noted that in Brazil things were inverted for the whole colony did not form a republic, but rather each house seemed to be one. See the discussion in F.A. NOVAIS, «Condições da privacidade na colônia», L. DE MELLO (ed.), *História da vida privada no Brasil* (3 vols.), São Paulo, Companhia das Letras, 1997-1998, vol. I, pp. 13-40.

2.000 mm. a year for sugar cane cultivation and the region was not subject to freezing. Thus, while good conditions for sugar production had existed on Madeira or São Thomé, Brazil offered an unequalled combination of location, climate, soils, water, forests needed for firewood, and other supplies. The Brazilian colony needed only to resolve the problems of capital and labor in order to become a major producer.

While there is some evidence that sugar was being produced in Brazil by the 1510s and that Brazilian sugar was reaching the market in Antwerp in those years, it was during the period of the lord proprietors or *donatários* after 1534 that the sugar industry began to flourish. By the 1540s, Portuguese colonists and government officials had constructed *engenhos* along the coast. Technicians and specialists, some of them probably slaves, were brought from Madeira and the Canary Islands to build and operate the mills. Capital was first found in Europe from both aristocratic and merchant investors. A Portuguese noble, the Duke of Aveiro, invested in the captaincy of Porto Seguro, the Lisbon-based Italian merchant, Lucas Giraldes set up a mill in the captaincy of Ilhéus, and an Aachen merchant residing in Antwerp, Erasmo Schetz, financed a large *engenho* in the southern captaincy of São Vicente with the help of his agent and relative Jan van Hilst (João Veniste)². In Pernambuco, the donatary or Lord Proprietor, Duarte Coelho took an aggressive role in initiating the industry, bringing artisans and specialists from the Atlantic islands, asking in 1542 for royal permission to import Africans as slaves, and seeking investors in Portugal. The first *engenho*, Nossa Senhora da Ajuda, was constructed by his brother-in-law, Jerónimo de Albuquerque but other mills were built by Duarte Coelho himself, by men like Cristóvão Lins, an agent of the Fuggers, and one by the New Christian (convert from Judaism) Diogo Fernandes in partnership with other «*companheiros de Viana, gente pobre*» (companions from Viana, poor folk). In most of the captaincies, especially Ilhéus, Espírito Santo, and Bahia, however, attacks by the indigenous peoples and internal conflicts between the donataries and the colonists disrupted the growth of the industry. Sugar only took a firm hold in the Recôncavo, the excellent lands around the Bay of All Saints in the captaincy of Bahia, after the arrival of Tomé de Sousa as Governor-general in 1549. His efforts and the subsequent military campaigns of his successor, the third Governor, Mem de Sá (1557-72) resulted in destruction of the native peoples and the granting of many land grants (*sesmarias*), some of which served as the basis for the building of mills. The Brazilian sugar industry, concentrated in the captaincies of Bahia and Pernambuco, flourished after 1570. From that date to the middle of the 17th Century Brazilian sugars dominated the European market.

² H. KELLENBENZ, «Relações econômicas entre Antuérpia e o Brasil no século XVII», *Revista de História*, 37, 1968, p. 295; E. STOLS, «Um dos primeiros documentos sobre o Engenho dos Schetz em São Paulo», *Revista de História*, 33, 1968, pp. 405-19.

Since newly-created *engenhos* were exempted from the tithe (*dízimo*) for ten years by a series of laws designed to stimulate the industry, and because many *senhores de engenho* found ways to continue to avoid taxation thereafter, it is difficult to establish the growth of the sugar economy or to estimate production based on the receipts collected from the tithe or other official quantitative sources. The best we can do is used the accounts of various observers between 1570 and 1630 who reported on the number of mills and the total production. While these observations are not consistent and are sometimes contradictory, they do provide a rough outline of the industry's progress.

By 1570 there were sixty *engenhos* in operation along the coast with the largest numbers concentrated in Pernambuco (23) and Bahia (18). Together these two captaincies accounted for over two-thirds of all the mills in the colony. During the next twenty years, the predominance of those two captaincies increased so that by 1585 when the colony had 120 *engenhos*, Pernambuco (66) and Bahia (36) accounted for 85 per cent of the total. These captaincies predominated throughout the colonial period, but other captaincies —Ilhéus, Espírito Santo, São Vicente— also produced sugar for export. Considerable income was generated in these years of expansion. A royal official, Domingos Abreu e Brito who visited Pernambuco in 1591 reported 63 *engenhos* there producing an average of 6,000 *arrobas* of sugar each for a total of 378,000 *arrobas*. At an average price of 800 *réis* per *arroba*, this amounted to a total value of the crop of over \$30,240,000³. These figures reveal that estimates like that of Giovanni Botero (*Relationi Universali*) of 150,000 *arrobas* of Brazilian sugar arriving in Portugal in 1592 are far too low. A report on Brazil from the first decade of the 17th Century stated:

«The most excellent fruit and drug of sugar grows all over this province in such abundance that it can supply not only the Kingdom [Portugal] but all the provinces of Europe and it is understood that it yields to His Majesty's treasure about 500,000 *cruzados* and to private individuals about an equal amount»⁴.

This would indicate for the colony as a whole a sugar production value of \$400,000. This estimate may be too high, but by the end of the first decade of the century, Brazilian income was about 50 percent above the colony's cost to the crown.

From the sixty *engenhos* in the colony reported by Pero de Magalhães de Gandavo in 1570, there was a considerable growth to 120 *engenhos* in 1583 and then to 192 reported by the military investigator, Diogo de Campos Moreno in

³ D. ABREU E BRITO, *Um inquerito a vida administrativa e económica de Angola e do Brasil (1591)*, Coimbra, Imprensa da Universidade (ed. A. de Albuquerque Felner), 1931, pp. 58-9.

⁴ Convento da Graça de Lisboa, t. VI F. Arquivo Nacional da Torre do Tombo (ANTT). Província do Brasil. This document is analyzed in A.T. DE MATOS, «O império colonial português no início do século XVII», *Arquipélago*, 1/1, 1995, pp. 181-223.

1612. By 1629 the colony had 346 *engenhos*. The annual rate of growth had been highest between 1570 and 1585 when Pernambuco (8.4 percent) and Bahia (5.4) led the way.

This expansion seems to have been driven by favorable prices and growing demand in Europe in the last years of the sixteenth and opening decades of the 17th Century. Local prices for white sugar at the mill in Bahia rose from about 500 *réis* per *arroba* in 1570 to almost \$1,600 by 1613. Good harvests and peace in the Atlantic because of the truce between Spain and the United Provinces after 1609 led to a general climate of prosperity and expansion. Joseph Israel da Costa, a man with experience in Northeastern Brazil reported to the Dutch West India Co. (DWIC) that by 1623 the captaincies of Pernambuco, Paraíba, and Itamaraca had 137 *engenhos* active and operational (*moentes e correntes*) producing almost 660,000 *arrobas*, an average of 4,800 (70 tons) per *engenho*⁵.

The expansion came to an abrupt, if temporary halt during the general Atlantic depression from 1619-23 when sugar prices fell precipitously, so low in fact, that no one in Bahia came forward to assume the tithe contract because of the «low reputation and poor repute of the sugars»⁶. Although conditions in the Atlantic market had improved by 1623, the outbreak of hostilities between Holland and Spain led to new problems for Portugal and its colonies which after 1581 were also ruled by the Spanish Hapsburgs. The Dutch attacked Salvador, the royal capital of Brazil in 1624 and held it for a year. During the fighting, considerable damage was done to Bahian sugar estates and much sugar was lost to the invading and the liberating armies. During the 1620s, the Portuguese merchant fleet in the Brazil trade became a major target of Dutch naval action and hundreds of ships were sunk or taken as prizes. The subsequent Dutch seizure of Pernambuco in 1630 and the extension of their control over most of the northeast disrupted the sugar industry in the area at least temporarily and also removed a large proportion of Brazilian sugar production from Portuguese control.

There were regional variations in the pattern of development. The industry in Rio de Janeiro grew at a somewhat different rhythm than the sugar economies of the northeast. It expanded rapidly between 1610-12 and 1629, the number of *engenhos* growing from fourteen to sixty, a rate of growth of almost eight percent a year. This expansion seems to have resulted from a technological change, the adoption of the vertical three-roller mill, which made it easier and less expensive to construct new *engenhos*⁷.

The Brazilian sugar industry adapted the technology of the Mediterranean and Atlantic sugar industries to local conditions. Despite the industrial organization of

⁵ «Memorial of Joseph Israel da Costa». Arquivo Algemein Rijksarchief (AAR), Loketkas 6, Staten General West Indische Co.

⁶ Arquivo Histórico Ultramarino, Bahia (AHU), pap. avul. caixa 1, 1st ser. uncat.

⁷ On the still unresolved question of the invention of the three-roller vertical mill see J. and C. DANIELS, «The Origin of the Sugarcane Roller Mill», *Technology and Culture*, 29/3, 1988, pp. 493-535.

sugar production, most of the processes involved were done by hand —agricultural labor, heating and clarification, and purging. Only in the crushing of the cane and the extraction of the juice was complex machinery used⁸. The only major technological innovation which occurred in the period under discussion was in the crushing of the cane, the introduction of the vertical roller mill. The first mills either had used a large milling stone in an edge runner arrangement, or more commonly, horizontally-arranged rollers driven by water or animal power. This system was unable to extract the juice effectively from the cane and a second stage of processing was necessary using large screw presses called *gangorras*. In 1591, for example, Engenho Sergipe in Bahia was using this system, a horizontal mill (*moenda*) and two presses (*guaogorras*). It was still at use at that mill in 1612⁹. This method was expensive, inefficient, and because of the impurities which the crushing process produced, it made the subsequent clarification process more difficult. A major change was introduced in the first decade of the 17th Century with the introduction of the vertical three roller mill. The «*engenho de tres paus*», sometimes called *de palitos*, or *de entrosas*, comprised of three vertical rollers, allowed smaller producers and marginal areas to enter the industry at lower cost. It eliminated the need for secondary presses, made the crushing of the cane more efficient, and apparently made the establishment of a mill less costly. This innovation was supposedly introduced by a priest who had been in Peru sometime in the period from 1610-14, but later a Portuguese technician, Gaspar Lopes Coelho, applied for compensation in 1620 claiming that he was inventor of the process and offering to build more of the new units in the area of Maranhão which the Portuguese were just conquering¹⁰. This may be an instance of an idea introduced from abroad and then adapted and employed by a local technician. In any case, the innovation spread relatively fast. Even in São Vicente further south, inventories made as early as 1615 listed «*engenhos de tres palicos*»¹¹. This technological change affected sugar production in all the captaincies, but Rio most of all. It made the building of *engenhos* less costly, obviating to some extent the

⁸ G.B. HAGELBERG, «Sugar and History: A Global View», A. VIEIRA (ed), *Slaves with or Without Sugar*, Funchal, Centro de Estudos de História do Atlântico, 1996, pp. 9-25.

⁹ ANTT, Cartório dos Jesuítas (CSJ), maço 13, doc. 4. In the harvest of 1611-12 at Engenho Sergipe the following entry was made in the account book: «to an artisan who helped Sebastião Pereira to make a *gangorra* for 12 days at 320 réis», ANTT, CSJ, maço 14, doc. 4.

¹⁰ Coelho's original petition was discussed by the Colonial Council (Conselho da Fazenda) in July, 1620. See Archivo General de Simancas (AGS), Sec. Prov. Portugal, 1473, fs. 38-39v. His request was refused and he petitioned again in February, 1622. AHU, Consulta, Conselho da Fazenda, Codice 34, fs. 29v.-30. The idea of making newly conquered Maranhão into a sugar-producing region led the noble, Antonio Barrios, nephew of the Bishop of Brazil, to build «one of the old style *engenhos* or two of those they make nowadays», to help populate the region in a few years. The discussion of his request in council indicated recognition of the willingness of colonists to build the new style mills. See, AHU, Consulta, Conselho da Fazenda, Codice 32, fs. 58v.-60.

¹¹ See S. ROBLES REIS DE QUEIROZ, «Algumas notas sobre a lavoura do açúcar em São Paulo no período colonial», *Anais do Museu Paulista*, 21, 1967, pp. 109-277.

need for tax exemptions to promote construction, and opening the possibility of mill ownership to a wider and less affluent range of colonists. This was an innovation that contributed to the rapid growth of the industry and was perhaps the only major technological change until the end of the century.

By the end of the 17th Century (c. 1689) the Jesuit priest Andreoni who wrote under the pseudonym Antonil reported 528 *engenhos* in Brazil producing about 1,295,000 *arrobas* or 18,500 tons. At that time, the 146 *engenhos* in Bahia had an average production of about 51 tons while the 246 *engenhos* of Pernambuco averaged only 26 tons. The scale in Rio de Janeiro was even smaller. The captaincy had 136 *engenhos* averaging 38 tons a year.

Annual productivity varied widely, but by 1610 Brazil produced 10,000 tons and by the 1620s it could produce from 1-1.5 million *arrobas* or about 15,000 to 22,000 tons a year, although it rarely did so. Matias de Albuquerque, a governor of Pernambuco, perhaps exaggerated when he estimated in 1627 that Brazil sent about 75,000 crates (*caixas*) a year to Portugal which at eighteen *arrobas* per crate equaled 1,350,000 *arrobas* or about 20,000 tons. Antonil's later estimate for 1710 thus falls into the range that had already been established in the 1620s. This capacity did not change markedly until the mid-18th Century.

The Brazilian sugar economy was particularly vulnerable to the political and economic vicissitudes of the Atlantic world. The depression of the early 1620s brought on by the beginning of the Thirty Years War in 1618, the reopening of hostilities with the Dutch after 1621, currency manipulations by various European governments, and overstocking by European markets seriously affected the Brazilian sugar economy for a decade. One observer estimated that between 1626 and 1627 alone, twenty percent (60/300) of the ships in the Brazil trade had been taken by the Dutch with a loss of over 270,000 *arrobas* or almost 4,000 tons. By 1630, the disruption caused by Dutch attacks and by unstable prices had lowered profits for Bahian planters from 30 to 50 percent of the levels in 1612 and the tithe (*dízimo*) of that captaincy had also fallen in value by thirty percent. Frei Vicente do Salvador, Brazil's first historian, asked in 1627 what good was it to make sugar if the earnings did not equal the costs¹². This is a refrain that sugar producers have repeated since the 17th Century.

The problem, of course, was never simply that of productive capacity, but of the price of sugar as well. Whatever the levels of productivity, the success of the industry and of individual planters depended on the price of sugar. Price series based on European values are often deceptive because European prices were often three times higher than the price at the mill in Brazil. Thus it is difficult to establish the profitability of the industry and its ability to generate capital. While evidence is sketchy, there are enough observations to allow us to establish a general outline.

¹² See the discussion in S.B. SCHWARTZ, *Sugar Plantations in the Formation of Brazilian Society: Bahia, 1550-1853*, Cambridge, Cambridge Univ. Press, 1985, pp. 170-3.

The secular trend of Brazilian sugar prices was upward from 1550 to about 1620. After the latter date, the general economic crisis (1619-21), the reopening of hostilities between the Dutch and the Spanish Hapsburgs who ruled Portugal and its empire (1580-1640), and a general European market contraction all contributed to a fall in the price of Brazilian sugar. Locally, these events were driven home by the Dutch attack and capture of Salvador, Bahia (1624-25), the destruction of a number of mills and disruption of the harvests in Bahia of 1624-26, and by the Dutch seizure of many ships carrying Brazilian sugar. This situation drove up the price of sugar in Europe but lowered it in Brazil where planters could find no one willing to carry their produce. A Brazilian planter with 3,000 *arrobas* of sugar would have suffered a loss of 45 percent between the value of his crop in 1611 and in 1623. We can see the effect of the Atlantic market on Brazilian producers in Table 1 which compares the value of the Bahian sugar crop in 1612 when prices were high and 1630 when they had fallen. Using an estimate of ratio of the sugar grades made by contemporaries (white 56 percent, *muscovado* 28 percent, *melles* 16 percent) and the prices current for each grade, it is clear that the value of the crop had fallen about twenty percent, but that the average earnings per mill had been halved. Even if we deflate the average productivity per mill (estimate 2) to compensate for the introduction of the three-roller mill after 1612, average income per mill would still be over a third lower.

TABLE 1
Estimates of the Bahian Sugar Crop, 1612 and 1629-30

Year	Number of Engenhos	Average production per Mil (arrobas)	Sugar type and arrobas	Price per arroba (réis)	Total value of Crops (réis)	
1612	55	4,700	White	144,760	1,287	156,306\$120
			Muscavado	72,350	771	55,804\$980
			Panela	41,360	480	19,853\$800
			TOTAL	285,500		261,963\$900
			PER MILL			4,762\$980
1612	55	3,700	White	113,960	1,287	146,666\$520
			Muscavado	56,950	771	43,931\$800
			Panela	32,560	480	15,628\$800
			TOTAL	203,500		206,226\$900
			PER MILL			3,749\$580
1629-30	84	3,700	White	174,045	714	124,270\$270
			Muscavado	87,034	373	32,459\$952
			Panela	49,728	170	8,453\$760
			TOTAL	310,000		165,183\$982
			PER MILL			1,966\$476

Source: S.B. SCHWARTZ, *Sugar Plantation in the Formation of Barzilian Society: Bahia, 1550-1835*, New York, Cambridge Univ. Press, 1985, p. 177.

This situation continued through the 1620s and only after 1634 did sugar prices begin to recover, stimulated to some extent by the Dutch invasion of Pernambuco and the shortages in production caused by the disruption of the industry in that region. Even though prices began to slip again after 1640, they stayed well above \$1,000 per *arroba* until the last decades of the century. By the 1640's, however, the rise of competing sugar economies, first on Barbados, and then in the Dutch and French Caribbean, and the introduction of exclusionist policies such as the English Navigation acts of 1651 changed the relationship of Brazilian sugar to its traditional markets. Whereas Brazilian sugars had supplied about 80 percent of the London market in 1630, by 1670, that figure had dropped by half. Moreover, in Brazil itself fighting with the Dutch in the 1630's and 1640s destroyed many mills and cane fields and disrupted colonial shipping. To pay for the war, the Portuguese government increasingly taxed sugar, adding an additional burden on the planter's finances.

SUGAR IN DUTCH BRAZIL

Perhaps the most obvious example of the impact of European politics on the Brazilian sugar economy was the twenty-five year Dutch occupation of northeastern Brazil. The Dutch capture of Pernambuco and the captaincies of the northeastern coast (1630-54) disrupted the sugar industry in that area and brought considerable pressure on the Portuguese controlled sugar economy in the rest of Brazil. During the period of invasion, the burning of *engenhos* and cane fields by both invaders and resisters put 60 of the 166 *engenhos* of the region out of operation by 1637. Many of the mills abandoned by Portuguese who joined the resistance or who fled to Bahia were eventually confiscated by the DWIC and then sold to Dutch or Portuguese investors as the Company sought to vertically integrate the industry by controlling production as well as the commercialization of sugar. Although the Dutch controlled Pernambuco and its adjacent captaincies until 1654, the Luso-Brazilian revolt against their rule which broke out in 1645 severely disrupted agricultural production during the almost decade during which the hostilities persisted.

The DWIC had targeted the Brazilian Northeast because of the attraction of the sugar economy. The Dutch and other northern Europeans had traditionally carried a large proportion of Brazilian sugars to European markets and they particularly resented their exclusion from this trade imposed by the Spanish Hapsburgs after 1605. With the reinitiation of Dutch-Spanish hostilities in 1621 and the formation of the DWIC in that year, Brazil became an attractive military and economic target.

Once in control of Pernambuco, the DWIC sought to resuscitate and stimulate the sugar economy. They were partially successful, especially during the enligh-

tened and astute administration of Governor Johan Mauritz of Nassau (1637-44), who offered the Portuguese residents religious toleration and a voice in local affairs in order to keep them employed in the sugar industry. The DWIC extended credit to the planters, both the Portuguese who stayed and the Dutch who acquired mills, as a way of stimulating the industry. The policy, was only moderately successful. Even during periods of peace, the captaincy rarely produced half of its estimated capacity of 15-20,000 *caixas* a year, and its share of total Brazilian production fell to only about twenty percent and sometimes to as low as ten percent¹³. Between 1631 and 1651, Dutch Brazil exported about 25,000 tons of sugar or an average of about 1,200 tons a year. About two-thirds of this sugar was exported by private merchants and the remainder by the DWIC itself¹⁴. This was far below the region's capacity, and although in the years of relative peace (1637-44) exports considerably exceeded the mean, the overall performance of the industry was seriously compromised by the political and military situation.

A number of Dutch accounts provide a picture of the status of the sugar economy during their rule¹⁵. A report of c. 1637 on the Dutch controlled captaincies of Pernambuco, Itamaracá, Paraíba, and Rio Grande identified 217 *engenhos*, but many of these had been confiscated when their owners had fled with the Luso-Brazilian forces, and others were inoperative due to depredations of the campaigning armies or abandonment by their owners or managers. For example, in the district of Olinda there were sixty-seven mills, but twenty of them were *fogo morto*, and five had been confiscated and resold¹⁶. Overall, the anonymous observer calculated that there were 150 *engenhos* in the four conquered captaincies, but only ninety-nine were functioning. A rough calculation is that by 1639, of the 150 mills in the region about one-third were inoperative (*fogo morto*) and some 68 (46 percent) had been confiscated and resold by the DWIC¹⁷.

While many Portuguese planters and cane farmers remained on their properties under Dutch rule, the policy of confiscation and resale of abandoned mills and the profits hopefully to be made in the sugar industry led a number of Dutch and some Jews to enter the industry. In 1637 and 1638, fifty-one mills were sold off to Dutch merchants and administrators to be paid for in installments. The report of Adrien Van der Dussen of 1637 listed mills like Engenho Marapatigipe

¹³ For a discussion of the effects of the fighting on sea and land on the sugar industry in Pernambuco see E.C. DE MELLO, *Olinda restaurada. Guerra e açúcar no nordeste, 1630-1654*, Rio de Janeiro, Topbooks, 1998 (2nd ed.), especially pp. 89-141.

¹⁴ See P. PUNTONI, *A miséria sorte. a escravidão africana no Brasil holandês e as guerras do tráfico no Atlântico sul, 1621-1648*, São Paulo, HUCITEC, 1999, pp. 81-2. Also, H. WÄTJEN, *O domínio colonial holandês no Brasil*, São Paulo, Ed. Nacional, 1938.

¹⁵ See J.A. GONSALVES DE MELLO (ed.), *Fontes para a história do Brasil holandês. A economia açucareira*, Recife, MEE/SPHAN, Fundação Nacional Pró-Memórial, 1981.

¹⁶ J.M. DE NASSAU, A. VAN DER DUSSEN and M. VAN CEULLEN, «Breve discurso sobre o estado das quatro capitánias conquistadas» (1638), J.A. GONSALVES DE MELLO (ed.) [15], pp. 77-129.

¹⁷ See the estimate provided by P. PUNTONI [14], p. 78.

in Ipojuca owned by Miguel van Meerenburch and Martius de Conten which was supplied by four cane farmers, three of them Portuguese and the fourth, Abraham van Molligen, a Hollander. The area of Itamaracá to the north of Pernambuco witnessed an especially heavy Dutch penetration of the industry. Of the twenty-two mills listed, ten had Dutch or other foreign owners and of the seventy cane farmers that supplied these estates, about a third were Dutch or other foreigners (22/70). There were other examples of this penetration. Seven of the eight mills in the parish of Goiana belonged to non-Portuguese¹⁸. But despite these acquisitions, it was commonly said that the Dutch really never learned how to manage the *engenhos* themselves and remained dependent on Portuguese expertise. As the Portuguese planter and confidant of Governor Maurits of Nassau, Gaspar Dias Ferreira stated in 1645,

«God created the various nations among men, and endowed each one with a different disposition and ability for various occupations ... as for the Dutch nation he gave them no aptitude for Brazil. If this observation seems unjust, show me the Hollander who up to the present day in Pernambuco who was a workman in making sugar or who wished to learn it, or any other position in a sugar-mill [...] There are but few Flemings who devote themselves to the sugar industry or to the maintenance of the mills in Brazil, and only rarely do they own them, and thus both the Negroes and the sugars have to pass through the hands of the Portuguese»¹⁹.

As a *modus vivendi* developed between the remaining Portuguese planters and cane farmers and the Dutch, the DWIC sought to stimulate recovery of the industry through a policy of loans and credit arrangements which allowed planters to acquire the necessary equipment and slaves which the DWIC began to import from the Guinea coast and Angola. Best estimates of the total number of slaves imported is about 26,000 over a twenty years period from 1631-51 with the trade particularly strong in the decade from 1635 to the outbreak of the revolt against the Dutch in 1645. This period of intense slave importation coincided with the high point of sugar exports from Dutch Brazil which crested between 1639 and 1644 and then fell off precipitously as the fighting in the countryside resumed.

¹⁸ A. VAN DER DUSSEN, «Relatório sobre o estado das Capitánias conquistadas no Brasil», J.A. GONSALVES DE MELLO (ed.) [15], pp. 137-232.

¹⁹ G. DIAZ FERREIRA, «Cartas e pareceres de Gaspar Dias Ferreira», *Revista do Instituto Arqueológico, Histórico e Geográfico Pernambucano [RIAHGP]*, 31, 1886, and 32, 1887, cited in C.R. BOXER, *The Dutch in Brazil*, Oxford, Oxford Univ. Press, 1957, p. 143. The same point is made by J.A. GONSALVES DE MELLO, *Tempo dos flamengos. Influência da ocupação holandesa na vida e na cultura do norte de Brasil*, Recife, Fundarpe/Massangana, 1978 (2nd ed.), pp. 134-5. This statement of Dutch ineptitude was often repeated by the Portuguese but contested by some of the Dutch who argued that admittedly with instruction from specialists from Brazil, the English and Dutch eventually learned sugar-making well enough to become major competitors to the Portuguese.

The political situation worsened with the withdrawal of Count Maurits of Nassau in 1644 and with new pressures from the DWIC to enforce collection from the planters indebted to it. Some of the Portuguese planters most heavily indebted to the DWIC, particularly João Fernandes Vieira and André Vidal were among the principal leaders of the revolt. The «War of Devine Liberation» (1645-54) when Portuguese residents of the colony aided secretly at first by the home government rose against the Dutch caused further destruction of the sugar industry as mills were abandoned, destroyed, or confiscated and slaves took advantage of the situation to flee to Palmares or other runaway maroon communities. In addition, the war at sea disrupted Portuguese sugar commerce. Some 220 ships in the Brazil trade were taken by the Dutch in 1647-48 alone.

After 1645 the Dutch lost control of the countryside and were progressively forced to abandon the captaincies beyond Pernambuco. «Sugar» was not only the password of the rebels, but the objective of the contending sides. Moreover, the war was not only fought over sugar, but «financed by it as well»²⁰. By 1648, over eighty percent of taxes in Pernambuco were derived from sugar production and commerce. Even after the war, taxes on sugar were used to pay for the rebuilding of Recife and there was also a long series of legal battles between those who had abandoned their *engenhos* and wanted them back and those who had purchased them from the Dutch. There was little capital left for expansion of the sugar industry or other economic sectors. Whatever profits had been possible in the sugar industry of Pernambuco were negated by these conditions. The sugar economy of Pernambuco never fully recovered from the Dutch interlude and its effects. It was surpassed by Bahia which remained the principal producer in Brazil until the 19th Century.

To some extent the Dutch hiatus in northeastern Brazil was not only a cause but also a result of the economic conjuncture of the 1630s. The price of sugar began to rise again after 1634. The improved conditions of Atlantic commerce and the rise in the price of sugar and other colonial commodities gave Brazilian merchants and *senhores de engenho* a renewed sense of security, but these same conditions also created a new, and more serious challenge. Rising sugar prices of the 1630s and early 1640s had attracted the interest of the small Caribbean island colonies of the English, French, and Dutch. Shifting from tobacco and other crops, colonists on Barbados actually sought advice and expertise in Pernambuco, and by 1643 sugar from Barbados was on sale in Europe. After the DWIC abandoned Pernambuco in 1654, its interest and capital were shifted to the Caribbean as well. With their own growing colonial sources of supply, France and England began to limit Brazilian sugar imports. The English Navigation Acts of 1651, 1660, 1661, and 1673 and Colbert's policies in France aimed at stimulating a French colonial sugar sector effectively drove Brazilian sugar from these markets. In the 1630s, eighty percent of the sugar sold in London had come from Brazil and by 1690

²⁰ E.C. DE MELLO [13], pp. 172-218.

that ratio had fallen to only ten percent. The loss of these markets could not be recovered in Portugal itself which simply had too small a population.

Still another negative effect of Caribbean competition was a rise in labor costs and an expansion of the slave trade. The Dutch had already made attempts to secure their own sources of slaves for Dutch Brazil with attacks on El Mina in 1638 which they held thereafter and their capture of Luanda in 1641 from which they were expelled in 1648. The new sugar economies now also needed labor and increased European demands and activities on the African coast drove up the price of slaves in Brazil.

In the second half of the 17th Century, the Brazilian sugar economy was challenged by competition which increased the supply of sugar in the Atlantic market and created new demands for slave workers. The result in Brazil was lower sugar prices and higher slave costs. Between 1659 and 1688, the price of sugar in Lisbon fell by over forty percent. Brazil's problem was not production. Even after the Dutch War in 1654, it still had the capacity to produce 18-20,000 tons, more than any competitor. Moreover, it still had comparative advantages, but international political and economic conditions and their effects on Portugal's fiscal policies combined to create a situation of crisis. Then too, nature did not help. Periodic problems such as droughts and excessive rains, the irregularities of the fleet system, and various «calamities» created problems in the 1660s and 1670s. More importantly, the War of the Restoration for independence from Spain (1641-68) and Portugal's foreign policy commitments to its allies were financed to a large extent by increasing taxation on sugar at the very moment that industry was facing lower earnings and higher costs. Various forced «voluntary» contributions such as the dowry for Catherine of Bragança as part of her marriage negotiation with Charles II of England, and other similar taxes and assessments weighed heavily on the sugar economy and caused constant complaints in the municipal councils of Brazil about the «miserable status» of the colony, but the Portuguese crown had little choice but to tax this major source of revenue to pay for its commitments.

By the 1680's the economy had reached a lowpoint. Portugal like the rest of Western Europe was in a general recession which led to a devaluation of Portuguese currency in 1688 and to an increased search for new sources of revenue. Hides and tobacco exports became regular items on the fleets arriving from Brazil and the search for mines increased, but when João Peixoto Viegas penned his famous memorial in 1687, the sugar economy seemed to be beyond recovery. He complained that Brazil had contributed more to the Portuguese empire than any province of Portugal itself, but foreign competition, royal policies, and general economic conditions had caused its ruin. His doomsday forecast was premature. War in Europe (1689-97) and (1701-13) once again disrupted Atlantic commerce and raised the prices for colonial products. The struggles of England and France were usually profitable for Brazil. White sugar which had sold in Bahia for 800 réis in 1689 was selling for \$1,440 in 1695. Although prices stabilized after 1700,

conditions for the Brazilian sugar economy remained good until the 1720s, although the competing demand for slave laborers in the Caribbean began to create an upward pressure on slave prices by 1670. Meanwhile the discovery of gold in Minas Gerais between 1693 and 1695 also began to alter the whole nature of the Luso-Brazilian economy. Brazil, after all, was no Caribbean island and its potential for economic diversity and diversification was great. Sugar remained regionally important in the coastal northeast and it continued to comprise a large proportion of Brazil's export value into the 18th Century, long after Brazil had lost its predominant share of the European market for sugar.

THE BRAZILIAN SUGAR TRADE

The foregoing description makes clear the importance of Brazil's integration into the European market system. Despite important work by Mauro, Kellenbenz, and Stols, there has been no general study of the commercial aspects of the sugar trade from Brazil in its early stages²¹. Although sparse, some documentation for such a study does exist. The records of the merchant Miguel Dias Santiago who was shipping sugar from Bahia (1596-98) and from Pernambuco (1599-1601), during the period of the sugar industry's rapid expansion provide one of the few detailed sources on the cargoes shipped, the taxes paid, and the costs of carrying the sugar²². Also from Bahia, for the period 1608-18 the records kept by the administrators of Engenho Sergipe provide a close accounting with similar information²³. In addition to these Bahian sources, there is also now available the *Livro das saidas dos navios e urcas, 1595-1605*, which records the customs activity of Pernambuco. Together these sources present an excellent basis for some generalizations about sugar shipping from Brazil during the period of the industry's rapid growth²⁴.

²¹ The essential books on the early sugar trade are F. MAURO, *Le Portugal et l'Atlantique au XVII^e siècle*, Paris, SEVPEN, 1960; H. KELLENBENZ, *Unternehmerkräfte im Hamburger Portugal-und Spanienhandel, 1590-1625*, Hamburg, 1954, and E. STOLS, *De Spaanse Brabanders of de handelsbetrekkingen der Zuidelijke Nederlanden met de Iberische Wereld, 1589-1648*, 2 vols., Hamburg, Verl. d. Hamburgischen Buecherei, 1954.

²² Public Record Office, State Papers, London, 9/104. These records have been studied more intensively by J.A. GONSALVES DE MELLO, «Um mercador cristão novo e seu livro de contas: Miguel Dias Santiago», a chapter in his *Gente da nasção. Cristãos novos e judeus em Pernambuco, 1542-1645*, Recife, FUNDAJ, Ed. Massangana, 1989, pp. 35-49.

²³ ANTT, CSI, maço 11, doc. 5. This is a register of the lading of the *engenho's* sugar shipping; it includes the name of the ship, the name and place of origin or residence of the captain, the cargo expressed as the number of crates and the weight of the sugar, and the costs in fees and taxes.

²⁴ J.A. GONSALVES DE MELLO, «Os livros de saidas das urcas do porto do Recife», *RIAHP*, 58, 1993, pp. 21-144. See also, M.A. FERNANDES MOREIRA, *Os mercadores de Viana e o comércio do açúcar brasileiro no século XVII*, Viana do Castelo, Câmara Municipal, 1990, for a view from a small Portuguese port in the mid- 17th Century.

These shipping records indicate that at the end of the 16th Century, the predominant ship type carrying Brazilian sugar was the rather large, round-bottomed hulks or what the Portuguese called the *urca*, a ship favored by the Hanseatic and Baltic merchants. All of the ships registered by the Pernambucan customs house were *urcas* and fifty two of the hundred and one ships on which Miguel Dias sent his cargoes between 1596 and 1602 were also of this type.

By the decade 1608-18 that situation had changed, the predominant type of ship was no longer these *urcas* more popular with the northern Europeans, but rather the smaller and more rapid caravels favored in Portugal and southern Spain. Of 42 vessels sailing from Bahia with sugar in this period, 35 of them were caravels. To some extent this change was due to the shift toward Portuguese flag vessels and the fact that non-Portuguese carriers were being squeezed out of the trade. The caravels had their problems. They were small and nimble sailors, but under attack their only recourse was to run. That is why the Jesuit Antonio Vieira called them «schools of cowardice». Another observer complained that they often arrived so heavily laden from Brazil that their decks were almost awash and their tiny crews were unable to handle the heavy sugar crates²⁵.

Until the 1590s many vessels from northern Europe carried the sugar under Portuguese license, principally to northern European ports. Antwerp, where the Schetz enterprise was based, was a major receiving port. It had developed its refining industry with the sugars of Madeira, Canaries, and São Tomé and by the 1560s was regularly receiving Brazilian sugars²⁶. A number of Flemish agents, some married to Portuguese women lived at various Brazilian ports where they were actively engaged in shipping sugar cargoes and dye wood. The predominance of Antwerp lasted until the political crisis of 1578-85, and although the trade resumed after that date, Antwerp increasingly lost its place to Amsterdam in the Brazil sugar trade.

An important aspect of this transition and of the Brazilian sugar economy in general was the role of the Sephardic Jews and the so-called «New Christians», that is, those Spanish and Portuguese Jews and their descendants who had converted or were forced to convert. Beginning in 1595, members of this community established themselves in Amsterdam, and although prior to 1648 they played only a secondary role in the Dutch economy as a whole, they quickly predominated in the colonial trades particularly those of Portugal²⁷. Linked to relatives and co-religionists in Lisbon and various ports in the south Atlantic as well as the

²⁵ AGS. Guerra Antigua, 690.

²⁶ See J. EVERAERT, «Les barons flamands du sucre à Madère», J. EVERAERT and E. STOLS (eds.), *Flandre et Portugal. Au confluent de deux cultures*, Antwerp, Fonds Mercator, 1991, pp. 99-142. On the continuity of the sugar market from Bruges to Antwerp see W. BRULEZ, «Brugge en Antwerpen in de 15^e en 16^e eeuw: een tegenstelling?», *Tijdschrift Voor Geschiedenis*, 83, 1970, pp. 15-37.

²⁷ This point is forcefully made by J.I. ISRAEL, «The Economic Contribution of Dutch Sephardi Jewry to Holland's Golden Age, 1595-1713», *Empires and Entrepreneurs. The Dutch, The Spanish Monarchy and the Jews, 1585-1713*, London, Habledom, 1990, pp. 417-48.

Indian Ocean, Portuguese New Christians in Brazil also became deeply involved in the production of sugar as well as mill owners, cane farmers, technicians and skilled workers as well as merchants. Miguel Dias is a good example in this regard, linked to his merchant brothers in Lisbon, cousin to Diogo Fernandes, manager of Engenho Santiago in Camarajibe, Pernambuco which in turn was owned by Bento Dias Santiago, who was probably also a relative of Miguel. The Inquisitorial investigations carried out in Brazil in 1591-95 and 1618 are replete with denunciations of New Christians from the sugar-growing rural areas as well as urban merchants²⁸.

The records of the New Christian merchant Miguel Dias Santiago for the years 1595 to 1601 are one of the best available sources about the patterns of the early trade. During this period, he shipped over 200 tons of sugar to Europe. Along with an accounting of the number and weight of the crates shipped, Dias usually listed in his entries the place of origin of the ship captains which in turn was a guide to their port of embarkation²⁹.

Patterns of the destinations emerge from these records. Portugal was represented by Lisbon, Sezimbra, Matozinhos and Vila do Conde, nine ships sailing from these ports. What is truly impressive, however, is the variety of foreign ports sending ships to load Brazilian sugar. Not only Holland, but the Baltic ports of Riga, Bremen, Copenhagen, and Malmö (Melma) were sending vessels to Bahia as was the Venetian Adriatic port of Ragusa. This diversity was not atypical. Symbolic of the far-reaching attraction of Brazilian sugar was the case of a ship from Danzig, owned by subjects of the king of Poland which in 1623 delivered goods in Lisbon and then sought and received permission to sail to Bahia to load sugar³⁰. The distribution in Pernambuco also reflects the importance of the Baltic and north European ports. Of the thirty-one ships that carried sugar from Recife, over 60 percent (19) originated in Hamburg, with others sailing from Antwerp, Bergen, and Lubeck. This trade was theoretically done under Portuguese license and control.

In Portugal itself, although Lisbon was the principal destination of Brazilian sugars, other ports such as Porto and Viana do Castelo also developed a regular trade with the colony. Brazilian sugar, in fact, had opened Portuguese trade by breaking the state-controlled commercial system that had grown in the 16th Century around the spice trade from the Indian Ocean. These smaller Portuguese ports now became active players in the trade. Viana do Castelo had an active

²⁸ Still the best study of the Brazilian New Christians is A. NOVINSKY, *Cristãos novos na Bahia*, São Paulo, Ed. Perspectiva, 1972. See also J. GONÇALVES SALVADOR, *Os cristãos novos. povoamento e conquista do solo brasileiro*, São Paulo, Livraria Pioneira, 1976.

²⁹ A typical entry read: «The lading made by me, Miguel Diaz in Bahia of All the Saints on the galleon St. Andre which is captained by Bartholomew Balde, a *vezino* of Ragusa. On behalf of *Senhor* Manuel Gomes da Costa and consigned to him or to whoever bears his certified message».

³⁰ AHU, pap., avul., caixa 1. See also *Calendar of State Papers, Venice*, 859 (24 feb. 1599) on Venetian shipping to Brazil.

merchant community and by the first decade of the 17th Century there were about 70 ships from that port dedicated to the Brazil trade. Most of these were medium size ships of 80 to 150 tons capable of carrying 300 to 450 crates of sugar. This trade was vital to the port's existence and about 85 percent of its customs duties derived from Brazilian sugar in this period³¹.

Faced with the uncertainties of maritime commerce and the vulnerability of the sugar ships especially during the recurrent hostilities in the Atlantic, various techniques were developed as insurance measures. Instruments of exchange such as letters of credit and bills of exchange authorizing a trade of goods rather than exchange for currency were commonly used³². As a kind of insurance, cargoes were often divided between a number of vessels. The administrators of Engenho Sergipe usually loaded between eight and twelve crates with 100 to 150 *arrobas* on any single ship. In 1611, for example a total of 136 crates with 1,871 *arrobas* were shipped to Portugal on thirteen ships.

The risks were high but the characteristic of the Brazilian sugar trade was its private nature. Merchants and planters preferred the dangers of this trade to the heavy hand of government intervention. Although taxes were imposed in the 1590s to pay for the costs of providing some protection to shipping, and by 1605 merchants with Lisbon-bound cargoes were required to purchase insurance, royal efforts to force the use of larger ships or suggestions in 1586 and 1615 to establish a convoy system were firmly resisted by the merchants in the sugar trade. It was only the stunning losses of Portuguese shipping between 1647-48 that finally cleared the way for the establishment of the fleet system organized by the Brazil Co. which in return for its provision of protection of the two annual fleets was given monopoly control over basic food imports to Brazil. As was to be expected, the price of imports rose in the colony, planters complained that sugar prices were set too low, and merchants from the smaller Portuguese ports complained of the new centralization of trade on Lisbon, the primary destination of the fleets. With the sailing of the first fleet in 1650, the age of private sugar trade and of the caravel's predominance came to an end³³.

Finally, it should be noted that the role of the sugar merchants was probably crucial in the financing of the industry's early stages if later patterns are a guide. We are particularly handicapped in establishing this fact since the notarial records from early Brazil are essentially lacking, but by the second half of the 17th Century merchants provided about twenty-five percent of the money at loan and may have provided an even higher percentage before the institutional lenders

³¹ M.A. FERNANDES MOREIRA [24], pp. 20-7.

³² See A.A. VIEIRA NASCIMENTO, '*Letras de risco*', e '*carregações*' no comércio colonial da Bahia, 1660-1730, Bahia, Centro de Estudos Bahianos, 1977, p. 78.

³³ The caravel was actually banned from the Brazil trade in 1648. See AHU, Codice 14, f. 146v. I provide a fuller description of the end of private trade and the role of the Brazil Company in, S.B. SCHWARTZ [12], p. 180.

such as religious orders, convents, and the charitable brotherhood of the Misericórdia had sufficient funds to do so. Merchants extended credit and carried standing accounts for sugar growers allowing them to buy slaves, tools, and equipment as an advance against their production. This availability of credit was an essential element in the early growth of the industry.

THE ART OF MAKING SUGAR IN BRAZIL

From this general survey of the Brazilian sugar economy let us narrow our focus to the specific realities of making sugar in that colony. The complex and difficult process of sugar making influenced in many ways the social organization and hierarchies of the colony as well as the particular solutions to the challenges of sugar production. Sugar making was an art, the result of a series of integrated processes: cultivation, milling, cooking, purging, and crating.

Each had its particular labor requirements and each was essential to the ultimate success of the *engenho*. These sugar mills were called «*engenhos*» (ingenious) it was said by antonomasia because they were a «spacious theater of human ingenuity», and «marvellous machines that require art and great expense»³⁴. With some regional variations, the *engenhos* of Brazil followed a similar method of operation with very few major changes until the late 18th Century. We can therefore use the pattern in Bahia as an example of the process, recognizing that there were slight regional differences within the general mode of operation.

In a spirit of festival, the harvest or *safra* began when the mills began to turn in late July or early August after the mill itself and the workers were blessed and the protection of the saints invoked³⁵. During the *safra*, the cane was cut during daylight hours but the mills began to operate at 4 p.m. and continued to about 10 a.m. the following morning, thus turning eighteen to twenty hours a day. The work went on in shifts. For the slaves, the rhythm of labor soon became exhausting. Their «service is an incredible thing», said Israel da Costa. «Sleepy as an *engenho* slave» was a common expression and «industrial accidents», were common. The evidence of this are the inventories of many *engenhos* which listed slave women with one arm. These were milling women (*moedeiras*) who had become tired or inattentive while feeding the *cana* in the mill and had lost their

³⁴ D. DE LORETO COUTO, «Desagravos do Brasil e glorias de Pernambuco», *Anais da Biblioteca Nacional do Rio de Janeiro* [ABNR], 24, 1902, p. 171.

³⁵ During the Dutch occupation of Pernambuco, the custom of the blessing of the mill and the workers by a priest at the beginning of the harvest was so entrenched that even Dutch mill owners allowed it to the consternation of the governing board of the Christian Reformed Church which objected to the presence of such «superstition», and to the fact that the *safra* usually began on a Sunday. See the «Atas da Classe», F.L. SCHALVIWIJK, «A Igreja Reformada no Brasil holandês», *RIAHGP*, 58, 1993, pp. 145-284, especially, 168, 72 and 78.

limbs as a result. Cuthbert Pudsey, an English observer who was in Brazil in the 17th Century wrote,

«If by occasion a Negar be laimed as they make no more account of them then beasts, then they put him to feed the mill or to rasp cassava roots on the wheel; they use their slaves very strictly in making them work unmeasurably, and the worse they use them the more useful they find them, such is their dispositions, as by experience they find kind usage perverts their manners»³⁶.

In Bahia, the *safra* lasted until the heavy winter rains in May made the *mas-sapé* impossible to traverse and began to lower the sucrose content in the cane. The *engenhos* operated over a period of 270-300 days a year although with stoppages for religious observance, repairs, and shortages of cane or firewood, that figure could be reduced by about one-third.

The Church required the *engenhos* to stop for Sundays and holy days, but many *senhores de engenho* tried to avoid these religious obligations which were responsible for about 3/4 of the lost days. In 1592, João Remirão testified before the Inquisition in Bahia

«That in his *engenho* on all Sundays and saint's days, the mill operated after sundown [...] which is the general use and custom in this captaincy among all the mill owners and managers without exception»³⁷.

The *senhores de engenho* argued that because the cane had to be milled in 24-48 hours after it had been cut, and because the juice extracted then had to be processed immediately, the mills could not stop without damaging the work of the days preceding and following those of religious observance. Such self-serving arguments were usually condemned by the Jesuits and the Church in general, but the repetition of complaints indicates that many *senhores de engenho* ignored the Church's directives³⁸.

³⁶ C. PUDSEY [1], vol. III, p. 31.

³⁷ ANTT, Inq. 10, 776. The original states: «*que no dito seu engenho sempre em todos os domingos e sanctos moendo seu engenho depois do sol posto [...] que usão e costuma geralmente nesta capitania a todos os senhores e feitores de engenho sem excepção*». A Jesuit mission to the Bahian Recôncavo in 1619 reported that the custom was to continue labor of the day prior to a Saint's day until mid-day of the Saint's day. The Jesuit's tried to stop the practice which «broke the commandments just to make an extra four *tarefas* of cane [a month]. See State Library. Truman State University, Vatican Film Library, Roll 159, Bras. 8 (1619). The account book of 1611-12 for Engenho Sergipe in Bahia records a payment of over 7,000 *réis* for «a sentence in the ecclesiastical court for the *engenho* to operate on holy days», indicating either a fine for past practice or an exemption purchased. See, ANTT, CSJ, maço 14, doc. 4.

³⁸ In inquisition investigations made in Bahia and Pernambuco in the 1590s, a number of planters were accused of not making their slaves work on Saturdays, a supposed sign of Jewish

The extended length of the *safrá* gave Brazil a considerable advantage over its Caribbean competitors whose harvest season lasted on an average of only 120-180 days. It also made sugar production in Brazil particularly well-suited to slavery since between the milling cycle and the planting period there was virtually no «dead time» and slaves could be employed in some aspect of sugar-making almost continually.

The key to the success of the harvest cycle actually lay in the preparation of the cane fields. Sugar cane took 14-18 months to mature after first planting and then usually 9-10 months thereafter to produce the second growth or ratoon. The *senhor de engenho* or the general overseer had to be able to regulate the planting and cutting of the cane so that each field belonging to the *engenho* and those cultivated by dependent cane farmers or *lavradores de cana* could be cut at the appropriate moment and so that there was never too much or too little cane at the mill. Cane not cut at the right moment produced less sugar, and once cut, the juice of the cane would dry or go sour rapidly if not processed. Thus the problem of regulating and managing the operation of field and factory demanded skill and experience. A good sugar master (*mestre de açúcar*) who could control and predict how the various activities would mesh and who by art and intelligence had mastered the ratios and volumes of the various parts of the process was essential for success. This job was usually well paid but even in the 16th Century there are references to mills where this position was already being filled by slaves as the mill owners sought to lower their costs.

In the fields, slaves planted the cane by hand. Plows were rarely employed in sugar cultivation in Brazil, probably because the *massapé* soils of Bahia and Pernambuco made their use difficult. Once the cane was planted, groups of slaves did the disagreeable job of weeding the cane at least three times. Then during the *safrá*, groups of 20-40 slaves cut the cane. They often worked in pairs, a man to cut the canes and a woman to bind them into sheaves. Each pair had a quota expressed in «hands» (*maos*). In the time of Antonil's report (c. 1689) the quota at Engenho Sergipe in Bahia was twelve canes in each sheaf, 10 sheaves in each «finger», 5 fingers in each «hand» (*mao*), and 7 «hands» or 4,200 *canas* as the daily quota. The cut cane was then taken to the *engenho* in ox carts or in small boats.

The mill or «*engenho*» (from whence the name of the whole estate was derived, the word «plantation» was never used), was powered either by water wheels or animal traction. Those that used water power, because of the costs of building a waterwheel, holding tanks, and an aqueduct or *levada* were more expensive to construct but had a greater productive capacity. Ambrósio Fernandes Brandão, author of the *Diálogos das grandezas do Brasil* (1618), estimated the cost of setting up an *engenho* at 10,000 cruzados (\$4,000) without counting the construc-

observance by the planters. See E. LIPINER, *Os judaizantes das capitánias de cima*, São Paulo, Ed. Barsiliense, 1969, p. 71.

tion of buildings or operating expenses for the first year. A so-called *engenho real* could produce 10,000 *arrobas* a year or even more, although few did so. Animal-powered mills sometimes called *trapiches* or *engenhocas* were usually turned by teams of oxen. They averaged 3-4,000 *arrobas* a year but were cheaper to build initially³⁹. It was estimated in 1639 that in Pernambuco a *trapiche* could process about 30 cart loads of cane and produce half a ton (25-37 *arrobas*) per day while an *engenho real* could mill 45 cartloads and produce a maximum of 1 ton per day (50-75 *arrobas*)⁴⁰. As already noted, the introduction of *engenhos* of three vertical rollers in the early 17th Century was quickly adapted throughout Brazil. The new construction was adapted to both water and animal power.

The juice squeezed from the cane was then passed through a series of kettles and teaches in the boiling house where through a process of clarification and evaporation the liquid was purified and the impurities skimmed off. The iron and copper kettles, called in a 1663 set of instructions to a *feitor-mor*, «the most important thing at the *engenho*», were a major item of expense and in constant need of repair⁴¹. There was no local copper available so its importation was vital to the industry's health⁴². This may explain to some extent the flurry of Portugal's diplomatic efforts to establish friendly trade with Sweden, a major copper source, after 1641. The process of clarification depended on the heat of large furnaces beneath the kettles. These «great open mouths» swallowed unlimited amounts of firewood. On Bahian *engenhos* the cost of firewood was usually about 20 percent of operating expenses. Until the introduction of the more fibrous *cana caiena* in the late 18th Century, Brazilian *engenhos* which processed the *cana crioula* rarely made use of *bagaço* (the hulks of the pressed cane) as a fuel and depended instead on the seemingly unlimited forest resources of the colony for fuel. The result was a destruction of large tracts of the Atlantic forest⁴³.

³⁹ G. SOARES DE SOUSA, *Tratado descritivo do Brasil em 1587*, São Paulo, Ed. Nacional, 1971 (4th ed.), notes a number of *engenhos* in Bahia that operated with two oxen driven mills (*moendas*), apparently an adjustment that permitted greater milling capacity without the necessity of building a waterwheel. Soares also mentions the existence in Bahia of an *engenho* with two waterwheels, but this is the only reference I have seen to such an arrangement. There is a drawing of a two *moenda trapiche* by the Dutch artist Frans Post who observed it in Pernambuco. For a more detailed discussion see R. GAMA, *Engenho e tecnologia*, São Paulo, Duas Cidades, 1979, pp. 149-50.

⁴⁰ A. VAN DER DUSSEN [18], pp. 93-6.

⁴¹ J.A. GONÇALVES DE MELLO, «Um regimento de feitor mor de *engenho* de 1663?», *Boletim do Instituto Joaquim Nabuco*, 2, 1953, pp. 80-7.

⁴² Hapsburg Spain prohibited the import of copper from nations at war with Spain, and in 1638 advised Portugal to do the same, ordering the Desembargo do Paço to discuss how copper could be obtained for Brazil's *engenhos*. ANTT, Desembargo do Paço, Liv. 18, f. 14. Miguel de Vasconcelos to Desembargo do Paço (10 feb. 1638).

⁴³ S. MILLER, *Fruitless Trees. Portuguese Conservation and Brazil's Colonial Timber*, Stanford, Stanford Univ. Press, 2000.

The work in the boiling house demanded considerable knowledge and skill. Under the direction of the *banqueiro*, the workers at each of the *caldeiras* moved the clarifying liquid through the kettles with large ladles until the purified and thickened fluid could be poured into large clay forms which were then placed in a separate building, the purging house (*casa de purgar*) where they were arranged in long rows. The crystallizing sugar in the forms was periodically covered with moistened clay. The water in the clay then percolated through the forms of crystallizing sugar, further draining impurities and producing a form in which white sugar predominated. The drainings from the forms were reprocessed to make lower grades of sugar and the molasses drained from the forms was distilled to make *cachaça*. Padre Antonil with an eye to both theology and profit pointed out that dirty mud turned the sugar white just as the mud of sins mixed with tears of repentance could cleanse our souls⁴⁴. Brazil's concentration on the production of this white, «clayed» sugar gave the colony a comparative advantage over its Caribbean competitors which tended to produce brownish *muscabado* sugars.

After four to six weeks the forms were emptied on a large platform (*balcão*) and under the sun, the white sugar separated from the brown *muscovado* and the lower grades under the direction of slave women, the so-called «mothers of the platform» *maes de balcão*. Depending of the quality of the sugar and the skill of the purgers, the ratio of white to brown was usually 2:1 or 3:1. Still, making sugar, said João Peixoto Viegas in his famous memorial, was like the act of procreation, one had to wait until the end of the process to see the result⁴⁵.

Brazil specialized in producing white sugar which was more highly valued than *muscovado* but which also tended to eliminate the need for further refining. Thus its metropole, Portugal, unlike Holland and England, did not develop a refining industry until the 18th Century⁴⁶. The Brazilian *engenhos* also produced lesser grades of sugar and from the molasses they made alcohol, or as it was called regionally *cachaça* or *geribita*. During difficult times, Brazilian *senhores de engenho* argued that they only met their expenses in the making of sugar and depended on the sale of *cachaça* for profit. Some regions like Rio de Janeiro came to specialize in the production of *geribita* which was used in the African slave trade, but in the 17th Century, the production of white sugar predominated in the colony.

Finally, under direction of the crater (*caixeiro*), the tithe was subtracted, and when necessary division was made between the *engenho* and *lavradores de cana*. The separated sugar was then packed in large wooden crates weighing in the 17th Century about 200-300 kgs (14-20 *arrobas*). These were then registered by the

⁴⁴ A.J. ANTONIL, *Cultura e opulencia do Brasil por suas drogas e minas* (2 vols.), Paris, Instituto de Hautes Etudes de Ameriques Latines, 1965 (ed. A. Mansura), vol. II, cap. 12.

⁴⁵ J. PEIXOTO VIEGAS, «Parecer e tratado feito sobre os excessivos impostos que cahirao sobre as lavouras do Brasil», *ABNR*, 20, 1898, pp. 213-23.

⁴⁶ Sugar refining in Portugal was prohibited in 1551 by a royal order which expressed concern for deforestation which might result. See F. MAURO [21].

crater, marked with the weight, quality, and sign of ownership and then transported by ox cart or boat to the main port.

From the foregoing description it is clear that the Brazilian sugar industry paralleled the other Atlantic sugar economies in its basic elements and structure. A Brazilian *engenho* needed a large labor force, some of it possessing considerable experience or skills. On the average *engenhos* in Bahia and Pernambuco had 60-70 slaves as part of the work force but also drew on the labor of the slaves of the dependent cane farmers so that the total effective number of workers per mill was about 100-120. Each mill also required adequate supplies of the raw material, sugar cane, large amounts of fuel, usually in the form of firewood, as well as food to feed the labor force, and a variety of materials and equipment. In this the Brazilian sugar industry reproduced the patterns established by its Atlantic and Caribbean predecessors.

THREE KEYS TO THE BRAZILIAN SUGAR ECONOMY

There are three key elements that determined the nature of the Brazilian sugar economy and its success and which gave it its peculiar contour and character. These elements, the structure of ownership, the supply of labor, and access to credit are all related to a lack of capital in the early stages of the industry which contributed to patterns of organization and practice that persisted in Brazil for centuries.

The first of these elements lay in the structure of production and ownership. Brazilian sugar mills were owned by the state, by institutions, or private individuals. In the earliest days of the industry a few mills had been built with royal funds as a means to encourage settlement and economic growth. As late as 1587, there was still a royal *engenho* in Bahia, in Pirajá close to the city, but it was leased to a private individual⁴⁷. By the later 16th Century, however, the crown had withdrawn from direct participation and preferred to stimulate the industry by granting lands and tax exemptions to private investors.

Some sugar mills were held by institutional owners. The most important of these being the Religious Orders particularly the Jesuits, Carmelites, and the Benedictines. The Jesuits, present in Brazil after 1549, were originally supported by royal subsidies and private bequests⁴⁸. Although at first reluctant to engage in plantation agriculture, especially that using slave labor, because of the possible dangers to their vows of poverty and Christian charity that such activities im-

⁴⁷ G. SOARES DE SOUSA [39], p. 146.

⁴⁸ D. ALDEN, «Sugar Planters by Necessity, Not Choice: The Role of the Jesuits in the Cane Sugar Industry of Colonial Brazil, 1601-1759», J.A. COLE (ed.), *The Church and Society in Latin America*, New Orleans, 1984, pp. 139-70, provides a detailed analysis of Jesuit sugar estates. See also S.B. SCHWARTZ [12], pp. 96-7 which differs in some details on productivity.

plied, the Jesuits found by the beginning of the 17th Century that agriculture and stockraising could provide an economic basis for their missionary and educational activities. In Bahia they began to develop two small mills in the first decade of the 17th Century, but a major breakthrough took place when the Jesuit College of Bahia and that of Santo Antão in Lisbon acquired by bequest Engenho Sergipe in Bahia and Engenho Santana in Ilhéus, both of which had belonged to Mem de Sá, a former governor of Brazil. Although the ownership of these estates was the cause of long litigation which pitted the two Jesuit colleges against each other as well as against other claimants, these mills, especially Engenho Sergipe, «Queen of the Recôncavo», were important assets. Later in the 17th Century both the Jesuit college of Olinda and that of Rio de Janeiro also acquired sugar estates⁴⁹.

Other religious orders also became involved in the sugar economy. The Franciscans, Carmelites and Benedictines in Bahia all cultivated sugar cane at various times and the Benedictines and Carmelites eventually had their own mills⁵⁰. The Benedictines, only established in Brazil after 1581, acquired cane fields in the Bahian Recôncavo when a cane farmer, Gonçalo Anes, took vows in that Order. Adding to that property by purchase, they eventually erected a mill, São Bento dos Lages, sometime prior to 1650. By the mid-17th Century, over 60 percent of the income of the Bahian Benedictines was derived from sugar. In Pernambuco, the Benedictines of Olinda owned Engenho Musurepe which was functioning from the second decade of the 17th Century while the Benedictines of Rio de Janeiro depended on Engenho Guaguaçu. While the records of these institutionally-owned estates have sometimes survived and thus provide the best documentation available on the colonial sugar economy, these mills were the exceptions in terms of ownership. Still, the Benedictines apparently knew how to manage their estates effectively (see below Table 2).

The vast majority of sugar mills were privately owned. Partnerships were not unknown and a few of the earliest mills were joint ventures in which a number of investors pooled their resources, but individual ownership was the most common form. Eventually, the ownership of more than one mill also became common, a situation caused to some extent by technological bottlenecks created by the limited capacity of the mills and the problems of transporting cane long distances. Thus the tendency to increase capacity by creating a new unit was common, resulting in individuals and families owning more than one mill. Although sugar mills provided the economic foundation for a number of aristocratic planter families who remained the social elite for centuries, more usual was a history of rapid turnover and volatility of ownership. One of the distinguishing features of the sugar economy was this insecurity and turnover, a sign of the difficulties of plantership. For those individuals and families that were successful, the local avenues of power and pres-

⁴⁹ The complex legal history of these estates is summarized in S.B. SCHWARTZ [12], pp. 488-97.

⁵⁰ S.B. SCHWARTZ, «The Plantations of St. Benedict: The Benedictine Sugar Mills in Colonial Brazil», *The Americas*, 39/1, 1982, pp. 1-22.

tige were fully in their hands. Prior to 1650 the municipal councils of Olinda, Salvador, and Rio de Janeiro as well as prestigious lay brotherhoods like those of the Misericórdia were dominated by the *senhores de engenho*. They came to see themselves as an aristocracy worthy of respect and deference despite the fact that the origins of most were not noble, and in fact, many were the descendants of New Christians⁵¹. In Bahia, for example, they constituted over twenty percent of the mill owners for those mills recorded between 1587 and 1592.

Those men (and some women) who had neither the capital or credit to set up a mill turned instead to the growing of sugar cane. From its beginnings of the Brazilian sugar industry had been characterized by the existence of cane farmers (*lavradores de cana*) who supplied cane to the *engenhos*. Even the original instructions for government or *regimento* carried by the first royal governor, Thomé de Sousa, in 1549 had recognized their existence and had sought to establish rules for their relationship with the *senhores de engenho*⁵².

It would appear that the Portuguese experience in the Atlantic islands, especially Madeira had been particularly important in establishing the utility of cane-farmers. Small-scale producers seem to have been part of the sugar industry there from the period of expansion after Diogo de Teive built the first *engenho* in 1452. In this regard, the *Livro do almoxarifado das partes de Funchal* (1494) is particularly important. It lists 221 *lavradores de cana* in the captaincy of Funchal but records only sixteen *engenhos*. Other sources indicate that Madeira had perhaps 80 *engenhos* at the time. Clearly, these figures suggest that many people who cultivated cane did not own an *engenho*. These *lavradores de cana* included a few *fidalgos*, but most were of artisan background or held some administrative position on the island. They included a few foreigners —Flemings and Genoese— but the vast majority were Portuguese. Thus, as Alberto Vieira demonstrates, the islands had numerous small and medium producers, men and women, many of whom were linked by blood or marriage to each other or to the owners of the *engenhos*. Traces of the existence of such cultivators also exist in the Canary islands where as early as 1508 the municipal council of Tenerife sought to regulate the relations between the owners of the sugar mills and cane growers. In Santo Domingo and Puerto Rico there is also some evidence of the early existence of cane farmers, but this class

⁵¹ On this point see for Bahia, S.B. SCHWARTZ [12], pp. 264-7; on Pernambuco, E. CABRAL DE MELLO, *A Fronda dos Mazombos. Nobres contra Mascates. Pernambuco 1666-1715*, São Paulo, Ed. Topbooks, 1995, pp. 128-30, and for Rio de Janeiro, J. FRAGOSO, «A nobreza da República: notas sobre a formação da primeira elite senhorial do Rio de Janeiro (séculos XVI e XVII)», *Topoi. Revista de História*, 1, 2000, pp. 45-122.

⁵² I have written extensively on the *lavradores de cana* in S.B. SCHWARTZ [12], especially pp. 295-312. See also my earlier article, S.B. SCHWARTZ, «Free Labor in a Slave Economy: The *lavradores de cana* of Colonial Bahia», D. ALDEN (ed.), *Colonial Roots of Modern Brazil*, Berkeley, California Univ. Press, 1973, pp. 147-97. An excellent and important study that takes up the theoretical implications of the *lavradores de cana* is V.L. AMARAL FERLINI, *Terra, trabalho e poder*, São Paulo, Ed. Brasiliense, 1988.

does not seem to have survived long in those colonies. In Brazil, however, they became a regular and essential aspect of the sugar economy whose existence had profound implications on the structure of the economy and the operation of slavery. Before 1650, *lavradores de cana* cultivated the largest portion of the sugar cane produced in Brazil⁵³. This was evidence of the diffusion of investment and risk which characterized the early Brazilian sugar industry.

The explanation for the existence and importance of cane farmers in Brazil is puzzling. Certainly, the tradition of small producers established in Madeira created a precedent as did long-standing Portuguese practice of rural contracts or *arroteias*, but the key in Brazil may have been the relative shortage of capital for *engenho* construction in the initial stages of colonization and the desire of the crown to stimulate settlement by presenting opportunities to potential colonists. In a way, the cane farmers are evidence of the shortage of capital in the formative stage of the colony. The crown's attention to their existence, and its demands that those who received land grants to build the first *engenhos* provide protection and benefits to dependent cane farmers, were a recognition of their importance to the project of colonization and to the establishment of the sugar industry. As early as 1548, the correspondence between the manager of Engenho São Jorge in São Vicente and the absentee owner noted the presence of cane farmers, but he also presented arguments why milling their cane was costly and perhaps unnecessary⁵⁴. This was a tension that remained in the Brazilian sugar economy into the 19th Century, but prior to 1650, the *lavradores de cana* were the most distinguishing feature of that economy.

While the term *lavrador* was used for any kind of farmer in Brazil, the *lavradores de cana* were, in fact, an agricultural elite, ranking just below the status of the *senhores de engenho* and often sharing many of the same social origins, features, and aspirations; but also because of the nature of their dependency, often in conflict with the mill owners. The nature of their relationship and their status depended on their tenure and access to land. *Lavradores de cana* who held their land by grant (*sesmaria*) or purchase were in effect small-scale landowners and were in the best position for bargaining with mill owners. Those with this so-called «free cane», usually divided the sugar produced from his or her cane, one-half to the mill and one-half to the *lavrador*, and they could negotiate other advantages such as the loan of oxen, help with the transport of cane, or preference in the schedule of the mill. A *lavrador de canas* with many *tarefas* of free cane was often treated with «much coddling» by the *senhores de engenho* who needed his cane. The majority of the *lavradores de cana* did not have this advantage.

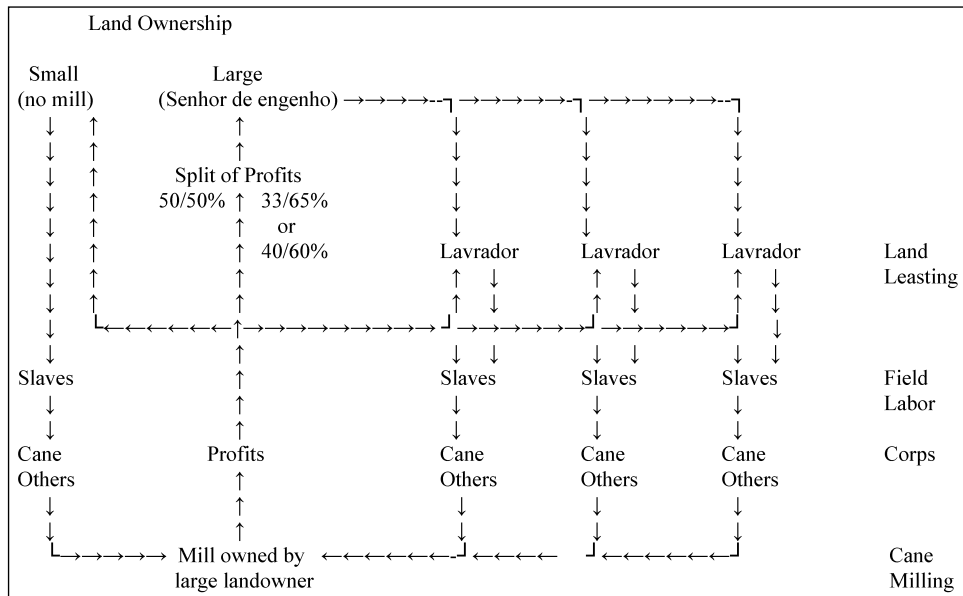
⁵³ *Ibidem.*, p. 171, believes that prior to 1650 *lavradores de cana* provided almost all the cane, but I believe this to be an error based on the atypical situation of Engenho Sergipe whose records served as a basis for her study and on a misreading of the 1639 inventory of A. VAN DER DUSSEN [18] which tended not to record the cane supplied by the *engenho* itself.

⁵⁴ See the text in E. STOLS [2], pp. 407-20.

They produced «captive cane» and held a *partido de cana* in which they rented land and then were required to bring it top the owners' *engenho* and had to pay 1/3 or 1/4 of their half of the sugar produced as a land rent. A *partido de terço* put great pressure on the *lavrador* but was preferred by the *engenhos*. In 1601, for example, the Conde de Linhares ordered the manager on his Bahian *engenho*, to rent cane lands to *lavradores* on the one-third arrangement⁵⁵. Usually, only *lavradores* with considerable resources in slaves and capital could accept the *partido de terço*. The diagram below presents the arrangements that characterized the relationship between mill owners and *lavradores* (see Figure 1).

Lavrador contracts varied over time depending on local custom and on the current state of the sugar economy. In the period of expansion in the late 16th and early 17th centuries, many people were willing to accept the burdens of the *terço* or *quarto* contracts but as the industry encountered difficulties the situation changed. By the close of the 17th Century contracts of 1/5 were common in Pernambuco and in Bahia contracts of 1/10 or even 1/20 were used.⁵⁶

FIGURE 1
Mill owner lavrador relations



Source: D. WATTS, *The West Indies: Patterns of Development and Enviromental Change since 1492*, Cambridge, Cambridge Univ. Press, 1987, p. 187.

⁵⁵ Countess of Linhares (23/3/1601), ANTT, CSJ, maço 13.

⁵⁶ A.J. ANTONIL [44], vol. 1, cap. 3.

The length of tenure of a *partido* varied, although terms of nine or eighteen years were common. Often *lavradores de cana* were required to provide firewood (*lenha*) for the processing of their cane and worst of all, at the end of the tenure, all improvements made to the land became the property of the *engenho*. Moreover, sales of land with obligations to provide cane to a particular *engenho* were often the cause of legal battles when after a series of subsequent sales or transfers, the *engenho* sought to insist upon the original obligations. These arrangements and disadvantages contributed to the instability of the *lavradores de cana* as a class. Over a period of 18 *safras* (1622-50) at Engenho Sergipe in Bahia, 128 individuals appeared as *lavradores* but only 41 percent (53) appeared in more than one *safra* and only 19 percent (24) appeared in more than five⁵⁷. When *lavradores* were forced to surrender the lands that they had worked and improved for years they often objected and resisted either physically or in the courts. Finally, there were also other forms of the rental of cane lands, usually in multiples of nine years, with various forms of obligation or payment attached to them.

The relationship between *senhores de engenho* and *lavradores de cana* was complex because of their need for each other as well as the conflict inherent in their relationship. An *engenho* might have as many as thirty *lavradores* supplying cane in a single harvest but the average number of *lavradores de cana* per *engenho* in the Brazilian northeast was probably three to four. In Pernambuco there were 250 *lavradores* supplying cane to about 166 mills in 1639. This situation allowed many people relatively easy entry into the sugar economy, often with the hope of social mobility. Startup costs for a *lavrador de canas* were about one-third of those for a mill owner. From the viewpoint of the *senhores de engenho* the existence of *lavradores de cana* was a way of sharing the risks and financial burdens of sugar production. In Bahia, about 1/3 of the slaves employed in sugar production were owned by the *lavradores de cana* rather than by the *engenhos*. *Senhores* wanted and needed *lavradores* but feared that when *lavradores* acquired their own lands they would be able to negotiate better arrangements for milling their cane or they would build their own *engenhos* and thus create competition for cane and firewood. One strategy was then to sell land to *lavradores*, but with restrictions forcing the buyer to provide his cane to the *engenho* of the seller in perpetuity or to pay other penalties if cane was brought elsewhere. *Lavradores* responded with their own strategies, often illegally bringing «captive cane» to other *engenhos*, especially during poor years when the demand for cane was high and many people could not meet their obligations.

This situation finally created a crisis in Bahia in the 1660s when Bernardino Vieira Ravasco, brother of the famous Jesuit Padre Antônio Vieira, a *senhor de engenho* and Secretary of the State of Brazil, led a movement within the municí-

⁵⁷ M. BUESCU, *História econômica do Brasil: pesquisas e análises*, Rio de Janeiro, APEC, 1970, pp. 110-2.

pal council of Salvador to limit the construction of new *engenhos*. He argued that competition had placed the *senhores* at the whim of the *lavradores* who now driven by «vanity or deceived by greed» sought to build new *engenhos* thereby ruining themselves and others. This suggestion met serious competition from many *senhores de engenho* who argued that if the hopes that *lavradores* had of becoming *senhores de engenho* were eliminated, then none would be willing to serve as *lavradores de cana*. Eventually in Bahia in 1681 and 1684 the crown issued laws that limited construction of new *engenhos* to within 1,500 *braças* (about two miles) from existing ones. The effect of this was to stimulate the opening of new sugar areas further from the coast. Similar laws were issued for other captaincies. While *senhores de engenho* disliked the potential competition of new *engenhos* and the comparative advantage that *lavradores de cana* had when many *senhores* competed for their cane, they also realized that without the hope of social mobility that few people would accept the burdens of growing sugar cane. The *lavradores de cana* were a permanent aspect of the Brazilian sugar economy and in its early stages a measure of its economic status.

The *lavradores de cana* thus worked under a variety of arrangements and varied considerably in terms of their wealth and social status. It is difficult to estimate the average size of a *partido de cana*. At Engenho Sergipe, the majority seemed to hold under six hectares of land, about half of it devoted to cane, but land sales indicate that larger parcels between thirty and two hundred hectares were also purchased. We have no good quantitative source on the holdings of *lavradores* in the 17th Century but a *partido* of a few hectares and perhaps five or six slaves was probably common⁵⁸.

These variations in wealth and capital indicate the range of *lavrador* social positions. Counted among *lavradores de cana* were some of the most prestigious individuals in the colony, many of whom were related by blood or marriage to the *senhores de engenho*. The religious orders, at times cultivated cane and provided it to *engenhos*. Individual clerics also were *lavradores de cana* and some like one priest in Pernambuco in 1639 with sixty *tarefas* of cane operated on a large-scale. There were also a good number of women, often widows, who participated in the sugar economy. Noticeable, however, until the late 18th Century was the fact that *lavradores de cana* were almost invariably white. Free Blacks and mulattos simply did not have the credit or capital to take on the burdens of this agriculture. Their absence underlines the relatively high social status of the *lavradores de cana* as potential planters. It was a status that few of them actually achieved, but the promise was always an attraction.

⁵⁸ A calculation for Bahia in 1817 indicates the average cane farm size at between five and ten hectares. While some *lavradores de cana* actually had no slaves and a few had over forty, the average for the 478 *lavradores* listed in that year was about ten or eleven slaves, although almost 60 percent of them held fewer than ten slaves and 25 percent held fewer than five. See S.B. SCHWARTZ [12], pp. 451-5.

Overall, the *lavradores de cana* and *senhores de engenho* were united by interest and by their dependence on the international market. Together they formed the «nerves of the body politik» in the words of Wenceslão Pereira da Silva in 1738. Antonil admonished *senhores* to treat their *lavradores* well and one administrator at Engenho Sergipe reported in 1623 that he had to treat the *lavradores* carefully because «in this land everything is respect and courtesies»⁵⁹. But many *senhores* abused their power. In last analysis, each side needed the other. The *lavradores de cana* were in many ways proto-planters, owning oxen, slaves, and sometimes land. They were often drawn from the same social strata as the great planters, and shared many of the same attitudes. They cooperated in conflicts with the merchants and in seeking a moratorium on their debts, a general concession that was achieved in Bahia in 1663 in a law that prohibited foreclosure of an *engenho* for debts less than its total value was extended to Bahian *lavradores de cana* in 1720 and to other captaincies thereafter.

The second characteristic of the early Brazilian sugar industry was its relatively long dependence on an indigenous labor force and its gradual shift to Africans. For the first seventy years or so, the industry depended on indigenous workers. This too, suggests the lack of capital or credit to finance the more expensive importation of African workers as slaves. African and Afro-Brazilian slaves eventually predominated in the sugar economy, but the process by which that happened took place over a long period of over half a century⁶⁰.

The transition from Indians to Africans as laborers was a key element in the expansion of the Brazilian sugar economy at the end of the 16th Century. With the demands of sugar agriculture growing by the 1560s, Indian labor could no longer be obtained by barter as it had been done when the principal Portuguese activity had been the gathering of brazilwood. Indians refused to work for wages or sometimes demanded goods like firearms which Portuguese were reluctant to supply. Moreover, for many groups like the Tupinambá, agriculture was considered the work of women, and men refused to do it. Portuguese attempts to acquire native workers by ransoming war captives and then holding them as temporary slaves was increasingly opposed by the Jesuits who claimed that Indians in Jesuit-run villages could provide labor to the *engenhos* more efficiently and with fewer abuses. By 1600, they claimed to have 50,000 Indians under their control and available to both the crown and the colonists. The Jesuits claimed to be able to provide 400-500 workers a month to the settlers for a salary of 400 *réis* per

⁵⁹ ANTT, CSJ, maço 70, num. 87.

⁶⁰ I have detailed this process in S.B. SCHWARTZ, «Indian Labor and New World Plantations: European Demands and Indian Responses in Northeastern Brazil», *American Historical Review*, 83/3, 1978, pp. 43-79; and in a comparative context with Russell Menard in R.R. MENARD and S. B. SCHWARTZ, «Why African Slavery? Labor Force Transitions in Brazil, Mexico, and the Carolina Lowcountry», W. BINDER (ed), *Slavery in the Americas*, Würzburg, Königshausen & Neumann, 1993, pp. 89-114. See also, J. MONTEIRO, *Negros da terra*, São Paulo, Editora da UNESP, 1994.

worker which usually went unpaid⁶¹. Colonists and Jesuits disputed control of Indian labor after the 1550s and the policies of both were disruptive of Indian life⁶². Meanwhile, the crown increasingly legislated against the enslavement of Indians with laws in 1570, 1595, and 1609. During this period, nevertheless Indians, both enslaved and free were the primary labor force in the sugar economy and they remained so until the first decades of the 17th Century.

Demography was also a major factor in the transition. The Indian population was decimated by diseases, first smallpox and then measles, between 1559 and 1563. Thousands died, whole villages were abandoned, many fled to the interior, spreading the disease. The Portuguese responded by sending new columns into the backlands to bring in more workers, and by moving groups from one captaincy to another, but such policies were costly as were the military operations needed to confront the Indian resistance they provoked. The susceptibility of Indians to disease made sugar planters reluctant invest in acquiring more Indians or in training them in the technical aspects of sugar-making.

The transition from a labor force of Indians to one predominately of Africans took place slowly over a period of about half a century. African slaves had been sought as early as the 1540s but by the 1560s there were still very few. Many of the first Africans brought seem to have been *oficiais*, that is skilled workers and some undoubtedly had already labored on *engenhos* in Madeira or São Thomé. At Engenho São Jorge in 1548, there were only seven or eight Africans but they served as sugar master, purger, and kettlemen. By 1580, Pernambuco's sugar labor force was still about 2/3 Indian, but the transition was under way. Africans were more expensive to obtain, but given the rising cost of acquiring Indians, their susceptibility to disease, their ability to runaway, and Portuguese perceptions that Africans were better and stronger workers, Africans were increasingly sought. In 1572, at Engenho Sergipe in Bahia, an African worker was valued at \$25,000 while an Indian with similar skills averaged only \$9,000. The records of Engenho Sergipe allow us to trace the transition. In 1574 only seven percent of its work force was African but by 1591 over 37 percent, and by 1638 it was totally African or Afro-Brazilian⁶³. Africans cost more to obtain but in the long-run

⁶¹ B. CORDEIRO, «Emformacao dalgumas cousas do Brasil, por Belchior Cordeiro, 1577», *Anais da Academia Portuguesa da Historia*, 2/15, 1965, p. 77.

⁶² D. ALDEN, *The Making of an Enterprise: the Society of Jesus in Portugal, Its Empire and Beyond, 1550-1750*, Berkeley, California Univ. Press, 1996, seeks to defend the Jesuit activities and excoriate «modern» critics for imposing the 20th Century standards of anthropologists and other «radicals» on these 16th Century men. But even the Jesuits themselves sometimes complained that Indians fled their villages to live with the colonists, preferring apparently their physical demands to the cultural and social pressures exerted by the missionaries.

⁶³ S.B. SCHWARTZ, *Segredos Internos. Engenhos e Escravos na Sociedad Colonial*, São Paulo, Companhia das Letras, 1988, pp. 67-73. The pace differed in other captaincies. On the Benedictine Engenho Guaguaçu in Rio de Janeiro, in 1652 there were twenty-five Indians among the eigh-

they proved to be a more profitable investment. The African skilled workers at Engenho São Jorge, for example, had eliminated the need to hire salaried employees. Indian labor had allowed the early industry to grow rapidly with relatively low labor costs and when its price began to rise to a point that made Africans a feasible replacement, a transition was made.

The transition from a Native American labor force to one composed primarily of Africans and their descendants was paralleled by a second transition from mostly free, white skilled workers to sugar-making specialists and artisans who were either slaves or free people of color⁶⁴. In the early stages of the sugar industry in Brazil often as many as twenty whites had worked for an annual salary or provided services for wages. Sugar masters, kettlemen, overseers, blacksmiths, carpenters, boatbuilders, stonemasons all were needed. Workers were paid differentially according not only to their skill but to their ethnicity as well; whites always being paid more generously than blacks or mulattos, and Indians paid least of all for performing the same tasks. Salaries for such workers constituted one of the largest category of expenses for an estate. Given the lack of specie, some mills only settled accounts with their salaried employees every two or three years as a way of dealing with this problem, but over time, a general tendency emerged to replace these white artisans with either slaves or former slaves who had gained their freedom, and for whom such occupations provided a means of social mobility. Access to these positions served as an incentive to *engenho* slaves. Planters favored mulattos and native-born blacks (*crioulos*) with these positions. From the planters' point of view, the replacement of free white workers with slaves or by freedmen who could be paid less than whites was another way of facing the costs of plantership. We have little direct evidence on this transition. The letter of 1548 from the Administrator of Engenho São Jorge in São Vicente to the absentee owner pointed with pride that the *engenho* was now saving \$30,000 a year by using an African as sugar master since that was the amount usually paid to a master brought from Madeira.⁶⁵ The records of Engenho Sergipe in Bahia are also suggestive of the process. Whereas early accounts had usually identified employees by their color or ethnicity when there was a multi-ethnic work force made up of whites, Native Americans and Africans and Afro Brazilians, by 1670 racial distinctions had all but disappeared in the account books because the vast majority of workers were now either Black or mulatto, and thus making such distinctions no longer served much of a purpose. This shift to an Afro-Brazilian skilled labor component was a result of the intensification of the Atlantic slave trade and the demographic shifts it generated which created an opportunity for planters to reduce their operating

ty-three adult slaves and by 1657 there were only fourteen of the eighty-six adults. See S.B. SCHWARTZ [50], p. 12.

⁶⁴ I have treated this question in some detail in S.B. SCHWARTZ [12], pp. 313-37.

⁶⁵ E. STOLS [2], p. 418.

expenses by turning to a growing Brazilian population of mixed origin. A century or so later planters would complain of that the ignorance of these skilled workers was the cause of the sugar industry's inability to compete, but in the 17th Century, planters saw the use of these workers as a necessary and quite positive response to the costs of plantership.

Finally, the access to capital and credit and the level of profitability were key factors in the success of the sugar economy. How did this industry grow in its early stages and what was the effect of this growth as Brazil became the world's leading supplier of sugar? In 1618, the New Christian, Ambrosio Fernandes Brandão argued that many Portuguese who had made a fortune in India returned to Portugal to spend it and live the good life, but rarely did someone who had become wealthy in Brazil return to the home country. The reason was that the wealth of Brazil was in realty and thus not so moveable. Despite occasional observations about the opulent life style of the great planters, many of them lived rather simply, sinking their fortunes into the building of their estates. Planters were always complaining of their indebtedness and the costs of plantership, but clearly considerable wealth was created at least in the first seventy years of the industry's growth. Calculating that wealth, however, remains a difficult task.

The issue is complicated by a lack of documentation for the period in question and by accounting practices that mixed capital-stock expenditures with current expenses⁶⁶. Planters simply calculated annual income against expenses to know how they were doing. This often gave them a false impression of their economic status. Then too, Brazil and its metropolis, Portugal, were chronically lacking money in circulation, especially in the period prior to 1580. This led to practices such as the exchange of goods for services or for other commodities, payments over time and a dependence on complex credit arrangements. The manager of Engenho São Jorge put it clearly in 1548:

«For here there is no circulation of money and one must by force give things on credit for a year and before being paid wait for two years. In this way, anyone who has an *engenho* here pays all his workers in goods [...].»

This situation changed somewhat between 1580 and 1620 when the Portuguese in Brazil got access to Peruvian silver by contraband through Buenos Aires which in 1605 the crown estimated to be as much as 500,000 cruzados in coin and bar a

⁶⁶ For example Father Estevão Pereira in his famous accounting of Engenho Sergipe has the following entry that demonstrates the confusion of capital stock replacement and current expenses: «Every year more or less it is necessary to replace at least five slaves for those that die and they cost at the minimum \$35,000 each \$175,000,000. Other than the manioc flour that the *engenho* receives as rent which is all given to the slaves, another at least 200 *alqueires* are needed which usually cost at least 200 *reis* each \$40,000. See «Dase razão da fazenda que o Colégio de Santo Antao tem no Brasil», in A.J. ANTONIL [44].

year⁶⁷. But this door was closed after 1621 and the previous conditions of shortage returned. In general the lack of circulating specie thereafter was seen by the planters as a major cause of their continual indebtedness and it complicates any attempt to calculate the creation and distribution of assets. Thus for the first half century of the sugar industry we must depend on occasional observations, a few contemporaneous estimates, and comparison by inference with latter patterns⁶⁸.

In the beginning years of the industry while some capital came from noble or foreign merchant investors or the state, many of the mills were set up depending on credit extended by merchants in the sugar trade. In this period, land was often acquired by grant and labor by the capture of Indians which kept down the original fixed capital costs and provided a kickstart to the formation of capital. Still, buildings and machinery had to be constructed, kettles and sugar forms had to be bought or made, livestock acquired, boats and ox-carts to move the cane built, and cane lands prepared or contracted. One source of capital for the sugar industry seems to have been governmental offices. The recent studies of João Fragoso for the development of the sugar economy of Rio de Janeiro reveal that the majority of Rio's sugar planter families established before 1620 had held administrative offices which had apparently been used to open doors for the accumulation of wealth or the gaining of other advantages that had then made plantership possible⁶⁹. Succeeding generations owned sugar mills and commonly held posts in the municipal council of Rio de Janeiro, thereby continuing the union of office and fortune. Royal office, the holding of tax contracts, and municipal office all generated capital that was invested in the sugar industry. Similar patterns seem to have existed in Bahia and Pernambuco.

Those wishing to enter the business of sugar-making usually found specie to be scarce, and thus credit was essential to begin operations for both planters and cane farmers—the latter sometimes depending on the former for access to it. If later patterns can be used as a model, many plantations were set up with an outlay of only about one-third of the necessary capital, the rest being supplied by credit. This allowed people of relatively modest means to aspire to the status of *senhor de engenho* and it meant that their returns were considerably higher than those implied by the ratio of capital to annual income.

Credit was obtained from a variety of sources, the charitable brotherhoods (*misericórdias*), convents, and other religious institutions were the major sources loaning money on easy terms of about 6.25 percent to low risk or high profile

⁶⁷ King to Viceroy, Dom Pedro de Castilho (26 Nov. 1605), Biblioteca da Ajuda (BA), 51-VII-8, f. 220-220v. On the illegal and contraband trade through Buenos Aires see L. FERAND DE ALMEIDA, *A diplomacia Portuguesa*, Coimbra, Universidade de Coimbra, 1957, pp. 78-80 and 303-6.

⁶⁸ An excellent review of the problem of credit is Jacob PRICE, «Credit in the Slave Trade and Plantations Economies», B. SOLOW (ed.), *Slavery and the Rise of the Atlantic System*, Cambridge, Cambridge Univ. Press, 1991, pp. 293-339.

⁶⁹ J. FRAGOSO [51], pp. 45-122.

borrowers. These loans were often very long term. Less advantaged borrowers contracted loans at much higher effective rates from merchants who found ways to avoid the limitations on usury. Many *senhores* established an *engenho* depending primarily on credit, but this often led to later conflicts with merchants over foreclosure for debt. The lack of notarial records for this period from Pernambuco or Bahia are a serious impediment to determine the nature of credit arrangements. What is noticeable is that the Amsterdam notarial registers where many transactions involving New Christian investors linked to the Brazil trade and to the Portuguese imperial economy appear reveal virtually no evidence of direct investment in the production of sugar⁷⁰. It would appear that credit was being extended for the most part by local merchants and correspondents in the colony rather than from the European sources.

During the rapid growth of the industry after 1570 a number of observers spoke of the wealth and opulence of the sugar planters, their taste for lavish hospitality, high living and the symbols of a noble life style. In Antonil's often-cited expression, to be a *senhor de engenho* in Brazil was equivalent to having a title among the nobility of Portugal. But prestige was not the same as wealth. Despite a taste for luxury, planter returns on capital do not seem to have been as extraordinarily high as have been projected by some modern estimates which have overestimated output and underestimated costs⁷¹. Labor was an essential element of these expenses both as a fixed cost in the form of the purchase, replacement, feeding, and care of slaves, perhaps about 25 percent of yearly expenditures, but also in the form of the salaries paid to sugar making specialists, artisans, and occasional workers, or about 20-30 percent of annual costs. As we have seen, this was one area where sugar planters sought to cut expenses.

In the early 17th Century, an *engenho* could be set up for 8-10,000 cruzados. (\$3,600) By the end of the century the average value of a Bahian *engenho* was about 15,000 not counting the slaves, and perhaps 18-20,000 *cruzados* with them. Capital was distributed among various assets, (buildings, equipment, livestock, etc.) with land consistently the most valuable one, usually constituting half the *engenho's* total value. The slave force was usually around twenty percent of the capital value. During this period, a return of \$2,000 to \$3,000 on an *engenho*

⁷⁰ See E.M. KOEN *et. al.*, «Notarial Records in Amsterdam relating to the Portuguese Jews in that Town up to 1639», *Studia Rosenthaliana*, serially from 1967-1979. See J. BOYAJIAN, «New Christians and Jews in the in the Sugar Trade, 1550-1750: Two centuries of Development in the Atlantic Economy», and E. PIJNING, «New Cristians as Sugar Cultivators and Traders in the Portuguese Atlantic, 1450-1800», P. BEDRNARDINI and N. FIERING (eds.), *The Jews and the Expansion of Europe to the West, 1450-1800*, New York, Berghan Books, 2001, pp. 471-84 and 485-500.

⁷¹ C. FURTADO, *The Economic Growth of Brazil*, Berkeley, California Univ. Press, 1965, for example, estimated production at 2,000,000 *arrobas* for 1600 and believed that returns of eighty percent on invested capital could be obtained in a good year with very low expenditures for salaries and other expenses.

worth \$20,000, or a return of ten to fifteen percent was considered very good and not always achieved. The Jesuit Engenho Sergipe do Conde in Bahia, one of the few *engenhos* for which we have account books, ran at a deficit for many years in the 17th Century, a fact that has long confused historians. But its problems seem to have been the result of mismanagement and accounting procedures which took no notice of capital investments and counted them as operating expenses, and it may have been a special case⁷². In the same period, the Engenho São Bento dos Lajes of the Benedictine Fathers in Bahia produced excellent earnings in the mid-17th Century as did the Benedictine *engenhos* in Pernambuco (see Table 2).

Throughout the 17th Century period an annual return on capital of between five and ten percent for the industry as a whole was probably common, although in periods of expansion higher rates were possible. *Lavradores de cana* faced even more difficult odds. We have Father Estevão Pereira's estimate of 1635 that the «partidos» or dependent cane fields of the *lavradores de cana* supplying Engenho Sergipe were valued at \$16,000. It was calculated that these lands produced 500 *arrobas* of whites and 250 *arrobas* of *muscavado* which at 800 and 360 *réis* respectively would generate a return of \$490,000 or about a 3 percent return on capital. Surely others did better than this and some *lavradores* eventually built their own mills, but the opportunities for quick fortunes seem limited.

TABLE 2
Profitability of engenho São Bento dos Lajes, 1565-1714 (values in mMilréis)

YEARS	EXPENSES	EARNINGS	PROFIT	ANNUAL	AVERAGE
1652-1656	87	16,018	44,239	28,221	7,055
1657-1660	113	7,152	20,020	12,868	4,289
1662-1667	115	6,632	14,076	7,444	1,861
1700-1703	117	4,140	14,356	10,256	3,405
1711-1714	—	3,881	15,326	11,445	3,851

Source: «Estados do Mosteiro de São Bento da Bahia», Arquivo da Universidade do Minho, Congregação de São Bento, 136.

⁷² S.B. SCHWARTZ [12], pp. 229-34 devotes considerable attention to the problem of Engenho Sergipe's accounts. This was also the subject of an earlier study by Frédéric MAURO, «Contabilidade teórica e contabilidade prática na América portuguesa no século XVII», *Nova história e novo mundo*, São Paulo, Ed. Perspectiva, 1969, pp. 135-48. Mauro and others made much use of the famous «Dase rezaon», written in 1635 by The Jesuit Estevão Pereira who managed Engenho Sergipe. This document was written as a self-defense after he had been accused of mismanagement by his Order and while valuable, must be used with caution. D. ALDEN [62], p. 419, tries to come to Pereira's defense, but Pereira's own Jesuit colleagues held him responsible for losses during his administration of the estate, and while never formally charged, his career in the order does not seem to have progressed thereafter.

Still, cash flow may not be the best way to evaluate the business of sugar-making. Much of the industry's early gains may have been in the form of capital creation as the value of assets grew more quickly than did income which suggests a high rate of savings. We should remember that many of the first *engenhos* in the previous century acquired lands by Sesmaria and Indian workers by capture at relatively little monetary cost, so that capital value grew rapidly. The clearing of land, the building of chapels, houses, and buildings, the construction of aqueducts and waterwheels all increased capital value and represented the building of personal wealth. This in turn created assets which allowed for an expansion of credit. Here the importance of familial and other personal ties so common in Early Modern commerce also played a role and explains the active participation of the New Christians in all aspects of the industry in ways which linked merchants to planters, managers, and artisans.

For the industry as a whole, the period between 1560 and 1620 probably witnessed the greatest gains in wealth with a considerable slowdown thereafter as sugar prices declined and costs increased as a result. The foundational generation of planters had acquired much of their land by grant and their labor by capture or as unpaid or modestly paid workers from the Jesuits. Their expenditures had been reduced by this process and their gains increased by it. By 1620 or so the best lands close to the littoral had been occupied so that new expansion had to be made on lands further from the coast where transportation costs would be higher. Sesmarias became less common and new lands were increasingly acquired by purchase. Royal measures to eliminate Indian slavery and Jesuit opposition to it made the acquisition of indigenous laborers more difficult and more expensive and only the introduction of the three-roller mill kept the process of expansion moving forward, although now at a slower pace. With the crisis of 1623 and the subsequent fall of sugar prices in the Atlantic market, and then with the Dutch invasion of 1630 and the disruption it caused, including the rising level of slave resistance and escape, the Brazilian sugar industry moved into a new stage of stability and slow expansion in which the exigencies of war and politics played a role more important than the benefit and blessings of climate and rainfall. By the time that the new Caribbean competitors in Barbados, Suriname, Jamaica, and Martinique were challenging Brazil's predominant position, the sugar industry was already experiencing considerable difficulties created by the internal organization of the industry and the social organization and strains it had created. Sugar remained the single most valuable agricultural commodity of Brazil until the middle of the 19th Century, and sugar planting remained a difficult, and sometimes profitable business through the 18th Century. But the heady days of the late Sixteenth and early 17th Century never returned in quite the same way, although the hope and memory of them lingered on in the minds of those who could aspire to the title *senhor de engenho* and to the wealth, power, and authority it had come to represent.

This article studies the basic characteristics of the Brazilian sugar economy between 1560 and 1660, when it became the main sugar producer in the Atlantic world. Firstly, it analyzes the conditions that made possible the position held by Brazil in the context of a Euro-American trade system. Secondly, it studies the local conditions in which it developed, and the challenges posed by three factors: land, work and capital, all of which furnished the early Brazilian sugar industry with the characteristics that have made it peculiar. Finally, the article studies the quick expansion it underwent up to 1620, and the reasons of its stagnation even before the appearance after 1650 of new competitors in the Caribbean.

KEY WORDS: *Brazil, Portugal, Holland, 16^h-17th Centuries, sugar, market, production factors.*
