The Integration of the World Coffee Market , 1450-1930

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The integration of international markets, which today seems so omnipresent and natural, required what Karl Polyani termed: "the Great Transformation." The creation of a global shopping mart demanded the movement from use value to exchange value, or, in other terms, the creation of commodities. There has been a substantial debate on the extent to which this change has been occasioned by changes in production processes (the creation of surplus), demand induced by changing consumption patterns, or caused by commercial intermediaries.[1] This relates to different ways in which "integration" can be viewed as well as different perspectives on the notion of "the law of one price."[2] On the one hand, one can study the extent to which prices for similar goods were at similar

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[1]Marx, though stressing the labor theory of value, accentuated the domestic force of the market in creating exchange value in the beginning of *Capital*. This has been extended by Arjun Appadurai ed. *The Social Life of Things* (NY: Cambridge University Press, 1986). Polyani as well as dependency theorists such as Paul Baran, Andre Gunder Frank, Samir Amin, see commodities as imposed by the world economy, particularly in peripheral countries. For many students of imperialism or dependency, the "logic of capital" more than any commodity-specific needs explained the evolving structure of the world economy. Recent work by Wallerstein, Gereffi, and Hopkins in *Commodity Chains and Global Capitalism* edited by G. Gereffi and M. Korzeniewicz (Westport CT: Praeger, 1994) recognizes the commodity-specific nature of its international integration and seems to argue that the impetus for integration can come from any one of the "nodes" of the chain. Modernizationists such as Walt Rostow and other development economists see the change coming from within the developing countries, through a "natural" process of following stages of development though the impetus can come according to Nurske and others from external demand. Douglass North emphasises institutional arrangements and lowered transaction costs, citing intermediation as much as production and consumption. Staples theorists such as Harold Innis and Melville Watkins as well as Albert Hirschman do emphasize the specific possibilities inherent in specific commodities.

[2]This is conceptualized by A.J.H. Latham and Larry Neal in "The International Market in Rice and Wheat, 1868-1914_" in *The Emergence of a World Economy 1500-1914*, vol.1 ed. by W. Fischer, R.M. McInnis and J. Schneider, Stuttgart: Franz Steiner Vergal, 1986), p.266 as "the prices in two markets for the same good... are separated by a constant amount but

levels and fluctuated similarly internationally. Here the price to the consumer is the measure. A second way to gauge this question is to compare prices to producers to determine to what extent they seem to be facing similar market forces: how fluidly and rapidly are international prices translated to the local level to affect local production decisions? Another way to conceptualize this issue is to ask how great are the shock-absorbers between consumers and producers, or, in other language, to what extent does the international market articulate heterogeneous modes of production? A third issue, that may appear only a technical subsidiary of the first two, but is in fact central, is the creation of international standards and grades. How homogeneous is the commodity and how uniform internationally are the definitions? This paper will address these issues by focusing on one of the oldest and most valuable commodities of the world market: coffee. The object of my paper is to analyze the transformation from Arab monopoly to European colonial product to the sustenance of Latin American national states, to finally a globally produced multinational commodity by asking the following questions: 1) What was the relative importance of changing patterns of demand and production in transforming the market or, to put it another way, what were the relative roles of culture and technology in driving change? 2) What were the relative roles of private and public actors in creating the market? 3) What forces drove standardization, grading, and other market conventions?4) To what extent was the international coffee a true market in which price was determined by supply and demand?

Coffee has been one of the world's most valuable internationally traded commodities for several centuries. One of the few commodities that was already important under Early Modern luxury long distance trade, it continues today as a key trade good. But one should not reify the "coffee market." Rather than a continuous, homogeneous institution, the international mart has been marked by radical disjunctures and essential transformations. Coffee continues to enjoy great international importance because the nature of its appeal to consumers has shifted to conform to remarkable changes in the societies of the dominant buyers over the last four centuries. The "social life" of coffee, its meaning to producers and consumers changed also. Over time coffee consumption became increasingly segmented, balancing between a luxury and a necessity. Production has also markedly shifted geographically from the Middle East to Asia to Latin America and now increasingly Africa. Clearly, the nature of the international coffee market has changed dramatically over the centuries. So has control of that market which moved away from the producer to the exporter in the eighteenth century, then in the nineteenth century to the importer, and in our century the roaster, government institutions, and finally today a few vertically integrated multinational firms. To simply speak of "the market" or "market forces" is to ignore the evolving nature of that market. But the central fact continues to be that over 90 percent of all coffee is exported by poor tropical countries and a similar percentage is imported by rich, temperate countries.

The Beginning

Coffee only entered into human history once Yemeni Sufis began creating a drink. Although native to what is today Ethiopia and Central Africa, it was apparently only consumed there as an energy pill embedded in balls of fat used on long hunting trips. The Abyssinians did not drink it in any appreciable amount until the twentieth century, though Muslims introduced the beverage into Harrar probably before the nineteenth century. Clearly the ability to produce coffee was not the key to transforming it into a commodity. Arabica coffee continued to grow wild in Abyssinia, (liberica in Liberia and robusta in the Congo) but with a small market economy (salt served as money) and great hostility to neighboring Muslims who became associated with the drink, Abyssinians neither picked nor drank many berries.[3]

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otherwise move together."

[3] Father Jerome Lobo, *A Voyage to Abyssinia* trans. by Samuel Johnson (London: Eliot & Kay, 1789) and Jean Poresse, *La Vie Quotidienne des Ethiopiens Chrétiens aux XVIIe et*

A taste for coffee was also not necessary to become a major exporter. Coffee is rather unusual because it was produced for exchange rather than use very soon after gaining human favor in the fifteenth century. Normally, foods are consumed first by their cultivators or gatherers who proceed to trade surplus and only later produce a commodity with the intention of exchanging with others. Coffee, however, quickly became an export commodity. In fact it is likely that the Yemeni, who today prefer qat to coffee, were never particularly fond of coffee, setting the precedent from the beginning of producers in the south and consumers in the north. This was quite unlike most other food crops which were consumed in large part in the producing countries and were, unlike coffee, nutritious.[4] In this sense, coffee was an especially export- market-oriented commodity from early in its history. Initially coffee had a relatively uniform production price that was largely set in the producing country because it was almost all produced in Yemen for the first three centuries of its life as a commodity. Although there are in fact three different subspecies of coffea arabica in Yemen, these differences apparently were not reflected in the market.

But prices in consuming countries varied greatly. Partly this was for botanical reasons: coffea arabica plants are prone to great variations in yield. Not only do year to year differences in rainfall, land fertility and sunshine translate into variable yields as with all plants, but coffee trees for unknown reasons occasionally have exceptionally large crops which are followed by several below average ones while the trees "rest." They undergo two year and seven year cycles. So there were great fluctuations in production levels. This could have been overcome, as it would be in the late nineteenth century, with warehouses because coffee can long be held off the market, but production and intermediation was still small and scattered, and capital not sufficient. More relevant, the early traders hoped to make monopoly rents by taking advantage of the spasmodic nature of supply rather than seek a mass market by dampening the oscillations. Even had they wanted to control the market, merchant capital was subject to the whims of producing peasants who brought small amount to market as the price or their need for money demanded. Despite having a virtual world monopoly on one of the ancient world's more valuable commodities, growers were not converted into commodity producers. Aside from taxing the trade, the state appears to have had almost no role in coffee. Merchandizing was controlled by a trading diaspora of Banians from the Indian port of Surat.[5] Although, as we will see, production was later revolutionized, producers were buffered from world market forces for coffee's first three centuries as a world commodity. Thus Yemeni coffee *was* integrated into the world

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XVIIIe Siècles (Paris: Hachette, 1972), p. 268. Charles Beke, *Letters on the Commerce and Politics of Abessinia and Other Parts of Eastern Africa* (London: Printed for Private Use, 1852), pp. 3,19, 184.

[4]Only tea rivaled coffee's nutritional uselessness. Cacau, the other competitor in the hot leisure beverage market, also was nutritious. Since few Middle Easterners added sugar in the first centuries after coffee's introduction, even that avenue for calories was lacking. It is true, according to F. Hulton Frankel, in *The Tea and Coffee Trade Journal* Feb. 1917:142 that digested coffee has more protein than wheat, 14% to 11% but the protein is insoluble and remains in the grounds rather than passing into the drink.

[5]Balkrishna Gouind Gokhale, *Surat in the Seventeenth Century* (Bombay: Scandinavian Institute of Asian Studies, 1979), pp. 97, 106. An excellent source for understanding trading diasporas in Phillip Curtin's *Cross-Cultural Trade in World History* (Cambridge: Cambridge University Press, 1984).

economy in the sense that Indian merchants acting for European, North African, Middle Eastern and Asian exporters purchased the Arabian product with Mexican silver. On the other hand, production levels and technology were relatively unaffected by world demand and the price of coffee in consuming countries probably varied according to local merchants' ability to monopolize and the willingness of the elite and urban middle class to pay.

Transaction costs were very high. Transportation within Yemen remained so rudimentary that even three hundred years later the barest mule paths connected the mountain gardens to the lowland markets. Jean de la Roque, the first Frenchman to directly buy in Yemen, reported that it took six months to buy enough coffee to fill his ship's hold.[6] The market was wide, spreading from Morocco to Turkey in the Levant, west along northern Africa and the Balkans, east to India, and beginning in the middle of the seventeenth century north to eastern and western Europe. But it was a shallow market because consumption was largely confined to urban coffee houses where it served as a secular drug and a religious drink closely tied to Islam.[7] Indeed, the Haijj pilgrimages to Mecca were a major market and source for the spread of the beverage to new lands.

The Dutch were the first European colonial power to enjoy much success in planting coffee in their colonies when they brought it to Java in the 1690s.(Earlier British efforts at Madras failed.) This was not a mercantilist effort to keep consumer and producer within the empire since neither the Javanese nor the Dutch were great coffee consumers. Indeed, for the first century most of the coffee appears to have been exported to Muslim countries. [8] Interestingly, the burger Dutch, who, unlike foreign traders in Yemen, did indirectly control production, did not change the essentially peasant nature of production. Each villager was required to tend and harvest several hundred trees. Production levels did respond to market forces because the Dutch East Indies Company varied the pressure it put upon peasants; but the V.O.C.'s heavy hand was not very capable at fine tuning. Production levels swung wildly.[9]

The market became yet more complicated when thirty years after the Dutch successfully transplanted the coffea arabica in Java, it spread to the Americas. The Dutch and French states participated in this hemispheric transfer by nurturing coffea seedlings in their home botanical gardens. But the expenses of coffea's transfer and cultivation in the New World were borne by private individuals. Climate and soil differences translated into marked taste differences. Combined with mutations into numerous subspecies, the coffea arabica ceased being a homogeneous product by the

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[6]Jean de La Roque, *A Voyage to Arabia the Happy* (London: G. Strahan, 1726)."Some Late Facts about the Mocha Coffee Industry" *Spice Mill* Oct. 1910:729.

[7]For more on Muslim consumption see Ralph Hattox, *Coffee and Coffeehouses, The Origins of a Beverage in the Medieval Near East* (Seattle: Univ. of Washington Press, 1985) and Rudi Matthee, "From Coffee to Tea: Shifting Patterns of Consumption in Qajar Iran" *Journal of World History* 7:2 (1996):199-229; Omar Carlier, "Le Café Maure. Sociabilité Masculine et Effernescence Citoyenne (Algérie XVIIe-XXe Siècles)J" *Annales E.S.C.* 45:4 (Juillet-Aout) 1990:975-1003.

[8]Anthony Reid, *Southwest Asia in the Age of Commerce, 1450-1680* vol. 1 (New Haven: Yale University Press, 1988).

[9]A.S. Kok, *Colonial Essays* (London: Sampson Low, Son & Marson, 1864), pp. 250, 266, 271; J.W.B. Money, *Java; or How to Manage a Colony* (London: Hurst and Blackett, 1861) vol. 1, p. 79; C.G.F. Simkin, *The Traditional Trade of Asia* (London: Oxford University, 1968), pp. 231-232.

nineteenth century though for at least the first half of the century many Latin American beans were designated "Moccas" or "Javas" because their beans were theoretically genetically related to those of the first coffee producing areas (and, not coincidentally, the areas whose coffee fetched the highest prices on the market.)

The Dutch were able to overtake Mocca and Mediterranean ports to transform Amsterdam into the world's leading coffee entrepot for over a century. By 1730 Amsterdam was trading in coffee from three continents: Asian Java, Middle Eastern Yemen, and American Dutch Guyana, St. Domingue and Martinique. Although Europe was still a small luxury market, its demands outstripped Mocca's possibilities. Whereas 90 percent of Amsterdam's imports in 1721 were from Mocca, by 1726 90 percent were from Java. But the Dutch were not driven just by mercantilist logic. They were perfectly willing to import cheaper coffee from elsewhere and sell Java's product in Asia. By 1750 Amsterdam's imports of American production almost matched its purchases of Javanese coffee. Initially the American good was mostly colonial production from Dutch Guyana. But soon the price of French production from St. Domingue made that island more attractive. Already before the French Revolution over 80 percent of the world's production originated in the Americas. By 1820 Java supplied only 6 percent of Europe's consumption and the Dutch imported mostly non-Dutch coffee.[10] The same thing happened in the Middle East. Already by the 1770s French coffee from St. Domingue was replacing Yemeni competitors in the Ottoman market of Cairo because it was cheaper although it had to cross the Atlantic and the Mediterranean.[11] This demonstrates that shipping rates were sufficiently low well before the transportation revolution to remove distance as a major barrier to market integration.

Prices in the Amsterdam market demonstrated the extent to which the world coffee economy had become integrated by the second half of the eighteenth century. Rather than the spasmodic prices of a century before, which fluctuated with the arrival of each rare coffee-laden ship, prices now were quite stable from month to month and fairly comparable between Java and the Americas. Improved warehouse capacity, port facilities, bulk freight and predictable freight lines reduced intermediation costs. Yemeni prices followed competitors less steadily but by the end of the century were close. When the French Revolution provoked a slave rebellion in St. Domingue (today Haiti), greatly reducing the production of what had been the world's premier producer, prices in Java and the Americas jumped to take advantage (See Table 1).

Table 1
Amsterdam Coffee Price
(in gulden per pound, January of each year)

	Mocca	Java	Dutch Guyana	St. Domingue (Haiti)
1735	1.06	.79	.74	
1740	.70	.48	.40	
1745	1.10	.51	.50	
1750	.90	.73	.50	
1755	.83	.59	.44	
1760	.80	.50	.36	.36

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[10] John Crawford, *History of the Indian Archipelago* (Edinburgh: Archibald Constable & Co., 1820) vol. 3, p. 374; Steensgaard in James D. Tracy, ed.. *The Rise of Merchant Empires. (*Cambridge: Cambridge University Press, 1990), pp. 129-130. Calculated from Ocampo, *Colombia*, p.303.

[11] Paul Butel, "Les Ameriques et l"Europe" in Histoire Economique et Social du Monde vol. 3 (Paris: 1978).

1765	.93	.63	.38	.43
1770	.76	.61	.54	.53
1775	.81	.41	.31	.28
1780	.74	.40	.35	.33
1785	1.13	.58	.53	.49
1790	.78	.70	.57	.53
1795	.71	.65	.60	.54
1800	---	1.20	1.03	.99
1805	1.10		1.06	1.03
1810	1.50		1.10	1.05
1815				2.48
1820		.77	.84	.78

Source: N. Posthumus, *Inquiry into the History of Prices in Holland* (Leiden: E.J. Brill, 1946), pp. 181-189.

Complexity was compounded in the late nineteenth and early twentieth centuries when other African coffee species, the robusta and the liberica, were discovered by European imperialists eager to export something from their newly-won colonies. However, it should be emphasized that except for the Dutch, who played a key role in coercing the Javanese to grow coffee in their colony and rather unsuccessful British, French, and Portuguese efforts in Africa, European states did not play a major role in the development of coffee production. They relied instead on comparative advantage in the world coffee market. Unlike the case of sugar, the first age of colonialism of the sixteenth through eighteenth centuries did not see the development of independent coffee colonies to supply the individual metropolises. On the contrary, the French at first attempted to prohibit production in their colony of St Domingue (Haiti) because the Levant Companies interest in its Middle Eastern monopoly. True, French colonies supplied two-thirds of the world's coffee in the years immediately before the French Revolution. But once Haiti gained its independence the French did not turn to other of their colonies.[12] The British, who saw the mercantilist possibilities in exploiting the Chinese and then the India tea trade, where the only western European power to reduce per capita coffee consumption rather than exploiting the coffee-growing potential of Jamaica, Ceylon, or India. The Spanish and Portuguese preferred cacau so that Latin America had to wait for independence to become a significant coffee producer.[13] Even later, once the United States gained coffee producing colonies of Puerto Rico, Hawaii, the Philippines and effectively Cuba--at a time the US was the world's greatest coffee consumer--it continued to import from Brazil in an open market.[14] After the decline of Java towards the end of the nineteenth century, production was dominated by independent

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[12]José Antonio Ocampo, *Colombia y la economia mundial, 1830-1910* (Bogotá: Siglo Ventiuno, 1984), p. 303.

[13]In 1909 the *Spice Mill* reported on p. 174 that Spanish and Portuguese per capita coffee consumption at .7 and .5 kilos was a fifth to a tenth of that of northern European countries and the U.S..

[14]The *Spice Mill* may 1909, p. 299 in an article discussing the limited amount of US investment in Mexican coffee fincas (when US capital was flooding into other Mexican areas) explained "Concerning the increase in the production of coffee, Brazil continues and will continue to have no competitors in the world."

nations in a relatively unhindered international market. States in consuming countries did not interfere except to tax imports.

Coffee was treated differently than sugar and rubber in the nineteenth century Age of Empire because its low technological demands meant that an independent country richly endowed with the factors of production, Brazil, could begin producing on an unprecedented scale. Cheap fertile land and slave labor allowed coffee prices to plummet after 1820 and remain low until the last quarter of the century creating supply-induced demand. Brazil's exports jumped 75 fold between independence in 1822 and 1899. World consumption grew more than 15 fold in the nineteenth century![15] No colonies could compete with Brazil in price nor meet the large new demand in the colonial powers. By 1850 Brazil was producing over half the world's coffee; in 1906 it produced *almost five times as much as the rest of the world combined*. Indeed, about 80 percent of the expansion of world coffee production in the nineteenth century occurred in Brazil alone![16] And this was no marginal market. At the dawn of the twentieth century the value of internationally trade coffee trailed only grains and sugar.[17] Thus Brazilian production helped to redefine the nature of the consumer market by dropping prices sufficiently to reach a mass market.

The reasons for Brazil's ability to so rapidly expand are complicated. I hesitate to attribute too much of this to technological improvements. There were no revolutions in production techniques; cultivating and harvesting continued to be done by hand.[18] Milling was advanced by steam power only late in the century. The rate of export expansion after the advent of the railroad and the steamship in South America, between 1860 and 1900, was barely greater than it had been between 1830 and 1860.[19]
And coffee production grew rapidly despite depending upon an increasingly aging and expensive slave labor force until abolition in 1888. Initially, at least, the expansion was due to vast, easily accessible virgin forests (meaning a sparse indigenous population that could be pushed out); proper climate; an export-oriented commercial infrastructure; a large slave force; and relative political peace.

If not key in instigating the export boom, the railroad was important in permitting it to continue to expand. Before the iron horse, transport prices had been very expensive. By one calculation, 20 percent of the male slave force was used in mule trains and transport cost one-third of the final price. Moreover, the primitive form of conveyance often damaged the beans.[20] The train reduced tariffs, but not dramatically. Because of relatively little competition, bulk discounts and distance rebates were not offered. In fact coffee rode for a considerably higher price than domestic staples. By the turn of the twentieth century, rail transport still contributed from 15 to 22 percent of

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[15]Brazil, IBGE, *Séries Estatísticas Retrospectivas* vol. 1 (Rio: IBGE, 1986), p. 85.

[16]Calculated from Robert Greenhill, "E. Johnston: 150 anos em café" in Marcellino Martins E. Johnston, *150 Anos de café* (Rio: Marcellino Martins & E. Johnston, 1992), p. 308; Ocampo, *Colombia*, p. 303, Brazil, I.G.B.E. *Séries Estatísticas retrospectivas* vol. 1 (Rio: IBGE, 1986), p. 84.

[17]Mulhall, *The Dictionary of Statistics* 4th ed. (London: G. Routledge and Sons, 189), p. 130.

[18]V.D. Wickizer noted in *Coffee, Teas and Cocoa* (Stanford: Food Research Institute, 1951), p. 36 that "It is sometimes said that no important changes have been made in the coffee production methods in the last 150 years."

[19]Ocampo, *Colombia*, p. 302.

[20]Stanley Stein, *Vassouras* (reprint NY: Atheneum, 1970), pp. 91,94.

production costs. But quality of coffee was better, and more importantly, cheaper, more fertile lands were now accessible in the interior.[21] This also meant, that once slavery was abolished in 1888 Brazil could become the only country to attract millions of European immigrants to work in semi-tropical agriculture.[22]

The shipping revolution meant that swelling Brazilian coffee exports--they grew six fold between 1850 and 1900--could be brought to market without shipping bottlenecks. A host of European steamers began regular service to Brazil where port facilities were slowly improved.[23] This allowed producers to receive a greater share of the final price while consumers enjoyed lower end costs. Because imports became cheaper, Brazil could enjoy steadily improving terms of trade; that is, the real price of coffee (at least in the ports where imports were mostly consumed) increased more rapidly than did its nominal price which was fairly steady until the late 1880s.[24]

Brazilian coffee planters("fazendeiros") as well as slavocrat growers in Haiti, Jamaica, and Puerto Rica were market oriented though the slaves who worked for them had little incentive to concern themselves about the demands of the market. But even fazendeiros were buffered from the market in the interior by the lack of transport and communications until the twentieth century and a complicated web of intermediaries in which small growers sold to larger growers or mill owners who sold through factors ("commissarios") who often sold to sackers who blended the coffee and then sold to exporters who initially were consignment merchants.[25] There were few coffee markets in the

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[21]On rail costs: Franz Dafert, *Uber die Gegenwartige Lage des Kaffeebaus in Brasilien*. Amsterdam: J.H. de Bussy, 1898. p. 49; Centro Industrial do Brasil, *O Brasil: suas riquezas naturais, suas indústrias*, vol. 2 (Rio: Imp. M. Orosco & Cia., 1908), p. 91. For rising land costs near Rio se Stein, *Vassouras*, p. 229.

[22]W. Arthur Lewis in *Trade and Fluctuations*, p. 181 points out that Brazil (1.43 million) trailed only the United States (23.4 million) and Argentina (2.5 million) in receiving European immigrants between 1871 and 1915.

[23]For a discussion of commercial conditions in Brazil at the end of the nineteenth century see: Steven C. Topik, *Trade and Gunboats, the United States and Brazil in the Age of Empire* (Stanford: Stanford Univ. Press, 1997). Also, Robert Greenhill, "Shipping" in DCM Platt, *Business Imperialism* (Oxford: Clarendon Press, 1977; Paul Bairoch, "Geographical Structure and Trade Balance of European Foreign Trade from 1800 to 1970,"*Journal of European Economic History* 3:3 (Winter 1974):606; Douglass North, "Ocean Freight Rates and Economic Development, 1750-1913" *Journal of Economic History* 18 (Dec. 1958): 537-555.

[24]Nathaniel H. Leff, *Underdevelopment and Development in Brazil* vol. 1 (London: George Allen & Unwin, 1982), pp. 80-85; C. Knick Harley, Late Nineteenth Century Transportation, Trade and Settlement" in Harley ed. *The Integration of the World Economy, 1850-1914* vol. 1(Cheltenham U.KI.: Edward Elgar Publishing, 1996), p. 236. Edmar Bacha, "Política brasileira de café" in Martins & Johnston *150 Anos de Café*, p.20.

[25]For detailed studies of the Brazilian coffee market see:

interior so information on prices and supply were very imperfect and favored the factors. Indeed, planters were often virtually enumerate.[26] Moreover, being quite undermonetarized, the world's largest coffee economy dealt in credits and notes which relied to a great degree on personal reputation and favors, not just market forces. [27]

In addition, Brazilian currency was usually inconvertible paper money which fluctuated greatly vis-a-vis the pound sterling though internal prices remained steady. Hence the real price of the crop to someone importing in the port cities was often quite different from its value to someone in the interior who would use his receipts to buy mostly domestic goods. This again muffled the effects of price fluctuations in the interior. For example, between 1875 and 1886, when coffee prices fell by 40 percent, the 33 percent depreciation of the milreis mostly compensated.

Moreover, the four to six year gestation period necessary for coffee seedlings to become commercially viable meant production could not be modified quickly to respond to price differences, especially to downturns. And when prices fell, some planters continued to expand output anyway because productivity was twice as high on new virgin lands as on already planted lands. Hence to meet declining prices they expanded output to reduce unit costs but probably helping to further reduce prices. Their salvation was a good frost--if it ruined their neighbor's crops and not their own. Brazil was the major producer furthest from the tropics , hence with the greatest weather variations and the greatest year to year variation in yield. Thus even if planters could plan the number of trees in production, they had great difficulty predicting the output of their trees. Nature came to the rescue in 1887, 1902, 1904, 1912, 1918, 1942, 1953, 1955, 1957, 1966, 1975, and 1981.[28] This is not to say that planters were completely unable to adjust to market conditions, just that responses were quite slow to reduce output or catch up with demand. Great price rises led to rapid expansion and geographic diversification. The Haitian Revolution, for example encouraged planting in other parts of the Carribean and Rio de Janeiro state. The next rapid jump in prices, in the late 1880s and early

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C.F. Van Delden Laerne, *Brazil and Java: Report on Coffee-Culture in America, Asia, and Africa to H.E. the Minister of Colonies* (London: W.H. Allen, 1885); Joseph Sweigart, *Financing and Marketing Brazilian Export Agriculture, The Coffee Factors of Rio de Janeiro, 1850-1888* (NY:); Robert Greenhill, "E.Johnston:150 Anos em Café' in Marcellino Martins and E. Johnston *150 Anos de Café* (Rio: Marcellino Martins, 1993).

[26]Stein reports in *Vassouras*, p. 83 that "most planters were unwilling to use 'complicated processes of commercial accounting' and preferred to await reports occasionally forwarded by the more zealous comissários." This led to a situation noted by Van Delden Laerne, *Brazil and Java*, p. 212, of comissários "from being the agents of the agriculturalists, became their bankers."

[27]Edward Greene, director of E. Johnston's Santos office reported in his letter to R. Johnston, Rio, 1 Nov. 1899 (Johnston archive, University College library, Univ. of London) that conditions were different in each zone, personal acquaintances were necessary, and that "to induce fazendeiros to sell to a perfect stranger has not been easy work."

[28]J. de Graaff, *The Economics of Coffee* (Wageningen: Pudoc, 1986), p. 105.

1890s, caused a four fold jump in Sao Paulo's trees in fourteen years and giving it alone over half the world's production; Colombia, Mexico and Central America also stepped up production. High prices in the 1920s pushed Colombia and Central America to much greater output and started Africa. The price rise after the Korean War encouraged Africa and in Brazil the state of Paraná. Reductions in production usually came from political unrest: the Haitian Revolution, Colombia's War of a Thousand Days; acts of nature like the leaf blight that after 1885 wiped out the production of Java and Ceylon; or government interventions as with the prohibitive tax in Sao Paulo in 1903 and later eradication programs. The standard deviation of coffee harvests was large (see Table 2). Since world coffee demand has been in secular ascent for over three hundred years, this relative inflexibility did not present a great problem.

Table 2
Fluctuations in Brazil's Coffee Crops, 1890s-1930s
(in millions of bags of 60 kilos)

Year	Avg. Crop	Upper Limit	Lower Limit
1890s	7.2	11.2	4.4
1900s	12.6	20.2	9.4
1910s	13.3	16.0	9.7
1920s	14.7	27.1	7.5
1930s	23.5	29.6	16.6

Source: United States Federal Trade Commision, *Economic Report of the Investigation of Coffee Prices* (Washington DC: Government Printing Office, 1954, p. 20.

While unpredictable and awkward with many market imperfections, Latin America's coffee production system did allow the bean to become one of the world's most widely-traded commodities and a mass drink.

Conclusions

The world coffee market was integrated very early on in its history, in the sense that the law of one price more or less obtained in the major consuming markets. However, this was not the price-responsive market of neo-classical economists' dreams. Producers were buffered from the market by a host of intermediaries, state monetary and price support policies, the botanical inflexibility of the crop, and the incentives of peasant agriculture. Technological advances had little impact until recently with the Green Revolution. Consumers, who at first reacted in a "price rational" manner, became socially and physiologically addicted; their indifference curve was not much affected by price. Their love of coffee was also not much affected by technology. Between the hundreds of thousands of coffee producers and the hundreds of millions of coffee consumers were a handful of exporters, importers, and roasters. Over time, the nature of the international market shifted notably. Control went from peasants to local merchants, to importers, to roasters, to multi-national corporations and, for a long while, states. Although the market's dynamism came almost entirely from private initiatives, state intervention was necessary to institutionalize and standardize practices once the market's size outstripped merchants' ability to operate it. Both the ability of producers to meet growing demand without raising prices (by super-exploiting natural resources and labor rather than technological improvements) and consumers' tastes and culture explain the rapid and huge expansion of the international coffee market.