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The Natural Price of Natural Ice in America, 1880-1910

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Adam Smith's concept of "natural price," the price of a good's raw materials and labor without producer profit, illustrates the way that many American consumers saw natural ice during the industry's heyday. Because ice cost nothing to manufacture and was nearly everywhere each winter, customers did not understand price fluctuations. In response, ice harvesters and dealers began a dialogue with consumers, explaining their cost structure and the vicissitudes of the market. Among the factors they cited for charging higher prices were weather, rising demand, and the need to make a profit to stay in business. By educating consumers, they helped the buying public to accept that the interaction of supply and demand determines the price of goods, not some innate feeling for the worth of a good based on its perceived costs. The impact of this dialogue illustrates the influence of culture on pricing across industries.

In volume I, chapter 7 of the *Wealth of Nations*, Adam Smith defines natural price as:

> When the price of any commodity is sufficient to pay the rent of land, the wages of the labour, and the profits of the stock employed in raising, preparing and bringing it to market. . . . The commodity is then sold for precisely what it is worth, or for what it really costs the person who brings it to market.

In contrast, "The actual price at which any commodity is commonly sold is called its market price." As one might expect, Smith explains that the market price is a product of the interaction between supply and demand.[1] Later in the same chapter, he suggests that natural prices are the point to which the intersection of supply and demand will always gravitate.[2] Smith believed that, in most cases, the market price would be above the natural price, and that

[1] Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776; Chicago, 1976), 62-63.
[2] Ibid., 67.

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prices over time would fall, although "[d]ifferent accidents may sometimes keep [the market price] suspended a good deal above it."[3]

One of the "accidents" that keep market prices above natural prices is the seller's desire for profit. This is precisely why David Ricardo introduced the concept of cost-price as a replacement for natural price: to facilitate the acceptance of the profit motive as a determinant of cost.[4] Although the idea that price is determined by where the supply curve meets the demand curve is now universally accepted, determining exactly how much profit consumers are willing to accept as legitimate is precisely why the interplay between producers and consumers can be so interesting. Even in our developed market economy, Smith's explanation of how price is determined still has a distinct cultural component. This is never more apparent than when the price of a commodity changes quickly. For example, more than $3.00 for a gallon of gasoline seems high to the average American, but Europeans would consider the equivalent a bargain. If one looks at a commodity whose demand spiked closer to the beginning of the Market Revolution, when people first encountered wild fluctuations, the process of consumers coming to grips with the vicissitudes of supply and demand can be seen even more clearly.

One such product was natural ice. Natural ice (as opposed to the artificial, machine-made kind) as an almost ubiquitous commodity during winters in the northern United States, did not have any monetary value until 1806, when the Boston merchant Frederic Tudor took a load of ice cut from Fresh Pond (outside Boston) to the Caribbean island of Martinique.[5] It took decades longer for the industry to become profitable, because the price of ice was seldom high enough for Tudor to cover his costs. To put it in Smith's terms, the difficulty was that ice gravitated downward toward its natural price faster than entrepreneurs such as Tudor might have wished. Even after the industry matured, suppliers felt the need to make frequent statements justifying their prices in order to slow the collapse of prices in the face of frequent consumer anger. For example, the *Kansas City Star* editorialized on behalf of its ice-consuming readers in 1906 that the local dealers' reliance on the "so-called law of supply and demand" was nothing but an excuse for the "extortion [it] already practiced."[6] This attitude was common among natural ice consumers throughout the country during this era.

The heyday of America's natural ice usage was 1880-1910, which was also the heyday of people complaining about ice prices. According to historian

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[3] Ibid., 65.

[4] Karl Marx, *Theories of Surplus Value,* chap. 10 (1861), accessed 3 March 2008. URL: http://www.marxists.org/archive/marx/works/1863/theories-surplus-value/ch10.htm#sa5c.

[5] On Tudor, see Carl Seaburg and Stanley Paterson, *The Ice King: Frederic Tudor and His Circle* (Boston, 2003) and Gavin Weightman, *The Frozen Water Trade* (New York, 2003).

[6] *Kansas City Star*, 11 July 1906, p. 6.

Oscar Edward Anderson, who wrote what remains the only academic history of the American ice and refrigeration industries in 1953:

> The public, though it obtained ice cheaply enough during price wars, was convinced that it was usually being gouged. A basic reason for this widespread belief was failure to understand the economics of the industry. Consumers saw that ice made by nature or manufactured from water costing as little as eight cents a thousand gallons was sold for thirty to sixty cents a hundred pounds, and they concluded that tremendous profits were made.[7]

Alternatively, as the *Philadelphia North American* explained the situation in 1893, "The causes controlling the market price of ice are something far beyond the understanding of the heated public."[8] They expected to pay something closer to Adam Smith's concept of a "natural price" rather than the market price of an ever-fluctuating commodity.

Most consumers in northern cities demanded cheap ice. Ice was all around them every winter, so why should it cost any more than last year? In fact, it cost companies nothing to make, so should it not cost very little? Firms felt the need to answer these questions publicly to keep up demand. They began a conversation with natural ice consumers (and their representatives in the press) that illustrates precisely why looking at price as simply the interaction of supply and demand does not tell the whole story of transactions. If a good appears to have no value, consumers need to be convinced otherwise.

In truth, there were considerable costs to harvesting and distributing natural ice (see Figure 1). A 1902 Edison Company film available online in the American Memory collection at the Library of Congress illustrates the process of cutting ice. In it, ten horses and approximately fifteen to twenty people drag plows and planers across a frozen lake near Groton, Massachusetts.[9] In addition to harvesting expenses, distribution costs could be considerable, particularly after rail took over from ships toward the end of the nineteenth century. Household consumers got ice from teamsters who drove around the city, cut blocks off a larger quantity for individual families, and took their own fee. Early in this period, companies would guarantee a particular rate for an entire season by contract. As the market for natural ice expanded after 1880, this method of distribution became less and less frequent because it made prices too inflexible to reflect an ever-changing supply and demand situation.

The most obvious factor that could change the price of ice was weather. Warm weather in the winter hurt supply. "The ice men say the reason for the enormous increase in price is that last Winter was an open [short] one, which

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[7] Oscar Edward Anderson, Jr., *Refrigeration in America* (Princeton, N.J., 1953), 117-18.
[8] *Philadelphia North American*, 29 May 1893, p. 4.
[9] Thomas A. Edison, Inc., "Cutting and Canaling Ice," 24 Feb. 1902, accessed 4 May 2008. URL: http://memory.loc.gov/mbrs/awal/1555.mov.

caused a shorter ice harvest," reported the *Brooklyn Daily Eagle* in June 1889.[10] Nevertheless, such declarations often brought resistance. "The large consumers of ice claim that the Company has no basis upon which to raise the price," reported the same paper during an ice shortage in 1870. "They say, that although the weather last year was mild, yet sufficient ice was gathered to supply the wants of the city and at the usual rate."[11] Similarly, hot weather in the summer increased demand, and often led to increased prices. The weather really did affect supply and thus prices. The failure of the Hudson River ice crop in 1880 led directly to New York firms setting up shop in Maine for the first time.[12] The failure of the same crop in 1890 provided strong impetus to the development of mechanical refrigeration.[13]

FIGURE 1
Ice Harvesting

Source: Library of Congress, Photographs from the Detroit Publishing Company, 1880-1920.

Another common justification for high ice prices during this era was ever-growing consumer demand. As the market expanded, it became increasingly difficult for companies to predict how much ice they needed in any given year. If the weather was particularly hot, ice dealers often ran out, an event

[10] *Brooklyn Daily Eagle*, 15 June 1889, p. 6.
[11] Ibid., 28 June 1870, p. 2.
[12] Henry Hall, "The Ice Industry of the United States," in U.S. Bureau of the Census, 10th Census (1883), 22: 21.
[13] Weightman, *The Frozen Water Trade*, 237.

dubbed an ice famine. The industry often justified raising prices as a way to head off such an event, yet sometimes their motives were less altruistic. "The large companies have plenty of ice, enough to stand the present demand as large as it is," reported a smaller ice merchant to the *Brooklyn Daily Eagle* in 1876. "[B]ecause some of the smaller companies are pinched, and compelled to purchase where they can supply their customers, a general advance in price is agreed upon."[14] This split in ranks is a reflection of the structure of the industry. Some firms cut and supplied ice. Smaller firms bought it from wholesalers, so were both buyers and sellers.

Ordinary consumers had the option of boycotting the product to protest its price, thereby cutting demand and, presumably, the price as well. "I have been taking five pounds of ice every other day," one customer told a reporter from the *Chicago Daily Inter Ocean* in 1896, "but yesterday, having received notice that the price was advanced 10 cents a week, I turned my back on the iceman and canceled my order. I can do without ice for a month, anyway, and I do not purpose being held up so early in the season."[15] That customer was the exception, not the rule. In many other instances, consumers complained that they had no recourse but to pay whatever price the companies dictated. "Ice has become one of the necessities of life," read a letter to the *Los Angeles Times* in 1890, "and many of our poor are dependent on it for their sick and suffering, but this company goes to their doors and says, '$1.50 per 100 pounds, or do without!'" That author offered a common solution: regulation (in this case by the Los Angeles City Council).[16] That this almost never happened undoubtedly reflects the laissez-faire philosophy so prevalent during the era.

For the companies themselves, their blanket response to all such complaints was to plead poverty. As New Orleans dealer Anthony Vizard told the *Daily Picayune* in 1890, "No one [ice company] has ever been known to pay a dividend, and many have been obliged to mortgage their works to secure money to keep running. You can go on the market now and buy the shares of any company for 50 [cents] on the dollar."[17] Other ice dealers went into further detail concerning the costs associated with their business. "The loss from melting during all this transportation is never less than 20 percent in hot weather," explained another dealer in 1898, "and will sometimes run up as high as 50 per cent. The freight charges on the railroads are also a large bill of expense. Taking all these things into consideration, the cost of natural ice is climbing upward every year, and the natural ice companies see their profits reduced as the expenses increase."[18] Cutthroat competition also made the price of ice unstable. All dealers had a great incentive to sell more early in

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[14] *Brooklyn Daily Eagle*, 17 July 1876, p. 4.
[15] *Chicago Daily Inter Ocean*, 26 April 1896, p. 33.
[16] *Los Angeles Times*, 8 June 1890, p. 12.
[17] *New Orleans Daily Picayune*, 15 July 1890, p. 4.
[18] Americus [pseudo.], "Ice and Ice Making," *Ice and Refrigeration* 14 (Jan. 1898): 99.

the season rather than late to avoid loss through melting—and the smaller the volume of ice, the faster it would melt. This often led to panic selling by dealers desperate to earn all they could from their remaining inventory. Others tended to match price reductions by one dealer, fearful of being put in the same position. Such downward pressure on prices would easily explain the failure of so many firms in the industry.

To end such price competition, the industry tended to consolidate over time. As an added benefit, greater size also led to efficiencies in storage, transportation, and production. During the 1880s, consolidation usually took the form of local cartels. Consumers were seldom happy about this. "Having the idea that 'the Lord made a big crop of ice' last winter," explained the trade journal *Ice and Refrigeration* in 1893, consumers "consider, therefore, that the price this summer should be merely nominal; and whenever dealers meet together and agree to stick to a fixed scale, immediately the press sets up to wail."[19] From there, companies took the next logical step and formed local monopolies. In St. Louis, for example, seven firms formed the Polar Wave Ice and Fuel Company shortly after 1900. Larger and smaller firms met their colleagues at regional and national ice association meetings, where they discussed the problems that faced the industry, such as legislation regulating the purity of ice, and, of course, prices.[20]

Of all the ice trusts to form throughout the United States, the one that received by far the most scrutiny during this era was the American Ice Company of New York, organized in 1896 by Charles S. Morse, a shipping heir from Bath, Maine.[21] By 1900, the "Ice Trust," as the New York papers called it, had a virtual monopoly on the market in both New York and Philadelphia. In 1900, the *New York Journal* revealed that the mayor of New York City and other members of his Tammany Hall machine were major shareholders, which led to a huge scandal.[22] Unlike ice trusts in other cities, this one depended upon natural ice, and it did not branch out into the machine-made substance until after 1900, when it began to expand into other cities through consolidation.[23] Despite New York state investigations and prosecutions, Morse made $12 million in profit when he sold his stock in 1900. Nobody in New York City ever went to jail for manipulating ice prices.[24]

Notwithstanding such profits, natural ice dealers could only manipulate prices for so long in the face of technology-driven competition. In 1877, the German scientist Carl Linde developed the first commercially viable mechanical ice machine, an ammonia compression refrigeration system. The system spread rapidly in the United States, starting in 1881, first to breweries, and then to manufacturers who erected mechanical ice plants, mostly in the

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[19] *Ice and Refrigeration* 4 (May 1893): 373.
[20] Anderson, *Refrigeration in America*, 116.
[21] Richard O. Cummings, *The American Ice Harvests* (Berkeley, Calif., 1949), 87.
[22] Weightman, *The Frozen Water Trade*, 237-39.
[23] *Cold Storage* 4 (Aug. 1900): 38.
[24] Anderson, *Refrigeration in America*, 117.

South, where there was little direct competition from natural ice cut in the northern part of the country. However, problems with the technology, particularly safety concerns, held back its widespread acceptance until after 1900.[25] Nevertheless, the natural ice industry persisted longer in the face of this competition than one might have expected, because of its price advantage. In an ever-growing market for ice, there were never enough ice plants to service the demand. Once machine-made ice was available in significant quantities to enter northern markets, it set a ceiling for natural ice prices.[26] In a particularly warm winter, existing ice plants would simply make more, or, as in 1890, could build additional artificial ice plants by summertime. Perhaps it was increased competition from the manufactured commodity or the inability of producers to cite weather to justify raising prices that foreclosed the possibility of natural ice returning to its natural price once machine-made ice became a reality. By then, ice was fully commoditized.

The story of natural ice pricing is a window into the culture that permeates the interaction of supply and demand for this and any other industry. After Frederic Tudor gave this product value, a consumer education process had to take place. The first step, to persuade people to purchase natural ice, had occurred by 1880. The second step was to convince them of its worth, even though its price changed as frequently as the weather did. Most late nineteenth- and early twentieth-century consumers viewed ice as being everywhere. They did not see the costs to companies of cutting, storing, and delivering ice to their doors. All they knew was that it often cost more money to keep their food and drinks cold than they thought reasonable to pay. By explaining the dynamics of this industry, natural ice dealers tried to convince consumers to accept the law of supply and demand as dictating the price of a resource that the untutored expected to be nearly free. By setting the terms by which consumers judged prices, natural ice dealers propped up demand for a commodity for which they often had only a precarious supply. In doing so, the industry made the natural price of natural ice (as Adam Smith defined it) a distant memory, even though Smith had predicted otherwise.

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[25] Jonathan Rees, " 'I Did Not Know . . . Any Danger Was Attached': Safety Consciousness in the Early American Ice and Refrigeration Industries," *Technology and Culture* 46 (July 2005): 549.

[26] Jonathan Rees, "What's Left at the Bottom of the Glass: The Quest for Purity and the Development of the American Natural Ice Industry," in *Food Chains*, ed. Roger Horowitz and Warren Belasco (Philadelphia, Pa., forthcoming).