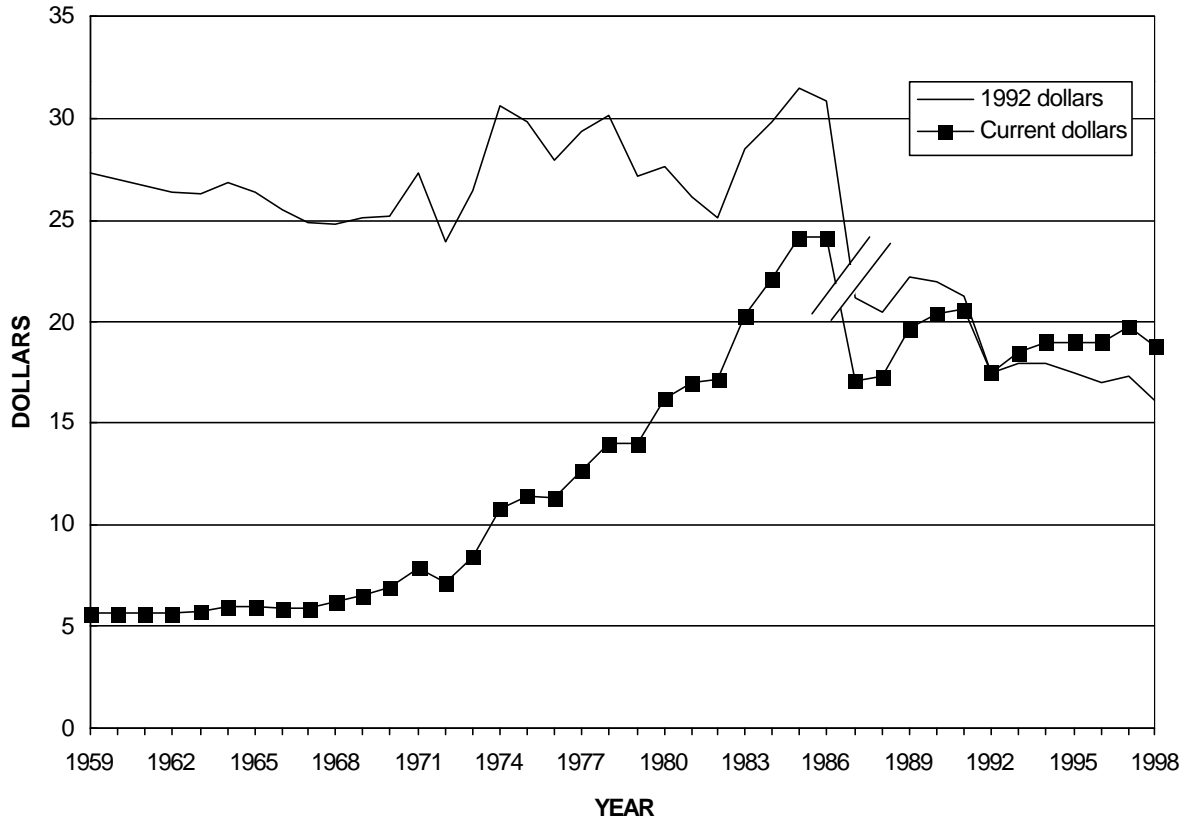# Iron and Steel
by Michael Fenton

Annual Average Hot-Rolled Steel Bar Price
(Dollars per one hundred pounds)

Significant events affecting steel prices since 1958

1965	The rise of scrap-based minimills and continuous casters begins
1970	Beginning of energy crisis
1971-74	Price controls in effect
1973	Peak raw steel and pig iron production and peak scrap consumption by steel mills; export restrictions imposed
1974	Peak scrap consumption (steel mills + ferrous foundries)
1989	First thin-slab continuous caster for flat-rolled steel products begins operating at minimill facility
1990	U.S. exports and imports of ferrous scrap reach record highs
1997	Start of the Asian financial crisis

Of the metallic elements, iron is the most useful and most abundant, as well as the cheapest. The term "iron" refers to alloys that contain too much carbon to be formable by forging or rolling. The term "steel" refers to an alloy of iron that is malleable in some temperature ranges and contains manganese, carbon, and often other alloying elements.

Hundreds of individual alloy specifications known as "grades" have been developed to produce combinations of strength, ductility, hardness, toughness, magnetic permeability, and corrosion resistance to meet the need of modern consumers. The ability of steel to be permanently deformed by plastic working allows it to be formed into many shapes and sizes

(Lankford and others, 1985, p. 773). Principal methods of hot and cold steel working are hammering, pressing, piercing, extrusion, rolling, drawing, and forging.

Steel products are priced by a system of "base prices" and "extras". In general, each producer specifies a base price for each product form that it manufactures. For example, a producer of carbon steel cold-rolled sheets would specify a base price for that product. In addition, the producer specifies completely the range of thickness, width, and other properties that are covered by the base price. If a customer's requirements are for material thicker, thinner, wider, or narrower than the base range, an extra charge is added. Extras are also added for such requirements as cut-length (as opposed to sheets in coil form), special drawing quality, small orders (e.g., less than 20,000 pounds of a single item), and other requirements, depending upon the product form.

The cost of transportation from the producer to the customer is a significant consideration. As a result, a producer often will adjust his price to match a customer's delivered price from a more proximate producer. When such an adjustment is made, the customer's cost is the same, regardless of the location of the shipping mill; the result for the steel producer is a lower realized price when shipping to a customer located closer to another producing mill.

Steel prices are usually quoted by weight. For many products, however, there is a provision for calculating the weight of a shipment so that a customer is required to pay only for the theoretical weight of the product rather than the actual weight, which normally is more than the theoretical weight because of allowable manufacturing variations. Discounts from the quoted price are often available. In recent years, discounts of as much as 25% have been described for some products at times.

Price indices of groups of steel products have been reported by the major trade publications to show at a glance the overall movement of steel prices since 1897 (American Metal Market) and 1926 (Iron Age). For the purpose of this publication, hot-rolled carbon steel bar was selected because it has been produced continuously since the adoption of the Bessemer steelmaking process in 1875; its historical price series is indicative of prices for the range of steel products; and its price does not incorporate the cost of extensive processing after hot rolling.

For the entire period of this review, except during World War I, prices of hot-rolled carbon steel bar fluctuated within a narrow $8.00 range, in constant dollar terms. During World War I, steep price increases brought about price controls, which were also imposed on the industry during World War II (Campbell, 1948). During the 1960's, prices in current dollars, increased very slowly, but the energy crisis of 1970 started a period of rapid price escalation as energy costs of steel companies increased rapidly and inflation dominated the economy. Wages of steel industry workers were automatically increased because of inflation protection clauses in their union contracts. Price increases were necessary to keep pace with rapidly escalating costs. From 1971-through 1974, price controls were instituted in an attempt to halt price inflation, but were abandoned when they proved ineffective and administratively infeasible.

During the early 1970's, a new approach to steelmaking gained prominence that caused record highs in steel production (1973) and scrap consumption (1974). Small steel plants were erected to produce simple products such as hot-rolled bars of steel. The first plants began production in 1965. These new plants, called minimills, did not have blast furnaces to process iron ore, but instead modern electric furnaces and continuous casters were used to melt ferrous scrap and cast the raw steel into products at the lowest possible cost. Competition with blast-furnace-based steel mills increased as thin-slab continuous casting equipment was adopted, first in 1989, to produce products at thinner gauges with ever improving quality at increasingly lower costs (American Metal Market, 1997; 33 Metal Producing, 1998). Minimills have been able to capture a significant share of the market by setting prices that the previously dominant steel companies were unable to match.

One of the relatively simple products that the minimill companies have come to dominate is hot-rolled steel bar. Discounts from the quoted prices have been widely available, and this was especially true during the late 1970's and early 1980's as minimill companies gained dominance of the market for hot-rolled steel bar. In 1984, the major steel mills stopped revising their quoted prices. In 1987, American Metal Market discontinued the publication of the major mill price and began to report the quoted prices of the minimills, which were more representative of market transaction prices. This change was marked by the 29 percent drop in the quoted price, to $17.12.

The first half of the 1990's were years of increasing domestic demand for steel products and increasing domestic capacity to satisfy this demand. U.S. exports and imports of ferrous scrap reached record highs in 1990, but there was still a trade deficit. By 1997, the American Iron and Steel Institute (AISI) reported an indirect steel-trade surplus of 1.1 million metric tons, the first surplus since AISI began tracking the measurement in 1984 and perhaps since the late 1970's (American Iron and Steel Institute, 1998). This surplus confirmed that U.S. manufacturers were among the world's most competitive producers of high-quality, steel-containing goods in 1997.

Despite rising domestic steel mill capacity, imports of semifinished steel increased significantly in 1993; these imports were needed to make up for the domestic shortage of hot metal capacity in order to satisfy the U.S. market demand for finished steel mill products. Domestic producers were also unable to keep up with demand for finished steel products. An unfavorable currency exchange rate made foreign steel prices much more competitive.

A financial crisis began in Asia in 1997 when Thailand devalued its currency (Garino, 1999). Prospering economies in China, Hong Kong, Indonesia, Japan, the Republic of

Korea, Malaysia, Singapore, Taiwan, and Thailand were seriously weakened. Steel consumption began to decline in these countries as they imported less steel and canceled some new steel production projects. Generally, significant production decreases were not feasible because sales were needed to repay loans granted by the International Monetary Fund to support the economies of these countries (Becker, 1998). Throughout 1998, the United States was the recipient of large quantities of inexpensive semifinished steel imports. Declining prices adversely affected domestic steel producers, who filed antidumping law suits and appealed for the implementation of steel import quotas. The combination of weak steel demand in the Pacific Basin, a strong dollar, and falling world export prices may continue to cause importation of low-priced steel into the United States to the detriment of domestic steelmakers.

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Annual Average Hot-Rolled Steel Bar Price
(Dollars per one hundred pounds[1])

Year	Price	Year	Price	Year	Price	Year	Price
1897	0.99	1923	2.33	1949	3.35	1975	11.43
1898	0.95	1924	2.20	1950	3.47	1976	11.32
1899	1.95	1925	2.04	1951	3.70	1977	12.68
1900	1.61	1926	1.99	1952	3.78	1978	14.01
1901	1.44	1927	1.84	1953	4.05	1979	14.01
1902	1.58	1928	1.87	1954	4.22	1980	16.20
1903	1.56	1929	1.92	1955	4.47	1981	16.95
1904	1.33	1930	1.73	1956	4.81	1982	17.23
1905	1.48	1931	1.63	1957	5.25	1983	20.25
1906	1.51	1932	1.58	1958	5.35	1984	22.08
1907	1.60	1933	1.64	1959	5.68	1985	24.10
1908	1.48	1934	1.81	1960	5.68	1986	24.10
1909	1.31	1935	1.80	1961	5.68	1987	17.12
1910	1.43	1936	1.92	1962	5.68	1988	17.25
1911	1.26	1937	2.40	1963	5.74	1989	19.60
1912	1.25	1938	2.35	1964	5.93	1990	20.43
1913	1.38	1939	2.19	1965	5.93	1991	20.60
1914	1.15	1940	2.15	1966	5.89	1992	17.48
1915	1.31	1941	2.15	1967	5.92	1993	18.44
1916	2.48	1942	2.15	1968	6.14	1994	18.95
1917	3.49	1943	2.15	1969	6.56	1995	18.95
1918	2.89	1944	2.15	1970	6.98	1996	18.95
1919	2.43	1945	2.21	1971	7.89	1997	19.75
1920	2.99	1946	2.47	1972	7.13	1998	18.75
1921	1.89	1947	2.72	1973	8.38		
1922	1.70	1948	3.09	1974	10.78		

[1] To convert to dollars per metric ton, multiply by 22.0462.

Note:
1897-February 1987, hot-rolled carbon steel bars merchant, Pittsburgh base, dollars per cwt., *in* American Metal Market.
March 1987-1998, hot-rolled carbon SBQ (special bar quality) 1000 series, *in* American Metal Market.