

The following pages are excerpts from "The Ohio Iron and Steel Industry" report. The full report is 93 pages in length and includes appendices of referenced Iron and Steel Industry data. "The Ohio Iron and Steel Industry" report may be purchased for \$25.00 (ID no. BA8). For additional information or to purchase the full report please contact the Office of Strategic Research.

THE OHIO IRON AND STEEL INDUSTRY

JULY 2000

Don Larrick, Principal Analyst
Office of Strategic Research, Ohio Department of Development
P.O. Box 1001, Columbus, Oh. 43216-1001
Phone: (614) 466-2115
Production Support:
James Kell, Editor
Robert Schmidley, GIS Specialist

EXECUTIVE SUMMARY

- 292 iron and steel industry establishments in Ohio employed over 58,000 people in 1998—10 percent of the U.S. industry's establishments and 16 percent of its work force;
- Blast furnaces and steel mills (SIC 3312) is the largest industry segment in Ohio, with 67 establishments and over 27,000 employees;
- The greatest concentration of industry employment in Ohio occurs in the cold finishing of steel shapes (SIC 3316—30 percent of the U.S.);
- 60 counties had at least one industry establishment, but five of every eight industry jobs in 1997 were found in Butler, Cuyahoga, Defiance, Lorain, Stark, or Trumbull counties;
- As judged by the dollar value-added at industry establishments, Ohio led the nation in all three groups of industry production (NAICS codes 3311, 3312, and 33151) during 1997; these include five industries: iron and steel mill products (331111), electro-metallurgical ferroalloy products (331112), pipe and tube manufacturing from purchased steel (33121), rolled steel shapes (331221) and iron foundry output (331511);
- As judged by value of shipments, Ohio led the nation in 1997 in eight product classes, ranked second in three product classes, and was third in four product classes;
- Ohio consistently produces one-sixth of the raw steel made in America, ranking second only to Indiana;
- 12 companies on Fortune's U.S. 1,000 or global 500 lists have plants in Ohio; four of these companies have their world headquarters in the state;
- AK Steel is the largest employer in Ohio's iron and steel industry with over 7,300 people, followed by Republic Technologies International and LTV, each with at least 5,000 employees; altogether, there are 16 companies in Ohio employing at least 500 people in the iron and steel industry;

- 12 companies (or their subsidiaries) from 10 foreign nations employed at least 3,100 people in Ohio in 1999 producing blast furnace and basic steel products (SIC 331);
- Gross state product data, adjusted for inflation, indicate real growth in the volume of goods produced by Ohio's iron and steel industry since 1992; this is consistent with the growth of raw steel production during the same time;
- Exports of primary metals from Ohio grew from \$600 million in 1993 to \$1 billion in 1998;
- The Ohio Dept. of Development recorded 46 major industry investments from 1997 through 1999 totaling over \$800 million, almost \$500 million of which was allocated for blast furnaces and steel mills (SIC 3312);
- Capital expenditures by the industry in Ohio are roughly proportional over time to the value-added, indicating that the industry is maintaining its presence in the state;
- While industry output is forecast to grow, perhaps apace with the economy at large, industry employment in the state and across the nation is expected to decline.

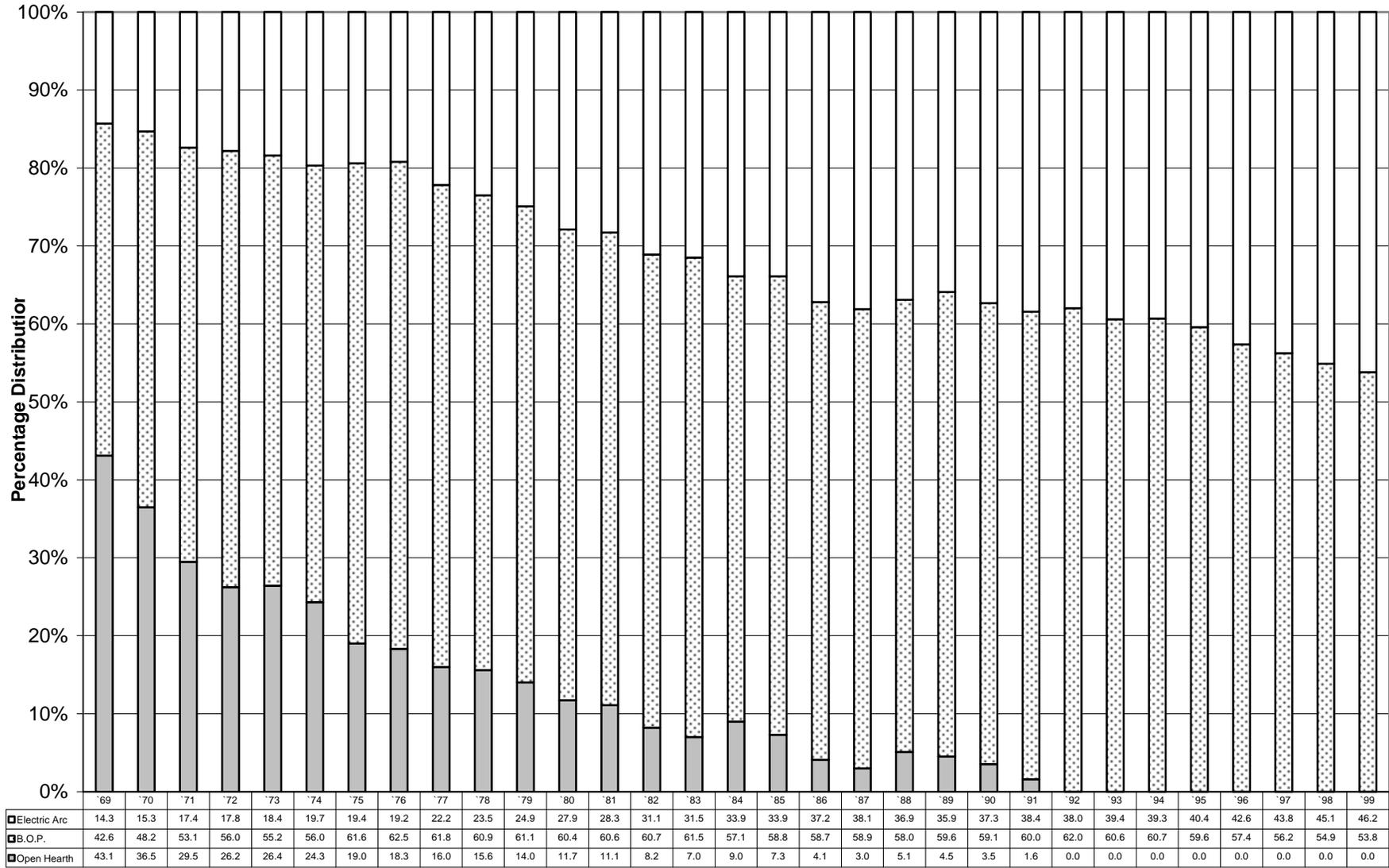
INTRODUCTION

The production of iron and steel on a large scale historically has been one of the fundamental characteristics of an industrial society. Industries using iron and steel include furniture and fixtures, fabricated metal products, industrial machinery and equipment, electrical and electronic equipment, transportation equipment, instruments and related products. Iron and steel are thought to be part of 80 to 90 percent of the end products manufactured in the U.S. (Duggan, 1989). The industry's concentration in Ohio makes any change significant for

This report provides a general understanding of this important industry. There are four major sections. The first describes the industry in Ohio by examining its current status, providing some comparison with other states and the nation, and noting the leading foreign and domestic companies. The second discusses industry trends during the past decade. The third summarizes the views of analysts about the current situation and possibilities for the future, including employment. The fourth is an appendix containing a substantial database for those seeking a more detailed understanding of industry trends. Many of the discussions herein are based on, and refer to, the appendix tables.

Statistics used in this report came from agencies of the U.S. Departments of Commerce and Labor, the Ohio Bureau of Employment Services' Labor Market Information Division (OBES/LMI), and the American Iron and Steel Institute. Detailed references and a glossary of key terms are in the appendices.

U.S. Raw Steel Production by Type of Furnace: 1969-99



Source: American Iron & Steel Institute

Year

AN IRON AND STEEL PRIMER

There are two types of steel mills: the so-called integrated mills and minimills. Integrated mills¹ produced pig iron as the first step of the primary steel making process by loading iron ore pellets, limestone and coke into a blast furnace and removing the slag. The resulting molten pig iron (typically 95 to 98 percent pure) is transferred to a basic oxygen process (BOP) furnace where contaminants such as phosphorus and sulfur are removed, and carbon, manganese and silicon are either removed or reduced to specified levels. Scrap iron and steel, directly reduced iron (DRI), and fluxes may be combined with molten pig iron in this stage of steel making. The defining characteristic of steel is that the iron alloy has a carbon content of 1.7 percent or less. Annual production capacities of primary producers typically range from two to five million net tons (Larkin, 1994,1995; Miller, 1984).

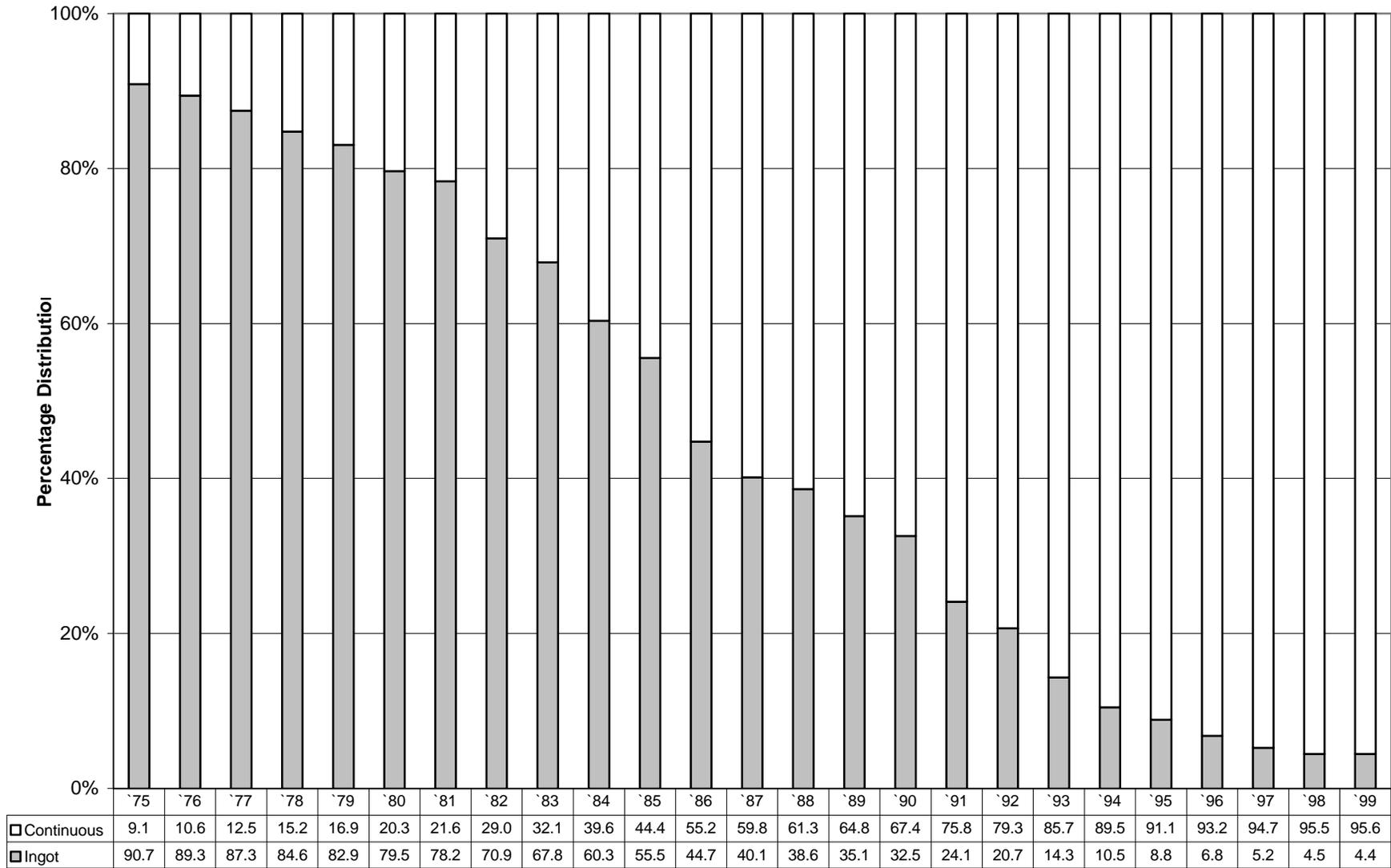
By contrast, minimills neither produce pig iron nor use it as raw material. They melt scrap steel (and, occasionally, DRI) with fluxes in electric arc (EA) furnaces. The capacities of minimills are usually far less than two million tons per year. Historically, primary producers located near their raw materials. Minimills locate near their clients because ferrous scrap is ubiquitous. Consequently, minimills are found in greater proportion in the South than primary steel production facilities (Larkin, 1994,1995; Miller, 1984).

The chart at left shows the growing use of these two techniques over three decades. The BOP furnace has eliminated the less efficient open hearth furnace for primary steel making. The growing percentage of steel produced in EA furnaces illustrates the growth of minimills.

Primary producers seldom pour molten steel into molds for cooling into ingots. If they do, ingots must be sent to a breakdown mill to be reheated and processed into semi-finished products. Instead, molten steel is poured into machines continually casting it into slabs, billets or blooms. Typically, rolling mill machinery works the semi-finished steel into finished steel products: slabs are processed into plates, sheets and strips; billets are processed into bars, rods, and tube rounds; and blooms are processed into structural shapes and rails. Breakdown mills are bypassed (Larkin, 1994,1995; Miller, 1984).

Continuous casting has nearly replaced ingot teeming in the U.S. during the preceding 25 years. Less than 10 percent of raw steel

U.S. Raw Steel Production by Type of Cast: 1975-99



Source: American Iron & Steel Institute

Year

produced in 1975 was continually cast. In 1999, ingot teeming was used less than five percent of the time.

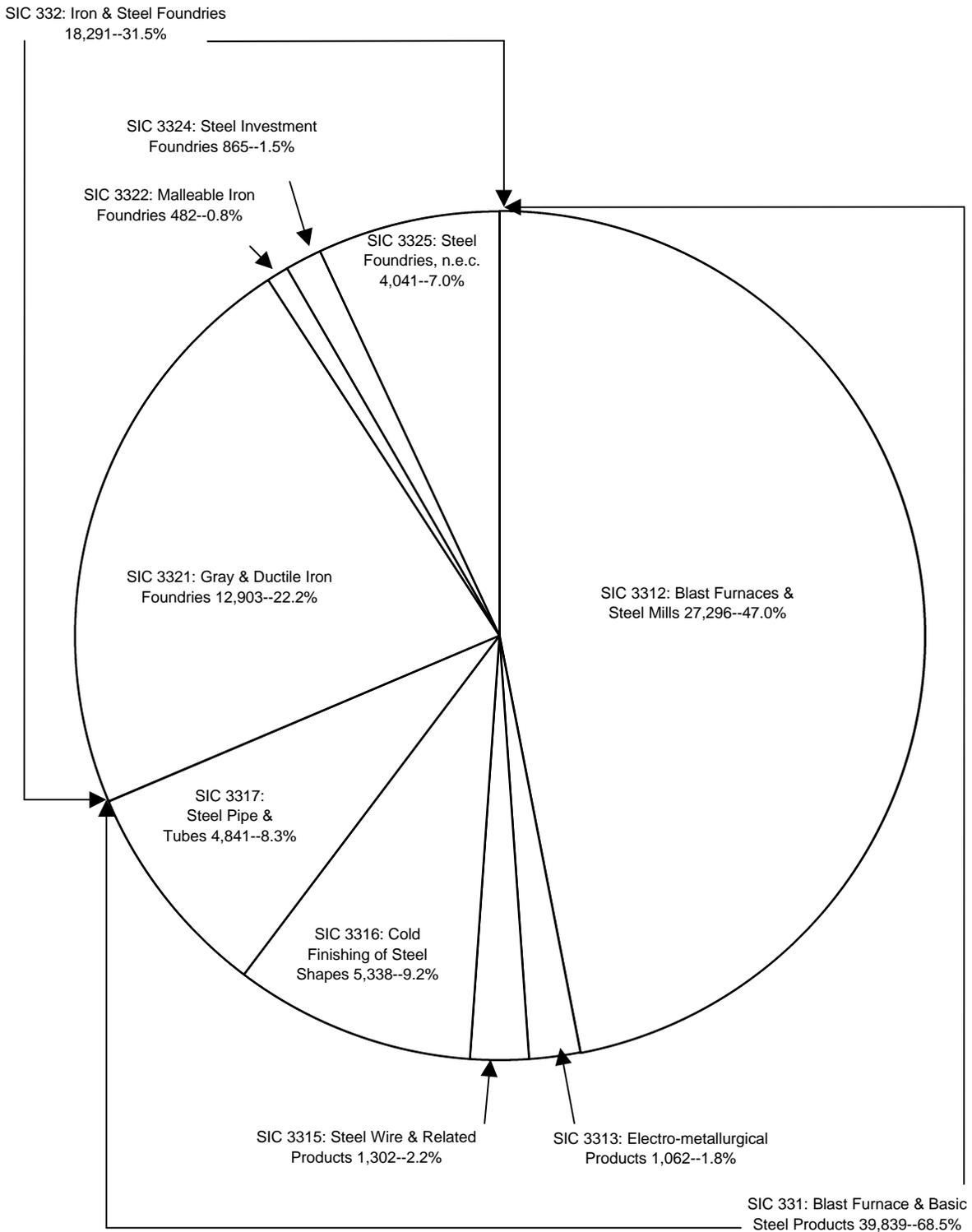
Minimills have always used continuous casters to produce semi-finished products. Recent technical innovations in intermediate and thin slab and strip-casting (which are also being adopted by primary producers) allow minimills to add higher-grade goods such as pipes, plates, strips and sheets to their product lines. Despite these recent advances, primary producers still are the source for the highest-grade goods (Larkin, 1994,1995; Miller, 1984).

Steel service centers are, collectively, the largest consumers of steel mill products, buying them from steel mills and providing services such as slitting before reselling them to end-users (Bell, 1994). Combined with motor vehicles and construction markets, these three account for about one half of the steel purchased from domestic manufacturers. Other notable consumers of steel are converters and processors; manufacturers of containers, machinery, electrical equipment and appliances; and the oil and gas industry (for mining, processing and transporting material (Larkin, 1997). Construction markets are the principal customers of minimills (Larkin, 1994). Motor vehicle and machinery manufacturers are significant consumers of iron casting; railroad equipment is the largest user of steel castings (Duggan, 1991).

See the Glossary for definition of the terms used above.

Employment in Ohio's Iron and Steel Industry, 1998

Total: 58,130--100%



Source: U.S. Bureau of Labor Statistics

COMPOSITION OF THE OHIO IRON AND STEEL INDUSTRY

Two hundred and ninety two establishments employed more than 58,000 people in Ohio's iron and steel industry during 1998. The industry is dominated by the blast furnace and basic steel products group (SIC code 331), which has three-fifths of the establishments and two-thirds of the jobs. The group is, in turn, comprised mostly of blast furnaces and steel mills (SIC 3312). That industry has 23 percent of all iron and steel industry establishments and 47 percent of the jobs.

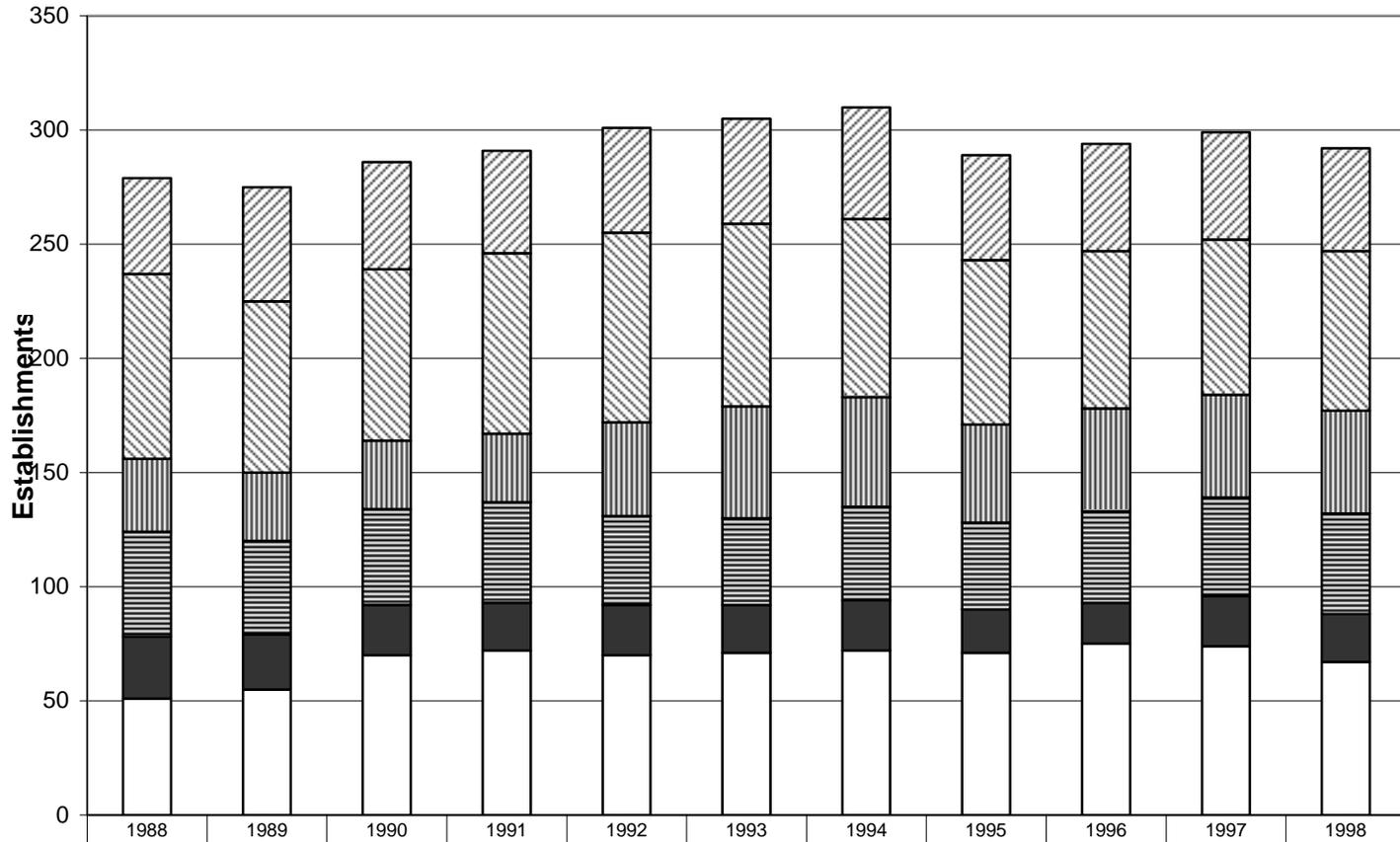
Other large industries, in descending order of employment, are gray and ductile iron foundries (SIC 3321—23 percent of establishments and 22 percent of the jobs), the cold finishing of steel shapes (SIC 3317—15 percent of establishments and nine percent of the jobs), steel pipe and tubes (SIC 3317—also 15 percent of establishments, but eight percent of the jobs), and steel foundries n.e.c. (SIC 3325—11 percent of establishments and seven percent of the jobs). The smaller industries include electro-metallurgical products (SIC 3313), steel wire and related products (SIC 3315), malleable iron foundries (SIC 3322), and steel investment foundries (SIC 3324).

Ten percent of the U.S. industry establishments and 16 percent of the jobs were found in Ohio in 1998. (Ohio's portions of all establishments and jobs in the nation were approximately four percent each.) The cold finishing of steel shapes (SIC 3316) is particularly concentrated in Ohio, with one-sixth of the industry's establishments and three-tenths of the jobs. Electro-metallurgical employment also appears slightly concentrated in Ohio.

The average industry establishment in Ohio employs more people (200) than the average industry establishment in the U.S. (130). Blast furnaces and steel mills are the largest, employing over 400, followed by electro-metallurgical products. Steel investment foundries typically are the smallest establishments in Ohio, followed by establishments producing steel wire and related products.

Employment in Ohio's iron and steel industry was estimated to be 54,500 at the beginning of 2000. 38,200 of these jobs were in blast furnace and basic steel products, and 16,300 in foundries (OBES/LMI, 2000a).

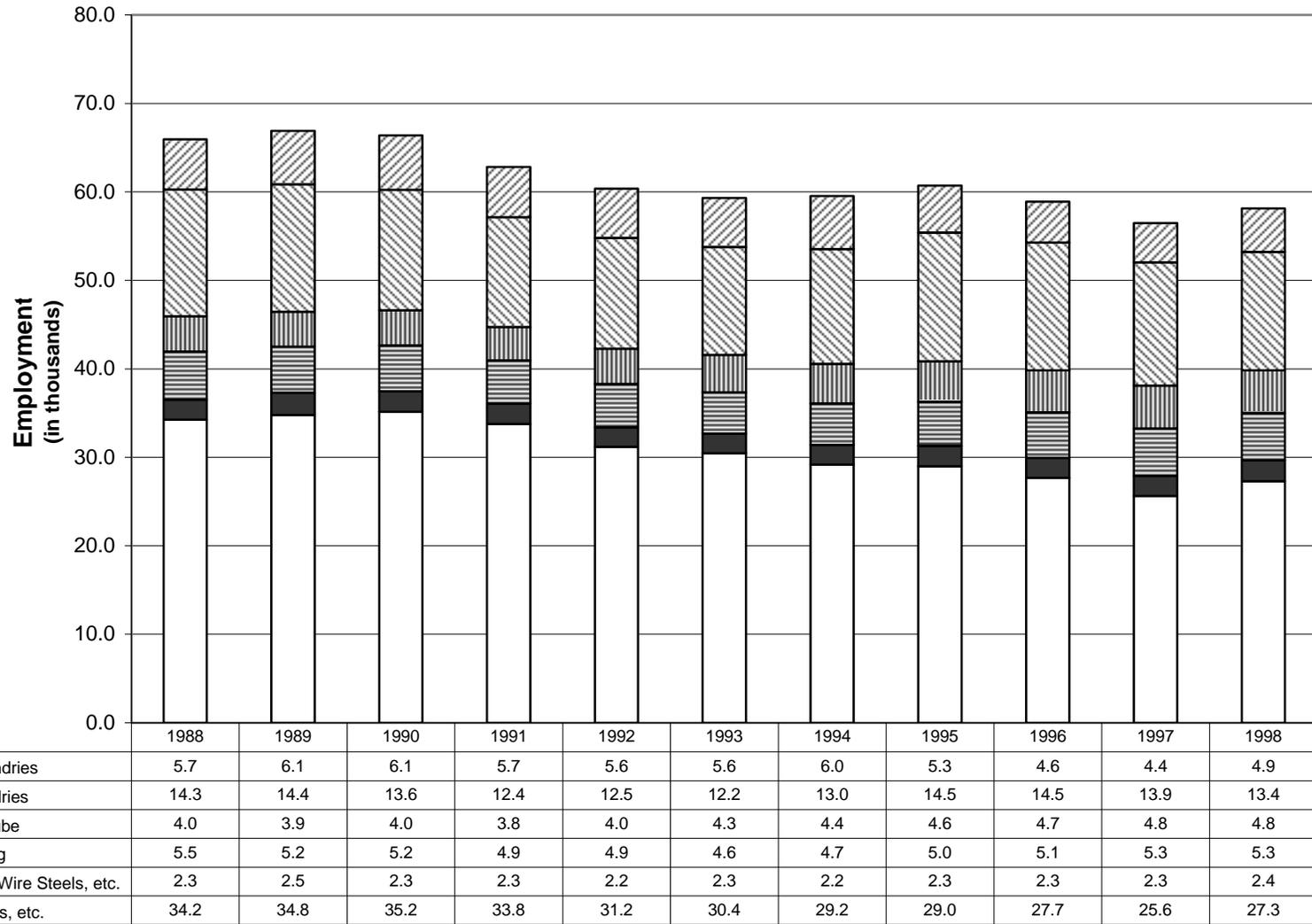
Ohio Establishment Trends Iron and Steel, 1988-98



	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
■ SIC 3324&5: Steel Foundries	42	50	47	45	46	46	49	46	47	47	45
▨ SIC 3321&2: Iron Foundries	81	75	75	79	83	80	78	72	69	68	70
▩ SIC 3317: Steel Pipe/Tube	32	30	30	30	41	49	48	43	45	45	45
▧ SIC 3316: Cold Finishing	46	41	42	44	39	38	41	38	40	43	44
■ SIC 3313&5: Electric & Wire Steels, etc.	27	24	22	21	22	21	22	19	18	22	21
□ SIC 3312: Blast Furnaces, etc.	51	55	70	72	70	71	72	71	75	74	67

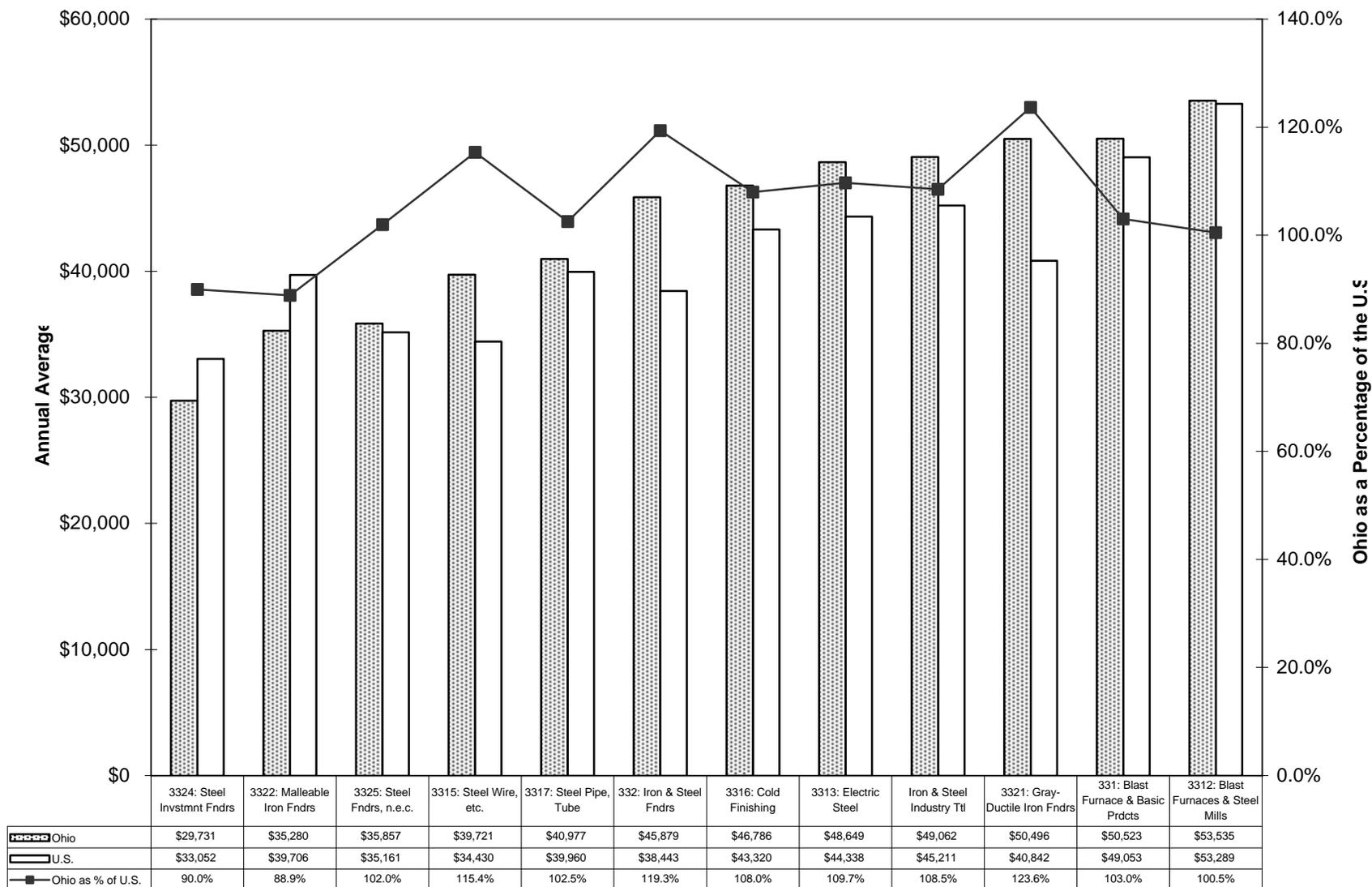
Source: U.S. Bureau of Labor Statistics

Ohio Employment Trends Iron and Steel, 1988-98



Source: U.S. Bureau of Labor Statistics

Wages in the Iron and Steel Industry: 1998



Source: U.S. Bureau of Labor Statistics

ESTABLISHMENTS, EMPLOYMENT, AND WAGES: OHIO AND THE U.S. COMPARED

The number of iron and steel industry establishments in Ohio is greater in 1998 than in 1988, and production has risen during the 1990s, but there are fewer jobs. Wages, after adjusting for inflation, are essentially unchanged. Not every segment of the industry followed these overall trends.

Primary producers must reduce costs to remain competitive, and cutting jobs (among production and non-production staff) has been part of the process across the nation (Bell, 1998).² Ohio has not been exempt from this trend. Consequently most of the job losses in Ohio's iron and steel industry occurred in blast furnaces and steel mills (SIC 3312), just as they have in other states. Losses also happened in many of the other constituent industries. The only industries showing any gains were two of the smaller ones: steel wire and related products (SIC 3315) and steel pipes and tubes (SIC 3317). The pattern of gains and losses was somewhat similar for the nation as a whole. More of the other constituent industries showed gains, but the net effect on the iron and steel industry was a proportional loss—approximately one-eighth of the jobs.

The increase and subsequent, smaller decrease in the total number of industry establishments in Ohio primarily reflects what happened with blast furnaces and steel mills. Other industries saw changes of lesser magnitude: steel pipe and tubes and steel investment foundries had more establishments; malleable iron foundries were unchanged; other industries had fewer establishments. The national pattern is one of gains in blast furnace and basic steel products and steel foundries, and losses in iron foundries.

In 1998, Ohio iron and steel industry wages were 8.5 percent above the national average. Jobs in blast furnaces and steel mills and gray and ductile iron foundries pay better than the overall average. In only two industries is the pay in Ohio less than the corresponding U.S. average: steel investment foundries and malleable iron foundries.

ESTABLISHMENTS AND EMPLOYMENT: GEOGRAPHIC DISTRIBUTION IN OHIO

The preceding maps show the distribution of iron and steel industry establishments and employment across Ohio in 1997. Data from County Business Patterns³ show a wide geographic distribution across the state. Sixty counties had at least one establishment whose primary activity was in the industry. However, the majority of establishments were located in 12 counties: Stark (22), Cuyahoga (21), Trumbull (14), Columbiana and Franklin (10 each), Mahoning (9), Montgomery (7), Butler, Hamilton, Lake, Lorain and Summit (6 each). Seven counties had four or five establishments, 19 had two or three establishments, and 22 had one.

By contrast, five of every eight industry jobs were located in just six counties. Cuyahoga had the most (9,300), followed by Stark (7,500), Trumbull (4,700), Lorain (4,200), Butler (3,600), and Defiance (3,500). Five counties had between 1,000 and 3,000 workers: Coshocton, Franklin, Hamilton, Mahoning, and Richland. Primary iron and steel production or large minimill operations are located in many of these counties. Nine counties had from 500 to 999, and 40 had from 1 to 499.

OHIO'S RELATIVE STANDING

RANKING OHIO IN IRON AND STEEL PRODUCTION BY INDUSTRY GROUP: 1996 & 1997

Industry	Value (in Millions)	Percent of U.S.50-State	Rank	Apparent
1996 Data (SIC system)				
SIC 33: Primary Metals				
GSP:	\$7,340.0*	14.2%		1 st
Value-added:	\$8,901.5*	12.8%		1 st
Value-added:				
Iron & Steel Total	\$6,496.7	17.0%		1 st
SIC 331: Blast Furnace & Basic Steel Products	\$5,303.1	18.2%		1 st
SIC 332: Iron & Steel Foundries	\$1,193.6	13.2%		1 st

1997 Data (NAICS)				
Value-added:				
Iron & Steel Total	\$8,364.8	19.6%		1 st
NAICS 3311: Iron & Steel Mill & Ferroalloy Mfg.	\$5,747.5	22.8%		1 st
NAICS 3312: Steel Product Mfg. from Purchased Steel	\$1,112.3	16.0%		1 st
NAICS 33151: Ferrous Metal Foundries	\$1,505.1	14.3%		1 st

Notes: * - See Note 4 for an explanation; n.a. - not available.

Sources: U.S. Bureau of the Census (1999), U.S. Bureau of Economic Analysis (1998).

The gross state product (GSP) is the final value of goods and services produced by labor and property located in the state. It is the state counterpart to the nation's gross domestic product. GSP data are available for the 50 states and the District of Columbia by division and many major industries. As the chart above shows, 14 percent of the nation's 1996 primary metals production (SIC 33) came from Ohio, making the state the leading source.

GSP data serve as proxies for iron and steel production. Value added data show that the iron and steel industry is the overwhelming part of primary metals production in Ohio (\$6.5 billion out of \$8.9 billion). Because value-added data are available for industry groups, the latter provide better insight into iron and steel production than GSP data alone.⁴ Value-added from the blast furnace and basic steel products group (SIC 331) is the larger of the two groups in the industry. It was 81.6 percent of the industry total for Ohio in 1996, four times the size of iron and steel foundries (SIC 332).

Despite the much larger portion from blast furnace and basic steel products, both groups in Ohio led all other states in their respective categories. This means that Ohio is the leading state for iron and

steel industry production overall. One-sixth of the valued added by the industry happened in Ohio.

Value added data from the 1997 Census of Manufactures reaffirm Ohio's leading position. The state again ranks first in each of the three primary metals sub-sectors defining the industry (NAICS codes 3311, 3312, and 33151). When aggregated, almost one-fifth of the value-added in the U.S. iron and steel industry comes from Ohio. The state ranks first, second, or third in the nation in a variety of specific industries. These include iron and steel mill production (NAICS code 331111), electro-metallurgical ferroalloy production (NAICS 331112), iron and steel pipe and tube production from purchased iron and steel (NAICS 33121), rolled steel shape production (NAICS 331221), and ferrous foundry products (NAICS 33151) (U.S. Census Bureau, 1999c).

As judged by the value of shipments, Ohio ranks first in eight product classes, second in three classes, and third in four classes for which data have been published. In short, the reason Ohio leads the nation in iron and steel production is not just because Ohio is a leading source for raw steel (American Iron and Steel Institute, various years), but because various products come from its mills and foundries in large amounts (U.S. Census Bureau, 1999c).

LEADING AND NOTABLE IRON AND STEEL INDUSTRY COMPANIES IN OHIO

Twelve companies on Fortune magazine's U.S. 1,000 or global 500 lists have iron and steel industry establishments in Ohio. The state is world headquarters for four of these companies: AK Steel, LTV, Timken, and Worthington Industries. The list of companies on the following pages provides information about these and other companies including the primary SIC code, number of employees, and location. The sites are included because their primary SIC codes define them as part of the industry.

With its purchase of Armco, AK Steel became the largest employer in Ohio's iron and steel industry with over 7,300 people. Republic Technologies International (formed by merging the bar divisions of USS/Kobe Steel, Republic Engineered Steels, and Bar Technologies (Bell, 1999)) and LTV are the only others employing over 5,000. General Motors and Ford together employ nearly 6,000 people in the two largest foundry operations in the state. Precision Castparts is the largest non-automotive foundry operation. Other companies employing over 1,000 people in Ohio include Armsted Industries, Buckeye Steel Castings, the Reserve Group, Senco Products, WCI Steel, and WHX Corp. Altogether, there are 16 companies in Ohio's iron and steel industry employing at least 500 people. The map at left shows the locations of the 38 establishments with 300 or more employees.

LEADING AND NOTABLE# IRON AND STEEL MANUFACTURERS IN OHIO: 1999

Parent/Company/Subsidiary or Division	County	Pri- mary SIC Code	Jobs in Ohio	
			Total	Site
* AK Steel Holding Corp.			7,366	
AK Steel Holding Corp.	Butler	3312		306
AK Steel Corp.	Butler	3316		3,800
AK Steel Corp./Armco, Inc.	Muskingum	3312		300
AK Steel Corp./Armco Coshocton Operations	Coshocton	3316		700
AK Steel Corp./Armco/Sawhill Tubular	Trumbull	3312		160
AK Steel Corp./Armco/Specialty Flat Rolled Division	Richland	3312		800
Amsted Industries, Inc./American Steel Foundries	Stark	3324		1,300
Birmingham Steel Corp./Cleveland Division	Cuyahoga	3312		500
Buckeye Steel Castings	Franklin	3325		1,400
Cast-Fab Technologies, Inc.	Hamilton	3321		300
Citation Corp./Mansfield Foundry Corp.	Richland	3321		300
Elkem ASA/Elkem Metals Co. LP	Washington	3313		650
Elyria Foundry Co.	Lorain	3321		330
* Ford Motor Co./Casting Plant	Cuyahoga		3321	
2,496				
General Casting Co.			294	
General Casting Co.	Delaware	3321		72
General Casting Co.	Delaware	3321		12
General Casting Co.	Hamilton	3321		40
Green Sand Division	Logan	3321		110
Iron Casting Division	Lorain	3321		60
* General Electric Co./Elano Corp.	Greene	3312		600
* General Motors Corp./Powertrain Division	Defiance	3321		3,500
Hawk Corp./Wellman Friction Products	Cuyahoga	3312		340
Hoogovens/Thomas Steel Strip Corp.	Trumbull	3316		600
Imetal/Copperweld Corp./Miami Division	Miami	3312		365
J & L Specialty Steel, Inc.	Stark	3316		430
J H Roberts Industries/Alliance Midwest Tubular Products	Stark	3317		425
Jackson Tube Service, Inc.	Miami	3317		350
* LTV Corp.			5,583	
LTV Corp.	Cuyahoga	3312		400
LTV Corp.	Trumbull	3312		240
LTV Steel Co./Cleveland Works	Cuyahoga	3312		4,500
LTV Steel Products Co.	Mahoning	3317		50
LTV Steel Products Co.	Mahoning	3321		80
LTV Steel Tubular Products	Marion	3317		90
LTV Steel Tubular Products	Cuyahoga	3312		150
LTV Steel Tubular Products	Lorain	3317		73
Marion Steel Co.	Marion	3312		400
* Mitsubishi Corp./Coilplus-Ohio, Inc.	Clark	3312		55
McDonald Steel Corp.	Trumbull	3312		250
* North Star--BHP Steel, Ltd. ¹	Fulton	3312		350
North Star Steel of Minnesota/North Star Steel of Ohio	Mahoning	3312		425
OscO Industries, Inc.			445	
OscO Industries, Inc.	Jackson	3321		120
OscO Industries, Inc.	Scioto	3321		300
OscO Industries, Inc.	Scioto	3321		25
Precision Castparts Corp.			1,700	
PCC Airfoils, Inc.	Lake	3324		200
PCC Airfoils, Inc.	Stark	3324		1,500
Quality Castings Co.	Wayne	3321		350
Republic Technologies International			6,122	
Cast-Roll Plant	Stark	3325		55
Hot Rolled Plant	Stark	3312		2,500
Republic Technologies International	Stark	3316		500
Republic Technologies International	Summit	3316		200
Special Metals Plant	Stark	3312		167
USX Corp./USS--Kobe Steel Co. ²	Lorain	3312		2,700
Reserve Group/C S C, Ltd.	Trumbull	3312		1,200
Sandusky International	Erie	3325		250

LEADING AND NOTABLE# IRON AND STEEL MANUFACTURERS IN OHIO: 1999

Parent/Company/Subsidiary or Division	County	Pri- mary SIC Code	Jobs in Ohio	
			Total	Site
Senco Products, Inc.	Hamilton	3315		1,600
TI Group PLC/Bundy North America/Bundy Corp.	Fayette	3317		300
* Timken Co.	Wayne	3317		220
* USX Corp./USS--Kobe Steel Co. ²	Lorain	3312		
* USX Corp./Protec Coating Co.	Putnam		3312	
127				
W C I Steel, Inc.	Trumbull	3312		2,300
* WHX Corp.			3,000	
Pittsburgh-Canfield Corp.	Mahoning		3312	
50				
Wheeling-Pittsburgh Steel Corp.	Belmont	3312		350
Wheeling-Pittsburgh Steel Corp.	Jefferson	3312		2,600
* Worthington Industries, Inc.				292
Dietrich Industries, Inc.	Portage		3312	
87				
Dietrich Industries, Inc.	Trumbull		3312	
125				
Worthington Industries, Inc.	Franklin	3316		80

Notes: # - "Leading and Notable" is not used as an evaluative term. It refers only to companies employing at least 250 people in Ohio or companies on Fortune's U.S. 1,000 or global 500 lists.

* - A Fortune U.S. 1,000 or global 500 company.

1 - A joint venture between North Star Steel and Broken Hill Proprietary Co., Ltd.-the latter is a global 500 company.

2 - Most of the joint venture between the USS division of USX and Kobe Steel, Ltd., was sold to Republic Technologies International, but a small portion remains. All employment was credited to Republic.

Sources: Fortune (1999, 2000), Harris (1999), Hoover's (2000), Intermet (1999), National Register Publishing (1999), OBES/LMI (2000b), Office of Strategic Research (1999a), Worthington Industries (2000).

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FOREIGN INVESTMENT IN OHIO, 1999

The Office of Strategic Research (1999a) maintains a list of foreign corporations with operations in Ohio. The companies may have American subsidiaries or engage in a joint venture with other companies. A list of foreign-based companies with subsidiaries or joint ventures in Ohio's iron and steel industry follows.

Akers International AB own Akers America, Inc.;

Arbed SA owns Namasco Middletown;

Bekaert Corp. has an Ohio subsidiary of the same name;

Broken Hill Proprietary Co. has a joint venture with North Star Steel;

Elkem ASA owns Elkem Metals Co., LP;

Hoogovens⁵ owns Thomas Steel Strip Corp.;

Imetal is the ultimate parent of Copperweld's Miami and Shelby Divisions;

Itochu Corp. is the ultimate parent of Southwestern Ohio Steel's SOS Leveling Co.;

Kobe Steel, Ltd., and the USS division of USX Corp. still have a joint venture in the USS-Kobe Steel Co. even after most of it was sold to Republic Technologies, Inc.;

Mitsubishi Corp. owns Coilplus-Ohio, Inc.;

Thyssen AG owns Ken-Mac Metals, Inc.; and

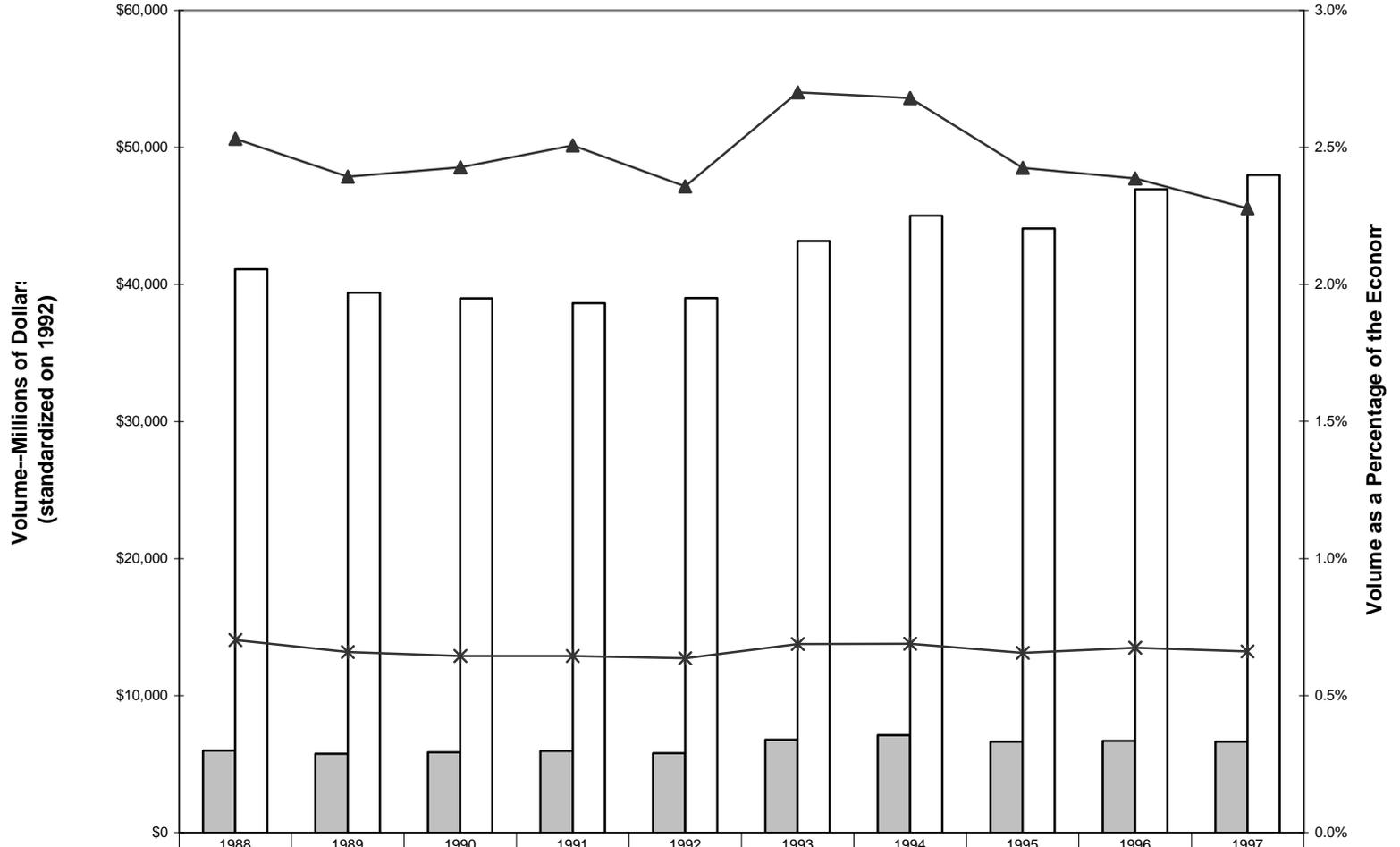
the TI Group PLC is the ultimate parent of Bundy North America's Bundy Corp.

The 12 foreign parent companies listed above manufacture blast furnace and basic steel products (SIC 331). None have foundry operations. With the sale of most of the USS-Kobe Steel operation to Republic Technologies (Republic Technologies, Inc., 1999), it is difficult to say how many Ohioans work for foreign iron and steel companies. Before the sale it was 5,800. After the sale it is at least 3,100.

The foreign parent companies or joint venture partners have headquarters in 10 nations. Three are located in Japan. One each is headquartered in Australia, Belgium, France, Germany, Luxembourg, the Netherlands, Norway, Sweden, and the United Kingdom.

AK Steel is excluded from this list even though Kawasaki Steel has a 14 percent stake. The company's only headquarters is in Middletown, Ohio.

Gross State Product of the Primary Metals Industry (SIC 33) Ohio and the U.S., 1988-97



	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Ohio Industry Volume	\$5,983	\$5,759	\$5,866	\$5,973	\$5,795	\$6,768	\$7,106	\$6,623	\$6,685	\$6,636
U.S. Industry Volume	\$41,105	\$39,398	\$38,983	\$38,637	\$38,999	\$43,173	\$45,014	\$44,074	\$46,942	\$47,983
Ohio Industry as % of Ohio Economy	2.5%	2.4%	2.4%	2.5%	2.4%	2.7%	2.7%	2.4%	2.4%	2.3%
U.S. Industry as % of U.S. Economy	0.7%	0.7%	0.6%	0.6%	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%

Source: U.S. Census Bureau

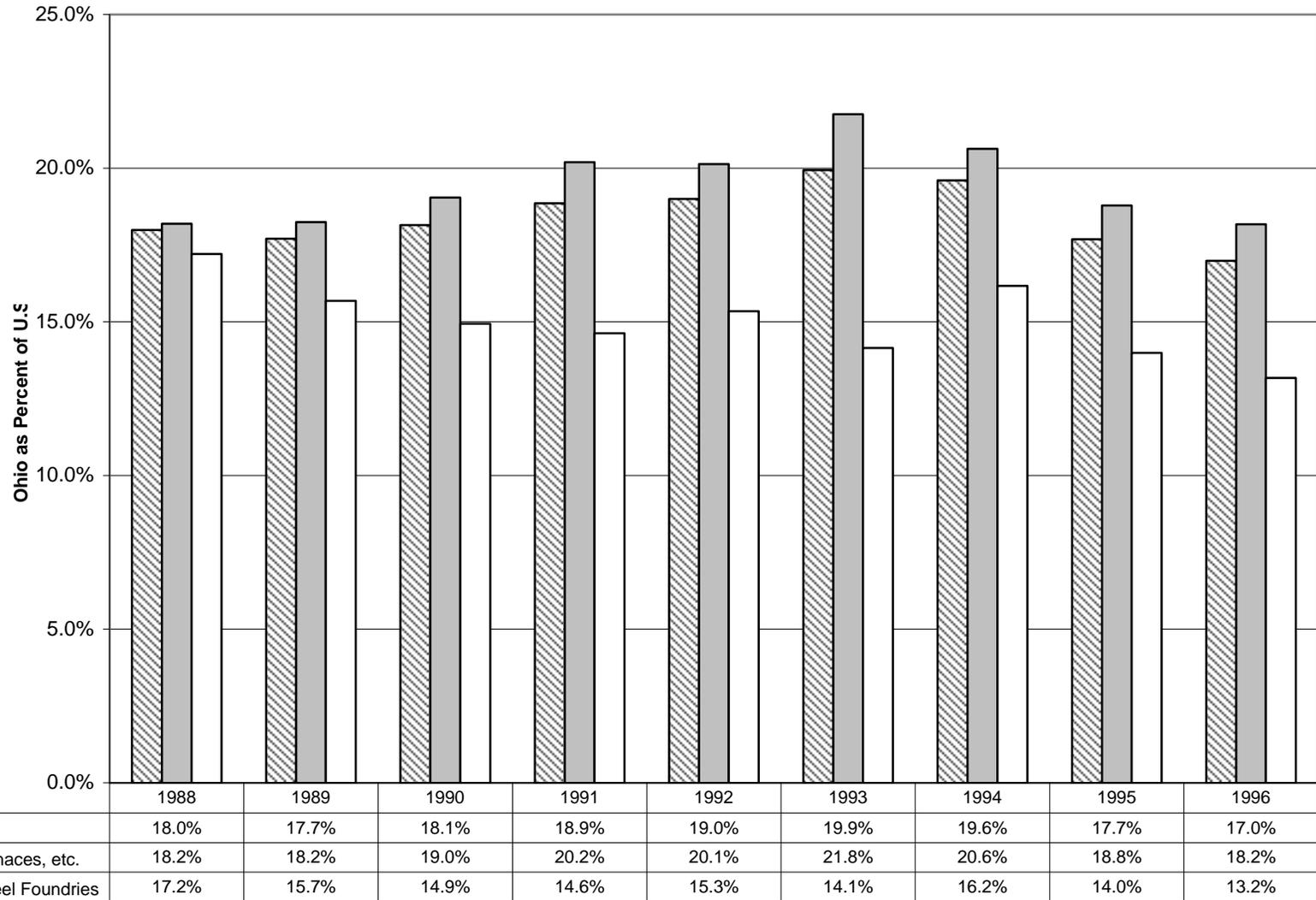
GROSS STATE PRODUCT

GSP data for the primary metals industry (SIC 33) serve as proxies for the volume of goods produced by the iron and steel industry. The table at left illustrates the cyclical character of change in the industry. After adjusting for inflation, real output fell four of the nine times for which year-to-year comparisons are presented. In spite of these fluctuations, the volume of production in Ohio grew from less than \$6 billion in 1988 to almost \$6.7 billion in 1997.

During this ten-year period, output of primary metals ranged from 2.4 to 2.7 percent of Ohio's GSP, ending at 2.4 percent. While caution is warranted when comparing the beginning and ending points of time periods, it is notable that Ohio's economy as a whole grew 23.3 percent from 1988 to 1997, while the real output of primary metals increased almost 11 percent. That means primary metals production was a slightly smaller part of Ohio's economy in 1997 when compared with 1988. Whether or not this trend continues remains to be seen.

The primary metals industry across the nation showed faster output growth than in Ohio, although the industry remains a smaller part of the national economy than is true for Ohio. Consequently, as can be seen in the chart at left, the portion of national output originating in Ohio fell from 14.6 percent in 1988 to 13.8 percent in 1997. Despite the faster growth in the rest of America, Ohio remains the leading state for the production of primary metals.

Value Added in Ohio as a Percentage of the U.S., Industry and Groups Compared: 1998-96



Source: U.S. Census Bureau

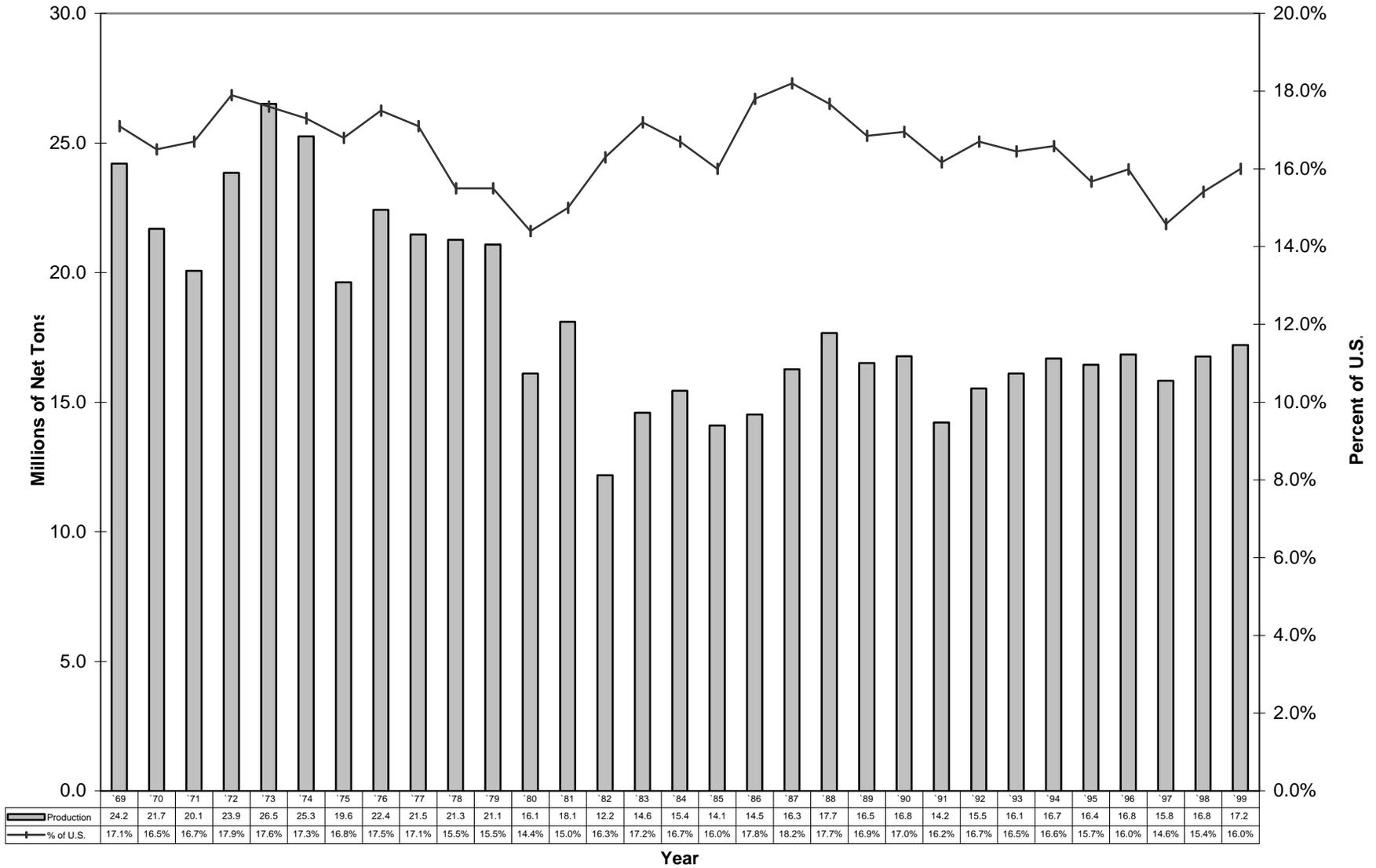
VALUE-ADDED

Unlike the GSP figures, the value-added data for the industry groups have not been adjusted for any changes in prices. Consequently, the true changes in the volume of goods produced by industry group remain unknown. However, looking at value-added in Ohio as a percentage of the nation can provide additional insight into industry changes because the effects of price changes have been removed.

The chart at left shows that the percentage of value added in the iron and steel industry that occurred in Ohio rose and fell during the 1988-96 period. This was largely driven by the rise and fall of value-added by blast furnace and basic steel products (SIC 331). However, the percentage of U.S. value-added by iron and steel foundries (SIC 332) in Ohio fell from 17 to 13 percent as a percent during this time. This lessened command by Ohio's foundries over the money spent in a slow-growth industry may help explain why growth in the primary metals industry was slower in Ohio than in the rest of the nation.

Whether this is part of a long-term trend or just a fluctuation in time remains to be seen.

Raw Steel Production in Ohio, 1969-99



Source: American Iron & Steel Institute

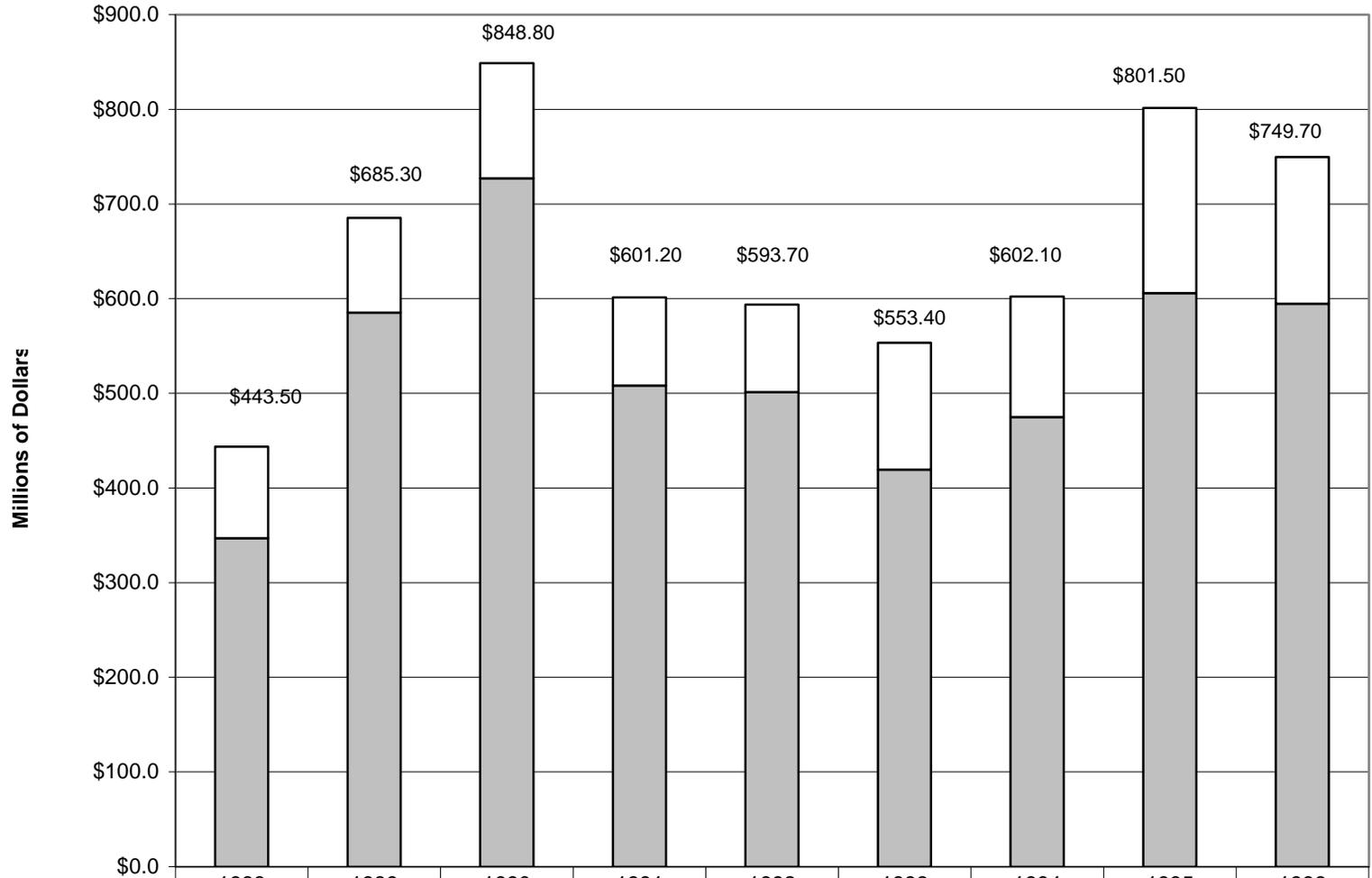
RAW STEEL PRODUCTION

Raw steel production in Ohio peaked in 1973 at 26.5 million net tons. Production exceeded 20 million tons every year from 1969 until 1980, except 1975, when the economy was in recession for at least part of the year. Production in Ohio has never been above 20 million tons after 1979, but has always been above the low point of 12.2 million tons during the recession of 1982.

Raw steel production in Ohio fluctuated between 14.2 and 17.7 million net tons during the 1988-99 period. With the principal exception of 1997, raw steel production has increased fairly steadily since 1991. In 1999, it topped 17 million net tons for the first time since 1988. Ohio ranked second only to Indiana in raw steel production throughout this time.

Approximately one-sixth of the raw steel produced in the nation originates in Ohio. Percentages varied from 14.4 in 1980 to 18.2 in 1987. The three decade span of data provides the context showing that the downward trend in the percentage of U.S. raw steel production since 1987 may not indicate a trend away from production in Ohio—a earlier downward trends is evident, only a fluctuation around a long-term average. The relatively low level of raw steel production in Ohio in 1997 and percentage from Ohio include the effect of the strike at WHX's facilities in Ohio.

Capital Expenditures in Ohio's Iron and Steel Industry, 1988-96



	1988	1989	1990	1991	1992	1993	1994	1995	1996
□ SIC 332: Iron & Steel Foundries	\$96.7	\$100.2	\$121.7	\$93.1	\$92.6	\$133.9	\$127.2	\$195.6	\$155.2
■ SIC 331: Blast Furnaces, etc.	\$346.8	\$585.1	\$727.1	\$508.1	\$501.1	\$419.5	\$474.9	\$605.9	\$594.5

Source: U.S. Census Bureau

CAPITAL EXPENDITURES

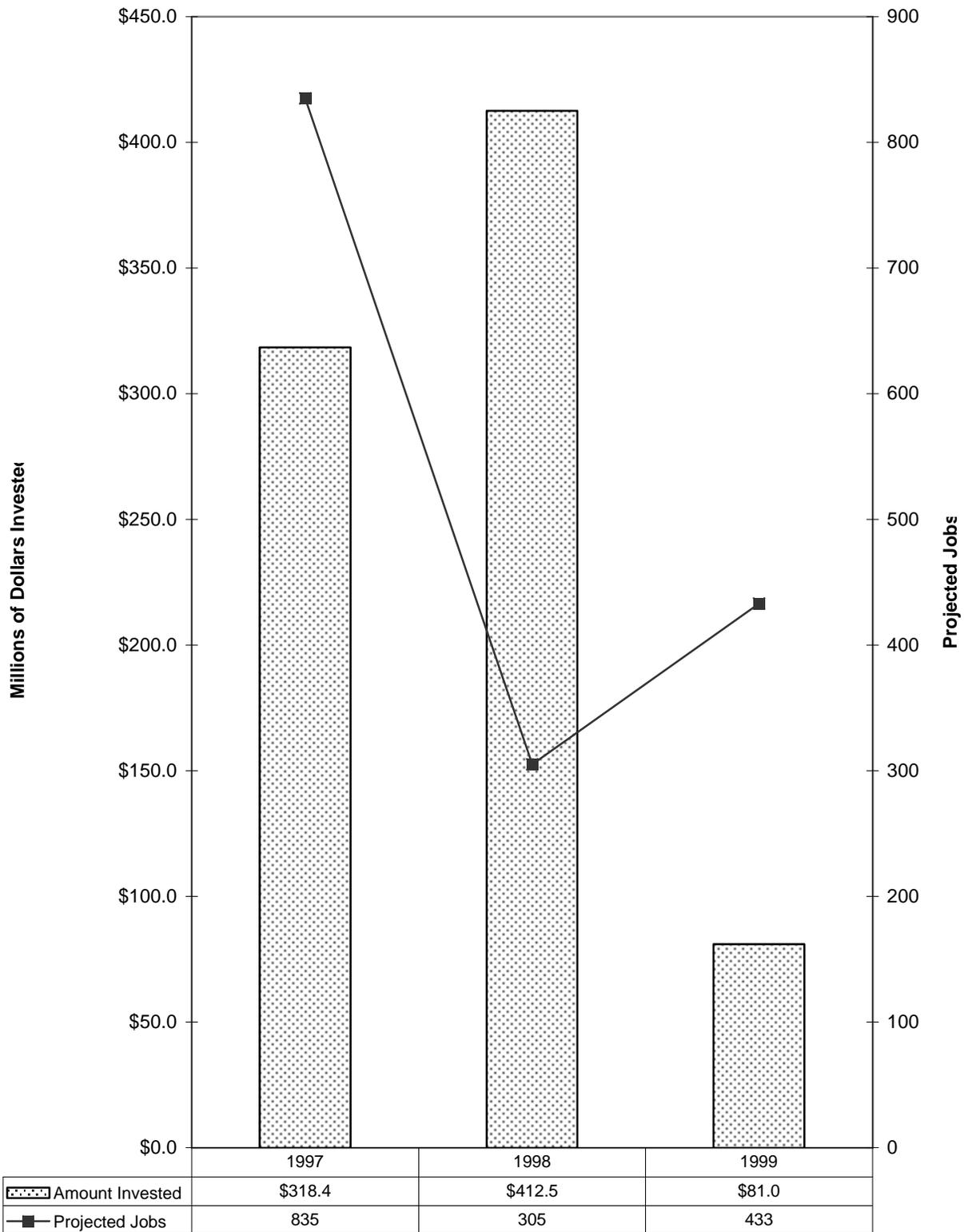
Capital expenditures by the iron and steel industry in Ohio vary substantially over the years. They rose from \$443.5 million in 1988 to \$848.8 million in 1990, and fell to \$553.4 million in 1993 before rising again to \$801.5 million in 1995. The portion of the U.S. industry expenditures invested in Ohio fluctuated between 15 and 24 percent, but averaged almost 19 percent. That is on par with the industry's portion of value-added in Ohio and slightly greater than the percentage of industry jobs found in the state.

The fluctuation in capital expenditures in Ohio largely reflects the year-to-year changes in blast furnaces and basic steel products (SIC 331). The nine-year average for these expenditures is four-fifth of the industry expenditures in Ohio. It also represents 19.4 percent of such expenditures in the nation. Again, this percentage is approximately equal to the percentage of value-added in Ohio.

Capital expenditures in Ohio for iron and steel foundries (SIC 332) also have fluctuated widely, from \$92.6 million in 1992 to \$195.6 million in 1995. These dollar amounts averaged about 24 percent of the national industry group's expenditures, exceeding the group's portion of employment and value added in Ohio.

Capital expenditures in Ohio during 1997 were \$581.1 million under NAICS. The majority of this went into iron and steel mills (NAICS 331111, \$317.9 million), while approximately one-quarter went into ferrous foundries (NAICS 33151, \$139.4 million). The remaining amount went for buildings and equipment to produce electro-metallurgical ferroalloys (NAICS 331112) and steel products made from purchased steel (NAICS 3312). The dollar amounts listed above represent 14.1, 11.5, and 19.5 percent of all such capital expenditures in the nation, respectively.

Expansions and Attractions in Ohio's Iron and Steel Industry, 1997-99



Source: Office of Strategic Research

RECENTLY ANNOUNCED EXPANSIONS AND ATTRACTIONS

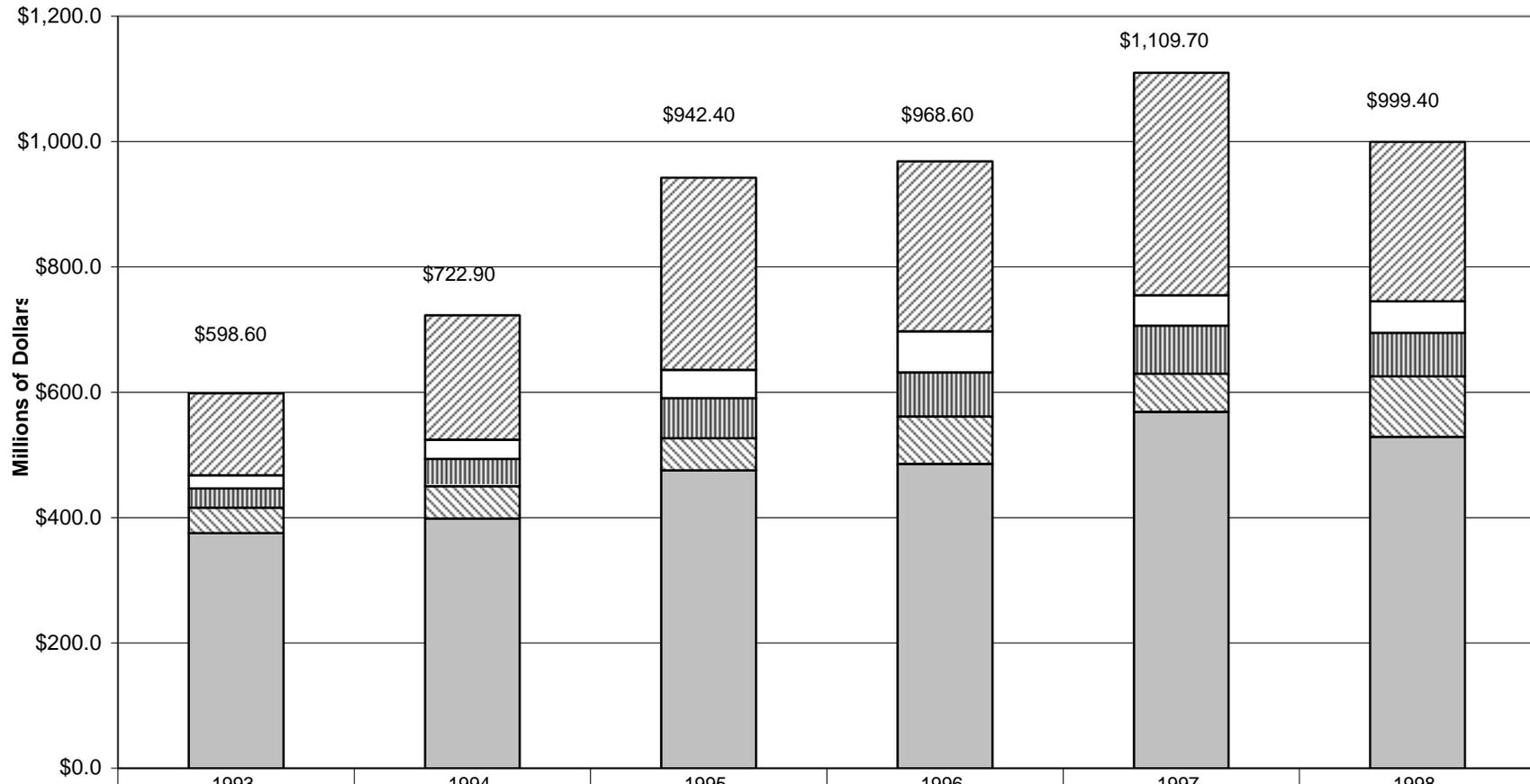
From 1997 through 1999 the Ohio Department of Development recorded 46 major investments in the state's iron and steel industry totaling \$811.9 million. The graph at left shows that the largest dollar amounts were recorded in 1998, but that projected new jobs from investments were greatest in 1997.

The vast majority of funds invested went into blast furnace and basic steel products (\$728.6 million—SIC 331), with the majority allocated for blast furnaces and steel mills (\$478.8 million—SIC 3312). \$83.3 million was invested in iron and steel foundries (SIC 332). No major investment was recorded for electro-metallurgical products (SIC 3313).

Only three companies appear to have invested more than \$100 million during the three years: BF Steel, the CSC division of the Reserve Group, and the Pro-Tec Coating subsidiary of USX Corp. A dozen more companies each invested between \$10 and \$100 million from 1997 through 1999 (Office of Strategic Research, 2000).

These counts are derived from a list of major investments submitted to Site Selection Magazine, which annually compiles announced business expansions and attractions by state. A major investment must meet at least one of the following criteria: 20,000 square feet of new space; \$1 million to be spent for land, building(s), or equipment; or 50 new jobs. Many of the major investments are phased in over a two-to-three year cycle, with production and employee counts phased in after project completion.

Exports of Primary Metals (SIC 33) with Ohio as the State of Origin of Movement: 1993-98



	1993	1994	1995	1996	1997	1998
▣ All Others	\$131.2	\$198.5	\$306.7	\$271.6	\$354.7	\$254.3
□ Japan	\$20.9	\$30.7	\$45.2	\$65.3	\$48.8	\$50.2
▨ U.K.	\$30.7	\$43.5	\$63.7	\$70.6	\$76.4	\$69.5
▤ Mexico	\$40.6	\$51.9	\$51.7	\$75.8	\$60.9	\$96.8
■ Canada	\$375.2	\$398.3	\$475.1	\$485.3	\$568.8	\$528.7

Source: Massachusetts Institute for Social and Economic Research

EXPORTS OF PRIMARY METALS

The growing importance of primary metals (SIC 33) exports from Ohio is evident in the chart at left. Data from the Massachusetts Institute for Social and Economic Research (MISER) offer a current view of export trends, albeit of exports from the state where a product is first identified as an export—not necessarily the state where it was produced. The value of primary metals products first identified in Ohio as exports grew 67 percent from 1993 to 1998 compared to 39.6 percent for all such exports (Office of Strategic Research, 1999c; there is no adjustment for inflation).

The chart to the left illustrates the importance of the North American market for exports from Ohio. Canada is the largest foreign market, receiving almost 53 percent of industry exports shipped from Ohio in 1998. Mexico is once again the second largest market, the destination of about 10 percent of the shipments. The United Kingdom and Japan were the only two other countries purchasing at least \$50 million of industry exports shipped from Ohio.

The chart at left also illustrates the growing importance of the rest of the world. Exports to Canada and Mexico comprised 69 percent of all primary metals exports in 1993, compared with 62.5 percent in 1998. The more-than-doubling of exports to both European (the U.K., France, Italy, Switzerland, Finland and Belgium) and East Asian countries (Japan, Hong Kong and Singapore) in five years is emblematic of this change.

One reason for the growth of exports to Canada and Mexico is the strong demand in the former and the continuing recovery from the peso crisis in the latter. Another reason is the elimination of trade barriers. Under NAFTA, Canadian duties on American steel have been eliminated, and Mexican duties will end by 2003. As a result of the Uruguay Round of WTO negotiations, steel duties between the U.S., the E.U., Japan, Canada, Norway, Switzerland, Hong Kong, and Singapore will end by January 1, 2004. Taiwan will begin eliminating steel duties as it accedes to the WTO. These countries combine for at least one-half of world steel consumption. On the other hand, the devaluations in the wake of the Asian financial crisis reduced exports to the affected countries (Bell, 1998).