A History of the Process of Captial Accumulation in Pittsburgh: A Marxist Interpretation

DAVID B. HOUSTON*

Pittsburgh has long been recognized as having played a crucial role in U.S. capital accumulation in the last quarter of the 19th and the first decade of the 20th centuries. It was in this period both literally and figuratively the crucible of American production of surplus value. Powerfully specialized, it burned like a smoky Roman candle on the American industrial scene, and brilliantly illuminated all of the dynamics and struggle of emerging, established, and declining capitalism. Specialization of place and the consequent uneven development are a hallmark of capitalist cities, and Pittsburgh represented an intensifying of this process until its land, its resources, its people, its factories, its rivers and air were all consumed in the open hearth of capital accumulation. An economic miracle that according to many observers resembled hell on earth, Pittsburgh's history in this period resembles that of a war: explosive, violent, rapidly shifting, victorious and in ruins. The raw and triumphant power of capitalism is nowhere in this country more clearly exposed. It would seem almost impossible to analyze this turbulent time and place in a clear and dispassionate framework, if indeed this is desirable. But an understanding of this process is necessary, for the ravaged landscape of Pittsburgh may yet foretell of the even greater triumphs of modern capitalism.

As Pittsburgh jumped off into a frenzy of capital accumulation there appeared in print for the first time an analysis of the process albeit based on English experience. Marx's *Capital* (1867) holds the key to understanding Pittsburgh's history, and the book was both prophetic and yet in other respects almost out of date within three decades. At the end of the Civil War Pittsburgh was entering a capitalism, pure, competitive, and vigorous. By the end of the century the very force and energy of this process had lead to concentrations of economic power and monopoly culminating in the great steel trust of 1901. Twenty years later Pittsburgh was in decline, and today the entire country is in some measure hostage to the industrial structures created in the turbulent and powerful transition from competitive to monopoly capitalism. Marx's analysis of capitalism is central to understanding

*Department of Economics, University of Pittsburgh, Pittsburgh, PA 15260.

this transition and yet once the transition has occurred many economic processes are changed, and new contraditions emerge from old ones analyzed in *Captial.*

This study will attempt to analyze the process of capital accumulation in Pittsburgh and hence the development of labor and capital in various historical periods which seem to conform to major shifts in the relations and forces of production. First, I will examine the period preparatory to the great accumulation. This dates roughly from 1800-1860 and witnesses the movement from petty commodity production and trading to capitalist production. Next the period from the Civil War until the formation of U.S. Steel will be studied in greater depth. This will include an examination of variable capital (labor power) and constant capital in the accumulation process. The relationships and struggles between labor and capital and among capitals will motivate the transition from competitive to monopoly capital. A third major shift in economic structure is the change in emphasis from production to circulation and management which occurs in the 20th century. The monopolization of capital, the separation of production and management, the rise of the CBD, the dominance of finance capital over industrial capital and the new division of labor, scientific management, are all part of this change. Finally a fourth change from manufacturing to non-manufacturing activity as reflected in the post World War II period will be investigated. This period contains a number of contradictory developments: increasing drains on surplus by unproductive activities; continued decline of the production of surplus value (relatively) in the manufacturing sector; the Pittsburgh Renaissance, an attempt by capital to redirect and redefine the economic role of the city; and the internationalization of Pittsburgh capital, an attempt to concentrate on the appropriation of internationally produced surplus value to compensate for the declining local production of surplus value.

The study will be undertaken within the Marxian paradigm utilizing the historical data available to get quantitative indications of some of the propositions. Because of the breadth of the study the arguments and data will be selective and limited. The intent is to delineate in a fairly broad way major developments in the accumulation process.

OVERTURE TO THE SYMPHONY OF ACCUMULATION 1800-1860

In 1800 the Pittsburgh region was primarily agricultural land with a small urban population of 2,400 where the Allegheny and Monogahela Rivers meet to form the Ohio. The regional population of about 72,000 was mostly settled on small farms. The imperialist struggles which had marked its 18th century history were over. British, French, and Indians had all been defeated. The area's political relationship was determined. The most basic elements of capitalist society, property and free labor had been established. No feudal or slave societal relations had to

be contested here. Yet few could have envisioned the tranformations which full capitalist development would bring in the coming century.

Pittsburgh began this period as an idyllic rural area with modest commercial and very modest manufacturing activities. The rivers provided its most important initial locational advantages, and Pittsburgh was both a stopping off point on the way west and a trading center for the hinterlands of the rivers in northwestern Pennsylvania and northern Virginia. The Ohio River with its ultimate connection to New Orleans and the world market would become increasingly important as population and hence markets shifted to the areas it and its tributaries served and as Pittsburgh production grew. The region also possessed important natural resources. The rich agricultural land laid the base for development, supporting in the first decades of the 19th century the vast majority of the population. The region was also rich in timber for cheap construction, coal for fuel and iron ore for producing iron which was shipped to small manufacturers in Pittsburgh City.

Population

First, we will examine the population and its spacial distribution as it grew and developed in the first half of the century. Table 1 shows the rapid growth in population in the region and more importantly the relative increase in urban population. Capitalist methods of accumulation require the concentration of large masses of labor power since this is the source of the surplus value which is to be accumulated. The history of capitalist accumulation is everywhere the history of the growth and development of capitalist cities, and Pittsburgh to become a center of accumulation needed thousands and ultimately millions of workers "freed" from the land, possessing only their labor power for sale as a commodity in the local market. At the beginning of the period the urban population was only slightly over 3%, sufficient for the trading and small manufacturing needs of a basically rural population. By 1860 the urban core contained 27% of the people of the region. Within this group were the workers, the proletariat, the goose who would lay the golden eggs of Pittsburgh. The pattern of this rapid urban growth was as important as the growth itself. If we examine the first half of this period we see that of the total growth of 71,000 people only 12,600 occured in the urban core, about 18%. In contrast the years 1830-1860 show greater growth in the region, 166,000, yet an even stronger component of that growth is in the urban area, 69,000 or about 42%. Urbanization at an increasing rate was a reflection of the economic transformation from agricultural and other primary activities to a nascent industrialism ready for the explosive growth of the post Civil War era.

Labor migration and accumulation are inextricably bound together, and their relations have been well documented in the latter part of the

TABLE 1

POPULATION IN THE PITTSBURGH REGION
IN THE FIRST HALF OF THE 19th CENTURY

Year	Urban[1]	Central County[2] (000)	Region: SMSA[3] (000)
1800	2,400[4]	15	72
10	4,800	25	100
20		35	121
30	15,000	38	143
40		81	195
50	68,000	138	262
60	84,000[5]	179	309

1. Pittsburgh & Allegheny City—estimates
2. Allegheny County
3. Allegheny, Beaver, Washington, Westmoreland Counties
4. Reiser, C.E. *Pittsburgh's Commercial Development 1800-1850*
5. Included Birmingham City (South Side)

SOURCE: U. S. Census 1800-1860.

19th century. Yet even in this earlier period we can see some interesting tendencies. One source indicates that by 1860 over 18% of the region's population was foreign born[1] while another states that over one third of Pittsburgh's City's residents were European immigrants at this time[2]. Immigrants have historically contributed disproportionately to the urban proletariat, and here we see Pittsburgh as no exception. The foreign born are about twice as frequent in the city as in the countryside. Problems of absorption were no doubt eased by the fact that even in 1870, 92% of the foreign born were from the British Isles or Germany much like the "native" population.

Economy

As already noted the Pittsburgh economy changed significantly in this period. Manufacturing showed the most important change and growth both quantitatively and qualitatively. The value of manufacturing output, taking account of the long term price declines of this period increased a hundredfold. Originally producing for its own regional needs, by 1860 there were substantial exports of manufactures to the west. Pittsburgh had become a center of manufacturing activity which probably accounted for more than half of its regional product excluding agriculture much of which was direct home consumption. Iron production and fabrication dominated the manufacturing sector throughout the entire period, and its influence increased with

time. Initially the furnaces were scattered throughout the region where wood (charcoal) coal, and iron ore were ubiquitous but as the scale of production increased and technology changed they began to concentrate in the urban core where both relatively cheap transportation (the three rivers) and labor were available. However, this concentration was only begining toward the end of this period. It was the foundries and rolling mills which had concentrated in Pittsburgh city, and there were 21 rolling mills and 30 large foundries employing between 6,000 and 8,000 workers in the 1850's. As can be seen from Table 2 the importance of iron rolling and fabrication rose steadily accounting for 40% to 50% of all manufacturing activity foreshadowing the developments of the next half century.

TABLE 2
MANUFACTURING IN THE PITTSBURGH URBAN AREA
1803-1859

Year	Value of Manufactures		Value of Iron Total Value	Manufacturing Employment
	Current ($000)	1967 ($000)		
1803	$ 350	$ 780	16%	
1815	2,620	4,800	29%	1,960
1819	800	1,700		680
1826	2,630	7,700	44%	3,000
1836	11,600	35,200	54%	
1849	16,700	66,800	37%[1]	14,700
1859	26,600	98,500	40%[1]	20,500

SOURCES: 1803-1836 Reiser, C.E. *Pittsburgh's Commercial Development* 1800-1850, p. 203.
1849 and 1859, Census of Manufacturers (Allegheny County).

[1] Percentage of workers in iron.

Other industries were also important. In 1803 textiles and shipbuilding were the next leading activities and at the end of the period glass had emerged as a leading activity with textiles and wood products large but declining. The growth of manufacturing within the process of capitalist development led to larger firms and capitals. The factory system with its masses of capital and labor replaced the small scale petty commodity production of the early period. For example, in 1857 five large textile mills employed 1300 workers and 16 steam engine plants employed 737 workers. In 1850, two iron castings factories employed 500 men. Thus one of the instruments of large scale capital accumulation was ready and in place at the end of this period, but its full development and multiplication was as yet unrealized.

Taking the region as a whole agriculture was still the largest economic activity perhaps using 60% of the working population, though not necessarily wage workers. The small farm was still the most common unit of economic activity, but it was not a significant vehicle for capital accumulation. Even though numerous, its history dissappears in the face of the explosive growth of manufacturing in the rest of the century.

Efficient transportation which was one of Pittsburgh's most important initial advantages was modified during this period by completion of a land route to Philadelphia in 1820 and The Pennsylvania Public Works Main Line, completed in 1834. This was a system of canals and portage railroads. These routes coupled with the rivers defined the transportation network throughout most of the period. However, in terms of its future the most significant transportation development was the connection of Pittsburgh to the growing national railroad network with the route to Philadelphia in 1852 and Chicago and Cleveland in 1856. The railroad would be important to the development of the Steel City in two ways. First, it provided the necessary linkages to markets and in a partial sense to raw materials, and second it would become the major single source of demand for the city's output in the form of rails, bridges, and steel for rolling stock.

The financial infrastructure necessary to an expanding capitalism was not well developed in Pittsburgh even at the end of this period. In 1850 there were five banks and two private banking houses, but currency and credit mechanisms were limited and unstable. Several of these institutions did not survive to 1870, which was the year when the most famous of all Pittsburgh banks, T. Mellon and Sons, was established. By 1850 there were six insurance companies in the city, three local and three from the East. Industrial capital was more highly developed than finance capital in the region as this period closes.

The ruling class of mid century was drawn more from the ranks of the merchant capitalists than the industrialists. Mercantilism and trade were at the base of the late 18th century fortunes, and these origins still dominated the Pittsburgh elite some of whom brought their fortunes from the East while others rose from the ranks of the petty bouregoisie and professionals. However, Pittsburgh a developing, wide open, competitive town was certainly not tightly controlled. All classes were subject in varying degrees to strong market forces with substantial risk and uncertainty.

Crises

It is interesting to examine the impact of capitalist depressions and panics on the Pittsburgh economy. The Depression of 1818-1819 struck Pittsburgh manufacturing quite strongly although only briefly. Looking at Table 2, we can see that both output and employment fell by two-thirds between 1815 and 1819. However, by 1826 real output had expanded over its 1815 level. It is important to keep in mind how small manufacturing was at this time in relation to the total regional

economy. Also it was easier and more natural in the West to revert to pre-capitalist relations and attitudes such as barter, mutual help, and self denial.

The panic of 1837 also caused dramatic declines in certain leading manufacturing activities. Iron manufacturers valued at $6.3 million in 1836 fell to $4.9 million in 1839 and glass declined from $1.3 million to $.5 million in the same years. Yet by 1849 total real production had almost doubled compared to 1836. Thus the crises were difficult, but the limited capitalist development itself was probably the greatest protection against more devastating effects.

Spacial Development

The spacial development of the city followed a fairly typical pattern. The basic street and lot pattern in the triangle between the rivers was laid out in 1784 and is essentially unchanged today. By 1860 this flat land area was completely filled out to Grants Hill which rose fairly sharply from the small river plain. Industry, commerce, public buildings, and housing were all clustered tightly in this small area. Trade facilities and manufacturing tended to locate immediately on the river banks, but in general there was little separation of work and residence. Within the city most people walked, with horses and carriages for those who could afford them. Population and industry did spill across the rivers to the north bank (Allegheny) and the south (Birmingham). In all three areas urban growth seemed unplanned. The results of the marketplace were not attractive. The various paintings and sketches of Pittsburgh from 1800 to 1860 show a progressive loss of the idlyic and bucolic landscape of the Indians and an increasing congestion, smoke, and overcrowding. By 1860 Pittsburgh's reputation was established as a smoky, noisy, industrial city: a great place to accumulate capital but not a place to enjoy the fruits of that accumulation.

Changes in Economic Form

The structure of production changed in two important senses in this period. At a general level the mode of production shifted from a petty commodity and merchant capitalist economy to a competitive industrial capitalist economy although this transition was still going on as the period closed. Concomitant with this the scale of production changed from small family oriented production unit, farms and shops with limited capital to large factory settings with masses of labor power applied to means of production owned by capital. Of course this development too was far from complete,

The idea that capital exploited people was not unknown. One Pittsburgh paper around 1850 editorialized:[3]

> "And what is Pittsburgh? Ask the hundred and thousands of her citizens who are flocking to California where there are no factories no improvements. They will answer, 'We are going to a place where we hope capital cannot oppress

> us. At the risk of our lives we will not be enslaved by the money power.'''

Yet as the quotation shows there were safety valves, and the struggle between capital and labor was not great as neither of the contending forces themselves was very highly developed. There may have been more discontent among the skilled laborers and artisans who watched as their power and control over production was taken over by capital. Either they organized themselves into small capitals and tried to pursue the high road, or they slipped into the class of wage labor and lost much of their advantage.

It remained for the Civil War to fully unleash capital in the U.S. and Pittsburgh. It is fitting that in one sense the War can be veiwed as a struggle between modes of production. Capitalism and slavery in a death struggle whose long run outcome was inevitable. The victory of the industrial north crowned capital as king. No longer restricted, it could go anywhere in the nation in search of opportunities. Pittsburgh was one of the greatest of these opportunities, and the war not only stimulated demand, it broke the last remaining fetters on American capital accumulation.

Many events near the end of this period could be taken to symbolize promise of the future. Here we suggest two. On December 10, 1852 the first train of the Pennsylvania Railroad arrived in Pittsburgh from Philadelphia, signalling the integration of Pittsburgh into the rail network so important to accumulation in America for the next 70 years. And in 1859 the first coke-fired blast furnace in the region was set up at the foot of Mount Washington opposite the junction of the three rivers. The Iron City was soon to become the Steel City and one of the greatest centers of capital accumulation in the world.

THE GOLDEN AGE OF ACCUMULATION 1860-1901

These years contain the greatest transformation in Pittsburgh's history to date. A modest manufacturing center with an emphasis on iron production becomes the largest center for steel production in the world. A regional manufacturing labor force of about 25,000 with great diversity and historic remnants of workers' control, is forced and shaped into a highly disciplined mass of variable capital numbering more than 150,000 workers. Some of the most intense, violent, and important struggles between capital and labor occur in these 40 years. Finally, the dynamic of accumulation is so strong that at the end of the period the greatest steel monopoly and trust is created for the most part from companies which did not even exist in 1860. As much as any time and place in history, Pittsburgh in the last four decades of the nineteenth century, reveals the classic pattern of capitalist accumulation: its requirements, its achievements, and its costs. In the following pages we shall discuss and analyze some of the most salient features of this accumulation, though many important areas and questions will remain unexamined.

Development of Labor: Variable Capital

Essential to successful accumulation is variable capital: a mass of labor power, "free", disciplined and purchased in the market by capital. The development of variable capital is an arduous, time consuming, and difficult process often resisted by the workers themselves. This process is continuous, but its early phases are still with us as the difficulties attendent to enlisting third world workers into capitalist production show. Population growth, immigration, factory discipline, attacks on unions and strikes are all part of the creation and development of variable capital in this period.

TABLE 3: POPULATION IN THE PITTSBURGH REGION
1860–1980

	Urban Core (000)	Central County Allegheny (000)	Region: SMSA 4 Counties (000)
1860	84	179	390
70	187	262	406
80	247	356	529
90	366	552	786
1900	483	775	1,084
10	566	1,019	1,472
20	628	1,186	1,760
30	670	1,374	2,023
40	672	1,412	2,083
50	677	1,515	2,213
60	604	1,629	2,366
70	520	1,605	2,401
80	424	1,434	2,261

Source: U.S. Census

Table 3 contains data on the size and nature of population change in the Pittsburgh region. In the 40 years following 1860 the regional population multiplied 3½ times until in 1900 it stood at over a million persons. But the growth in the concentrated urban population was even greater showing a more than five fold increase. In 1860 the urban core accounted for 27% of the regional population while by 1900 it contained 483,000 or 45% of the Pittsburgh regional population. The central county, Allegheny, had almost ¾ of the region's people. These relative shares were the highest ever attained. Indeed today the City of Pittsburgh is 12% smaller than it was in 1900 and contains less than 20% of the region's population. This concentration of labor power was necessary for capitalist production. It was not until the beginning of the 20th century that capital began to discuss the necessity of dispersing both factories and workers' residences in order to better discipline the labor force.[4] Wide spread dispersal awaited the technology of pro-

duction and transportation of the middle of the 20th century, but early moves were already being made by 1910. However, increasing concentration marked Pittsburgh's development in the years under study.

The rapid increase in the demand for labor could hardly be met by natural increase. The result was massive immigration to the region much of it foreign. If we assume a 20% natural increase in population per decade and no out migration, then by 1900, 57% of the regional population would have to be accounted for by migrants, both U.S. and foreign born. Throughout this period the percentage of foreign born in the population increased from 18% in 1860 to 22% in 1900. Of the approximately a quarter of a million foreign born in 1900, 64% were from Northern Europe, 27% from Central and Eastern Europe, and 7% from Italy. Both the increased number of migrants and the cultural and language differences created enormous strains both within the working class itself and within the general population. Of course, this divisiveness could only work to capital's benefit. In addition it should be remembered that the foreign migrants were not distributed proportionately to the general population. Most of them came to work in the mills and that meant working in the urban core or the small river mill towns in the center of the region. Newly transplanted workers are likely to be more docile and uncertain, and this fact was not lost on capital.

Development of Capital: Industry

By the beginning of the Civil War manufacturing was crucial to the Pittsburgh economy, and its importance would greatly increase in the next four decades. Table 4 contains various statistics which illustrate that growth. First, we see that value added (wages, depreciation, interest, and profit) in manufacturing increased in the region over 12 times to nearly ¾ of a billion dollars when measured in 1967 dollars. At the turn of the century Pittsburgh was the fifth largest industrial area in the nation in terms of value added. Production workers in manufacturing [5] increased from 24 to 155 thousand, which is roughly their number today, and they doubled as a proportion of the regional population, reaching a historic peak of over 14% in 1900. In addition we can see how the labor force participation rate rose in this period from .30 to .41. This increase is a response to the rising demand for labor but it also reflects the changing character of the economic relations under capitalism. As capitalism advances opportunities for self employment, both urban and rural, and employment in subsistence and barter economic relations dry up and more and more workers are forced into the capitalist market in labor. The last column in the table shows the increasing specialization in metals and metal products until it accounts for perhaps ¾ of all manufacturing activity in the region.

At the center of Pittsburgh's golden age of accumulation was the great iron and steel industry. As noted earlier by the beginning of this period Pittsburgh was already specialized in iron fabrication. There

TABLE 4:
MANUFACTURING AND EMPLOYMENT IN THE PITTSBURGH REGION
1859–1899

	Value Added in Manufacturing in 1967 $ (000,000)	Production Workers in Manufacturing (000)	Prod. Work. as a percent of Regional Population	Labor Force Participation Rate, City of Pittsburgh	Metal and Metal Products Prod. Workers as a % of Manu. Prod. Work.
1859	58	24	7.4	.30	36
1869	101	39	9.6	.34	
1879	171	55	10.4	.33	61
1889	400	104	13.2	.40	
1899	727	155	14.3	.41	70–75

Source: *U.S. Census of Manufacturers* and estimates on the *Census*.

was also some crucible steel production. The Civil War encouraged production and by 1865 Pittsburgh was producing 40% of the nation's iron. Pittsburgh's advantages in the production of iron and steel consisted of cheap transportation of raw materials, especially a high grade coking coal at Connellsville, adequate sites, and large amounts of water. All of the great steel works were built along the rivers wherever a sufficient flat site could be found. Eleven large plants were built between 1853 and 1911. None has been built in the region since. The oldest, the Jones and Laughlin works were in the city itself. Originally an iron works, it was converted to Bessemer steel in 1886. The first Bessemer steel plant in the region was Carnegie's Edgar Thomson Works, opened in 1875, and named for the President of the Pennsylvania Railroad, the best customer for the steel rails which it produced. The enormous profitability of the Edgar Thomson works motivated the opening of the Homestead Works in 1880 also intended to produce rails. In 1883 Carnegie bought Homestead and stopped rail production which competed with his other plant just two miles up the Monongahela River. The cost of purchasing the Homestead plant was paid for with two years of profits. The Duquesne Works were opened in 1889 and designed to produce steel rails. Carnegie bought them in 1890 and the purchase price of $1 million was recovered in a little more than a year. In 1892 another integrated works was developed at McKeesport. Of the works so far described, all except J & L became part of the newly formed U.S. Steel Corporation in 1901. Of the remaining six plants built, two were built or acquired by U.S. Steel, one was built at Alliquippa by J & L (today owned by Ling, Temco, and Vought of Texas) and the other three by independent companies. All increases in basic steel output in the region since 1911 are the result of changes in equipment and organization rather than of new plants.

Pittsburgh's dominance in steel production is revealed in the following data. In 1894 Allegheny County produced 43% of all the steel in the nation and in 1898 the region contained 32% of all the steel making capacity in the U.S. These are the peak regional shares and after 1900 they turn down gradually for two decades and then more steeply. Today the regional share of steelmaking capacity in the country is in the vicinity of 10%.

From Competition to Monopoly

At any given time and place there are many forces shaping capital and determining its future development. The struggle between capital and labor is one of the most important of these forces, and as discussed below its effects can be profound and long lasting. Another aspect of the development of capital is found when we look at the struggle within capital itself: the frenzied competition in the accumulation of surplus value. This competitive struggle has many elements such as technological change, control of raw materials and markets and of great importance the impact on corporate form and structure. Since 1880 competitive capitalism in many lines of economic activity has

become, through the struggle of many smaller capitalists, monopoly capitalism where one or a very few giant agglomerations of capital dominate the field.

What is the reason for the increasing centralization of capital? To begin with we must recognize as did Marx[6] that there are two processes going on. First each capitalist is attempting to expand his particular capital through reinvestment of surplus, i.e. extended reproduction. Second, the more successful capitals will buy out the less successful ones. This is often encouraged by capitalist crises which cheapen the value of capital and make possible the acquisition of many "good bargins" from among the weaker and smaller firms. Scale is an important factor here as large firms possess the labor power, credit lines, maketing capacity, and so forth necessary for succssful expansion. Indeed, capitalist development has led to the adoption of technologies which promote large scale and hence reduce competion. Bourgeoisie economists never tire of extolling the virture of "pure competition" to the abstract consumer, but capitalists, from the earliest days of merchant capitalism forward, have assiduously avoided competition wherever possible. The centralization of capital is not so much a choice of capital as a necessity of the accumulation process. Capitalists would like to control the markets that they must operate in, markets in raw materials, labor, final products, finance, and larger units of capital are both necessary and enabling for this control. The steel industry provides an important example of this transformation, and Pittsburgh's capitalists were a central part of the process.

Andrew Carnegie, the most famous of the steel capitalists, began his investments in a small iron forge in 1863. Along with partners he formed the Union Iron Mill in 1865, capital $500,000. In 1872 they opened the Lucy blast furnaces. In 1875 the Edgar Thomson Works, a Bessemer plant producing steel ingots and rails was opened. A new incorporation of Carnegie Brothers and Co. in 1881 had a capital of $5 million. In 1882 Carnegie obtained a 30% interest in the H. C. Frick Coke Co. and thus secured a guarenteed supply of the valuable Connellsville coke as well as the involvement of Henry Clay Frick who was to become for several years the very effective and successful chief executive of the Carnegie interests. In 1883 the newly constructed Homestead Works were acquired at a low cost, eliminating a competitor in the rail business. In 1890 the Duquesne Works, hardly more than a year old, were purchased for $1 million which was recovered in a little more than a year's operation. In 1892 the company was reorganized into the Carnegie Steel Co. Ltd. with a capital of $25 million. In the following years the company built a railroad which connected all the Pittsburgh plants, acquired substantial iron ore reserves in the Mesabi Range, and acquired a railroad from Lake Erie to Pittsburgh which completed the control of the transportation of iron ore. In 1900 there was a final reorganization and the holding company was incorporated under the favorable New Jersey laws with a capital of $320 million. At this point the Carnegie Company produced 18% of the nation's steel in-

got output and owned or controlled over 40 companies in steel, natural gas, water, coal, coke, iron, limestone, steamships, docks, and general merchandising. It was the most powerful company in steel, noted for its financial strength and efficient management. Table 5 shows the capital of the corporations and their profits in selected years. Recalling that the general price level fell about 45% from the end of the Civil War to the turn of the century, these figures are truly phenomenal. While one might expect that the capital figures are overstated or watered, there is a rare market test of a sort which more than validates at least the 1900 figure of $320 million. This is the final, great acquisition of the Carnegie Company by the U.S. Steel Corporation in 1901.

TABLE 5
CAPITAL AND PROFIT OF CARNEGIE INTERESTS 1865-1900

Year	Capital (000,000)	Profit (000,000)	Year	Capital (000,000)	Profit (000,000)
1865	.5		1889		3.5
80*	1.25	1.62	90		5.3
81	5.0		92	25.0	4.0
86		2.9	98		11.5
87		3.5	99		21.0
88		2.0	1900	320.0	40.0

Source: Hogan, William T., *Economic History of Iron and Steel*, Volume 1, pages 98-100, 243-254.

*Edgar Thomson Works only.

The formation of U.S. Steel represents the highwater mark of the centralization of capital which had been occurring both in steel and in many other lines of economic activity in this period. Elimination of so called destructive competition, control of markets and prices was clearly the intent. This was to be the biggest merger to date with a capital of over $1.4 billion. The Carnegie interests which were the largest single element were valued at $492 million. Carnegie was also in a negative sense the motive force for the steel trust. In 1900 and 1901 Carnegie threatened to enter both the wire and the tube business, and it was feared that this would precipitate price wars througout steel production. While the Carnegie Company was financially sound and well managed and could probably have weathered the storm, other holding companies were more fragile and could go under. Capital needed saving from its own tendencies. In a sense finance capital came to the rescue of industrial capital. J. P. Morgan was one of the few capitalists with sufficient resources to organize such a venture. The new corporation was completely integrated through all lines of raw materials and finished products and controlled in 1902 between 33% and 73% of

the national production of raw materials and finished products. The drive to accumulate had taken the myriad blast furnaces, forges, and rolling mills of Pittsburgh in the 1860's and welded them into the greatest agglomeration of capital in history created by men whose direct knowledge and experience in steel production was negligible. Here we see capital beginning to free itself from a particular form, steel, railroads, etc. Finance capital though it must be invested in a concrete activity has not interest in the activity other than its ability to accumulate surplus value. The modern conglomerates represent in an even purer form this capital *qua* capital aspect.

Finance Capital

Finance capital was growing in Pittsburgh too, and here the most famous and important element was the Mellon family. In 1860 the Bank of Pittsburgh with assets of $1 million was the largest of the city's 14 banks. By 1876 the banking and financial structure was well established with 87 banking institutions. The Pittsburgh Clearing House Association at this time was composed of 18 banks and had a capital of $10 million. It had been formed in 1865 and showed annual clearings of $84 million in 1866, $787 million in 1890, and $1,600 in 1900. Considering the 45% decline in prices, these data also show the incredible expansion of capital in this period. In 1870 T. Mellon and Sons banking house was established. Under the direction of Andrew and Richard Mellon during the next 50 years this firm would become one of the greatest finance capitals of the world. Unlike Carnegie whose path to accumulation was through a single activity, steel, the Mellons as bankers accumulated through diverse activities such as aluminum, oil, chemicals, construction, steel, shipbuilding, and more. Lending, acquiring shares, merging, consolidating, these were the techniques of the great finance capitalists. In 1902 the firm became Mellon National Bank and had large interest in or control of many diverse corporations. The most recent estimate of the family fortune is $4.7 billion. This is the result of the continuity of the family and 100 years of unrelenting accumulation. Unlike Frick or Carnegie, one never hears of the Mellons being referred to as ruthless. Finance capitalists being at least one step removed from the actual production and appropriation of surplus value can be more gentil.

Land Use

Economic growth affected the land and its use. Real estate value rose from $100 million in the City in 1880 to $207 million in 1890 and $320 million in 1900. Rapid population growth led to overcrowding though this was somewhat relieved after the late 1880's when trolleys and electric railways began to be developed. Parks, conservatories, libraries, museums, music halls all the gifts of great capitalists, although all producted in fact by the workers of Pittsburgh, made their appearance. Skyscrapers and public building appeared in the

Triangle. But land use in Pittsburgh was an even greater disaster after the golden age of accumulation then before. Floods, typhoid epidemics, and daily smoke pollution were continuous and chronic events. The lives of hundreds of thousands of workers were so miserable as to defy description. In the case of Pittsburgh, the dark side of accumulation has been so continously and thoroughly described that no repetition is necessary here.[7] In general the capitalist fled their city of steel first to the hilltops and nearby countryside, then to Ligonier, then to New York, and some even left the country.

Strikes

As capital and labor both developed, the antagonism inherent in the relations of production were bound to surface. While these antagonisms exist on a continuing day to day level, strikes are among the most dramatic manifestations of the struggle between capital and labor over both the production and distribution of surplus value. The two great strikes in Pittsburgh in this period reveal both dimensions. In July of 1877 the Baltimore and Ohio Railroad announced a 10% wage cut coupled with a plan to reduce the workforce by half and consequently double the work rate of those remaining. The strike spread quickly across the country and a week later in Pittsburgh the Pennsylvania Railroad freightmen went out shutting down the yards. Because the general population was sympathetic with the strikers the local militia could not be relied upon, and the Philadelphia militia was called in. After some rock throwing the militia killed 20 workers and wounded many more. People responded by attacking the militia and destroying the property of the railroads. Then as now the bourgeoisie media was appalled at the "riot." Harpers Weekly reported that Pittsburgh was controlled "by a howling mob whose deeds of violence were written in fire and blood." The actual fighting and attack on capitalists' lasted two days. After that volunteer committees worked on clean up and embryonic workers' governing councils were established. The strike was not broken for nearly two weeks, and in that time the bourgeoisie feared for both its capital and its control over Pittsburgh society. Even to this day the Great Strike of 1877 is treated as a riot rather than as a class struggle and an attempt to curb the power of capital. This moment viewed from a workers' perspective rather than a capitalist one represents one of the high points of workers' consciousness in Pittsburgh's history. Regardless of the interpretation one puts on the strike, it is clear that it flowed out of an attempt by capital to radically increase its share of the value produced by labor: to drive down variable capital and consequently raise surplus value. Workers, of course, fought against this reduction, then as now.

The second great strike in this period of Pittsburgh's history was in steel itself in 1892 at the Homestead Works which were part of the Carnegie empire. The union of this period was Amalgamated Association of Iron and Steel Workers founded in 1876 through the merger of three unions. By 1890 it had 24,000 members in Allegheny County, but

the development of unionism was very uneven. The Edgar Thomson works had been briefly unionized and the Duquesne Works never had a union.[8] One of the strongest locals or lodges was at Homestead, and it was here that the most important struggle between capital and labor of this era was joined. The Amalgamated was a skilled workers' union; only 20% of the 3,800 workers at Homestead were members. At this time the skilled workers and not the management controlled production on the floor of the plant.[9] The owners wished to shorten the work shift from 12 to 8 hours to allow more continuous operation of the steel works. However, since skilled workers were paid on a tonnage basis this would drastically reduce their earnings. In addition it is clear with hindsight that the owners wished to radically alter the whole role of labor in steel production, most particularly so as to gain control of the entire production process and strip the workers of all control. Carnegie as late as 1886 had written supporting workers' right to unionize, but as little as two years later was opposing unions in the works he controlled. Workers' rights were a principle but not as high a principle as that of capital accumulation. He attempted to break the union at Homestead in 1889 but a threatened strike forced him to sign for another three years. In 1892 his resolve was greater having hired Henry Clay Frick, noted for his anti-unionism, as chairman of the Company. It was clear that the "contract" that the company proposed would have eliminated the union. A lockout on June 28, was followed by a strike that lasted almost five months until November 20. The workers fought private armed Pinkertons and the whole 8000 man state militia, but finally capitalist law and order was restored. Scabs operated the plant and production went forward. The union was effectively broken, membership declined in the Amalgamated, and it was not until 1936 that unionism returned to steel. The breaking of the union was really the breaking of the skilled workers' hold over production. After this time technology and labor organization changed rapidly with unskilled labor replacing skilled labor, a general de-skilling of the whole labor process, a subdivision of the production process so that no one worker could understand and carry out the entire process, and a separation of manual and intellectual tasks relegating the latter to management so that the full control and understanding of the production process was in capital's hands. This process which has been examined in detail in Braverman's work[10] represents a fundamental transformation of variable capital and the further subjugation of labor to capital. Even the unionization of steelworkers has never been able to alter or reverse this subjugation. Thus, most importantly the Homestead strike was a struggle over relative surplus value wherein masses of expensive skilled labor power were discarded for even larger masses of unskilled labor power, a process which has not yet reached its limit. The degradation of labor is not simply measured by a wage rate, though wages did fall after capital's great victory.[11] It is measured by the total relationship of the workers to the production process, and the defeat at Homestead meant increased degradation and alienation for the worker in steel.

A Quantitative Analysis of the Accumulation Process

This section presents an analysis of the accumulation process using Marx's value categories. Several caveats are in order. The data in the *Census of Manufactures* from 1859 to 1899 is certainly subject to error, most particularly the capital stock figures which were finally eliminated in the 1919 Census as they were considered too unreliable. However, capital stock is one of the most important economic variables, and it is necessary for this analysis. A second major limitation results from our treating prices as values. The data in the census are collected in price terms. Marx's theories are developed in value terms; the unit of value is a unit of labor. Thus, in effect we are ignoring the transformation problem in this analysis. It is possible that the errors introduced by this are reduced by using the aggregate data for all manufacturing in the region, if the organic composition of capital for manufacturing in the region corresponds to that of the entire economy. Finally, the fact that we are examining fifty years of history with just six data points must limit our conclusions. Data of this sort are particularly vulnerable to undesirable cyclical variation.

Marx's scheme is presented in terms of total value of the final products not only value added or created in this cycle of production. The value equation is:

$c+V+S=$ Total Value, where:

$c=$ the flow of Constant Capital consists of two distinct elements: the raw materials energy, fuels, etc. used to produce the final product, (c_{rm}), and the depreciation on capital machinery and equipment, buildings, etc. used in this cycle of production, (c_d).

$C=$ the stock of constant capital, i.e. fixed capital $+c_{rm}$.

$V=$ Variable Capital is the value received by labor in this cycle of production.

$S=$ Surplus Value the value above V created by labor but appropriated by capital in this cycle of production.

The data in Table 6 is for all manufacturing and production workers in manufacturing in the four country region (SMSA). For Marx only workers productive of surplus value employed by capital should be included in variable capital. Other workers who may be equally necessary to capitalists in their quest to accumulate, e.g., advertising workers, laywers, accountants, much of the managerial staff, are not productive of surplus value and should be accounted for as a deduction from surplus value. This element will become important in some of the 20th century calculations, but here we assume that the non-productive labor force in manufacturing had not grown to significant proportions.

There are several value ratios which Marx believed were important to an understanding of capitalist development. The first of these is the organic composition of capital, q, of which is the stock of constant capital divided by variable capital. In a sense it shows the structure of production of machines and materials to human labor power. The closest traditional measure would be the capital-labor ratio, but they are not identical. Marx contended that the nature of capitalist development was such that capitalists would over time substitute inanimate

TABLE 6
VALUES OF MANUFACTURING IN THE PITTSBURGH REGION 1895–1909
(000,000)

Year	c_{rm}	c_d*	c	C	V	S	Total Value	$q = \frac{C}{V}$	$p = \frac{S}{C+V}$
1859	14.9	2.5	17.4	39.4	7.5	5.8	30.7	5.3	.12
1869	57.0	6.0	63.0	119.4	19.9	14.5	97.4	6.0	.10
1879	68.0	7.8	75.8	146.3	24.5	15.7	116.0	6.0	.09
1889	171.0	22.0	193.0	391.6	56.8	16.2	266.0	6.9	.04
1899	320.0	45.7	365.7	776.7	83.1	46.2	495.0	9.3	.05
1909**	367.0	64.0	431.0	1010.0	90.0	58.0	579.0	11.2	.05

Source: *Census of Manufacturers*
*Depreciation is estimated as 10% of capital as shown in the census.
**Data in 1909 are for the Pittsburgh Metropolitan District which includes only three counties: Allegheny, Washington, and Westmoreland.

capital, or dead labor, or constant capital for living labor or variable capital in the production process. As a result historically C/V should increase. Given the limitations described above we can see that the organic composition of capital does increase over this period. In fact it increases dramatically after 1889, although the increase is so large that the data may be faulty. Recalling the discussion of the Homestead steel strike (1892) and the reorganization of production after the strike, we might expect a significant increase in q in the next two decades. We may conclude that during this classic period of accumulation Marx's hypothesis is given support.

Marx also identified the rate of profit in value terms, $p = \frac{S}{C + V}$ as an important ratio in capitalist development. He argued that because of the substitution of dead for living labor, and since only labor could create *new* value, that there was a tendency for the rate of profit to fall. He also showed that there were many counter tendencies, and consequently that the resolution of forces at any given moment was *a priori* indeterminant. However, over the long period the tendency was for the rate of profit to fall, since even though productivity could increase, it could not increase sufficiently to overcome the relative decrease in variable capital, the only source of surplus value and hence profit. The value rate of profit is shown in the last column of Table 6. The results are interesting in that they show the rate of profit declining steadily until 1890. Notice that surplus value is fairly constant from 1869 to 1889, and rises sharply thereafter. Thus we might conclude that up until the 1890's capital was loosing ground to labor in the struggle for surplus value. Then, the reorganization of production led to such increased labor productivity that even though firms were substituting constant for variable capital—a rising q—the net effect was to maintain the rate of profit. These results do not contradict Marx's hypothesis of the tendency of the rate of profit to fall, but it should be observed that it is at the end of this period when competitive capitalism is being transformed into monopoly capitalism, and monopoly is a factor which can counter a falling rate of profit. With all the limitations discussed, it is still true, that organizing the data in terms of Marx's categories can help us understand the history and structure of capitalist production in this pericd.

One final exercise with the data can shed further light on the quantitative relation between capital and labor. While it is true that the average annual real wage in manufacturing rose in this period, one can ask if it rose as rapidly as productivity. This can be measured by taking the share of wages in value added. If this ratio is increasing then wages are rising faster than productivity whereas if the ratio is falling the reverse is true. Table 7 shows these figures. Here again we see the tendency for labor to gain at the expense of capital through 1890. But after that productivity exceeds wage gains, that is capital was winning this economic dimension of the class struggle.

Thus we see in Pittsburgh in this period the strong development of the two great forces of capitalism: capital and labor. At the beginning

TABLE 7
RATIO OF PRODUCTION WORKERS WAGES TO VALUE ADDED IN MANUFACTURING IN PITTSBURGH 1859-1909

Year	Wages / Value Added	Year	Wages / Value Added	Year	Wages / Value Added
1859	.48	1879	.51	1899	.46
1869	.49	1889	.53	1909	.42

Source: Calculated from *U.S. Census of Manufacturers.*

of this era each is diverse, small, and casual. The process of accumulation brings unity, size, and seriousness of purpose to each. Of course there was no question as to which force or class was dominant in 1900, as there is none today. Indeed, what would capitalism be if capitalists were not the ruling class? But class struggle is a continuous dialectical process. There are no permanent victories and each new period of development simply reveals the new forms of the struggle.

This concludes Part I, the analysis of Pittsburgh's first century of accumulation. In both physical and social terms the fixed or rigid nature of this development has deeply affected Pittsburgh in the 20th century. More recent change has been inhibited by the somewhat inflexible legacy of rapid industrialization. In Part II we will examine how Pittsburgh has tried, with only limited success, to respond to newer forms of capital accumulation. If the 19th century shows Pittsburgh in the active mode, in the forefront of capital accumulation, the 20th century is a history of passive response to forces of change beyond its boundaries and beyond its control.

FOOTNOTES

[1] Lowry, Ira S., *Portrait of a Region*, University of Pittsburgh Press, 1963, p. 37.

[2] Lorant, Stefan, *Pittsburgh*, Doubleday, 1964, p. 101.

[3] Lorant, *Op Cit.* p. 107.

[4] Gordon, David M., "Capitalist Development and the History of American Cities," in Tabb, William and Sawers, Larry, Eds. *Marxism and the Metropolis*, Oxford, 1978.

[5] Production workers are used here rather than total employment since they correspond more closely to Marx's category of productive labor. While there are other groups of workers who would be classed as productive, e.g. transport, agricultural, mining, in a region like Pittsburgh, the manufacturing production workers are by far the largest group. This distinction will become more important and obvious when discussing surplus value and profit below.

[6] Marx, Karl, *Capital*: A Critique of Political Economy, Volume I, pp. 625-627, International Publishers, N.Y.

[7] Lubove, Roy, *Twentieth Centry Pittsburgh*, Chapter One, John Wiley, 1969.

[8] Hogan, William T., *Economic History of the Iron and Steel Industry in the United States*, Volume 1, pp. 227-233. Lexington Books, Mass. 1971.

[9] Stone, Katherine, "The Origins of Job Structures in the Steel Industry," *Review of Radical Political Economics*, Volume 6, No. 2, Summer 1974, pp. 116-118.

[10] Braverman, Harry, *Labor and Monopoly Capital: The Degradation of Work in the 20th Century*, Monthly Review Press, 1974.

[11] Hogan, *op cit.* Volume 1, page 233: "Between 1890 and 1910 labor costs were to be reduced almost one-third from 22.5% to 16.5% of total manufacturing charges, and productivity was to double in the steel plants and triple at the blast furnaces."