

Chapter 2

Dimensions of Change: 1869-1900

"The best business you can go into you will find on your father's farm or in his workshop. If you have no family or friends to aid you, and no prospect opened to you there, turn your face to the great West, and there build up a home and fortune." -- Horace Greeley, 1855

The time span of this book's interpretation of the American standard of living begins at noon on May 10, 1869, at Promontory Point, Utah. That moment was unprecedented in world history not just because Leland Stanford pounded a golden spike with a silver hammer and in an instant ended the isolation of California and the great West from the eastern half of the United States. Just as important, symbolizing the revolutionary increase in the speed of communication achieved by the 1844 invention of the telegraph and first 1858 undersea ocean telegraphic cable, the famous message "DONE!" was transmitted within a second to the entire United States, Canada, and the United Kingdom.¹ This was the first time in the history of the world that news of an epochal event was greeted with such celebration by so many people at the same time:

"Across the nation, bells pealed. Even the venerable Liberty Bell in Philadelphia was rung. Then came the boom of cannons, 220 of them in San Francisco . . . , a hundred in Washington, D. C., countless fired off elsewhere. It was said that more cannons were fired in celebration than ever took part in the Battle of Gettysburg A correspondent in Chicago caught exactly the spirit that had brought the whole country together. The festivity was . . . `was free from the atmosphere of warlike energy and the suggestions of suffering, danger, and death which threw their oppressive shadow over the celebrations of our victories during the war for the Union." (Ambrose, 2000, p. 366).

The joining together of the nation through a transcontinental railroad and instantaneous telegraphic communication together symbolize how much the American standard of living had improved by 1869. After millennia in which the life of rural farmers remained little changed since the days of ancient Rome, the First Industrial Revolution had begun to spread its bounty in many directions before 1869, particularly in the form of steam engines, cotton gins, railroads, steamships, and telegraphic communications. If the beginning of the First Industrial Revolution is dated to 1750, the pace of its improvement in living standards was relatively slow. The year 1869 is chosen for the starting date of this book not just because a wide variety of economic data are

¹ Details from Ambrose (2000), pp. 365-7.

available back to 1869 but not before, and also because the pace of advance picked up markedly in the three decades from 1869/70 to 1900.

During those three decades the Great Inventions of the Second Industrial Revolution were all achieved within a short time span of roughly 15 years, largely in America (with a prominent German role for the internal combustion engine and motor car), and mainly by self-employed entrepreneurs. The most important of these by far were electricity and the internal combustion engine, inventions so important that it took almost a century to develop the secondary and tertiary inventions that were made possible by the initial Great Inventions. After a delay of almost four decades (David, 1990), factories were finally reorganized to take advantage of the dispersion of individual small electric motors not previously feasible with large centralized steam engines. Consumer benefits from electricity occurred almost immediately with electric light, although that did not diffuse fully from rich to poor and from city to isolated farms until the 1930s. Poor people benefited from electric urban transit starting in the 1880s. Consumer appliances took even longer to be developed and reach the average household, with the first electric vacuum cleaner in 1904, first refrigerator in 1918, first commercial TV station in 1946, and first room air conditioner in 1951.

Similarly, the invention of the internal combustion engine and its replacement of animal power for transport faced a long evolution. Ford's assembly line and genius for reducing costs was perhaps the single most important reason that the standard of living in the United States raced ahead of other nations in the period 1900-1930. By 1929 the United States was producing 80 percent of the world's motor vehicles and accounted for 90 percent of the world's motor vehicle registrations. But the full development of the impact of the motor vehicle waited for decades, until two-lane highways could be built starting around 1915, until suburbs and supermarkets could be built in the 1950s, and until the interstate highway system began its epochal post-1958 spread roughly one century after the even more ambitious construction of the transcontinental railroad.²

2.1 Unique Aspects of 1869-1900

Most of the benefits of electricity and the internal combustion engine, not to mention secondary inventions of the Second Industrial Revolution (chemicals, plastics, telephone, motion pictures, phonographs) diffused into the standard of living of the average American during the subsequent time period 1900-1930, covered in Chapter 4. The importance and variety of inventions in 1870-1900 earn an accolade as perhaps the most creative three decades in human history, but from the point of view of the average

² The construction of the transcontinental railroad was more ambitious primarily because of the primitive methods used. In Ambrose's words "the transcontinental railroad was the last great building project to be done mostly by hand." The mechanized construction of Interstate 80 is less impressive when we recognize that its route from Omaha to Sacramento closely follows the original railroad grade as the 19th-century surveyors laid it out.

consumer much of the inventing was happening behind the scenes, with multiple benefits waiting for the future. While recognizing that some of the Great Inventions had arrived in the centrally heated and electrified homes of the highest income families by 1900, this chapter is largely devoted to conditions of life not directly influenced by the Great Inventions until after the year 1900.

The remarkable aspect of progress in 1869-1900 is the multiple dimensions of growth in the standard of living in an age when most people still read by gas or oil light and when the overwhelming engine of personal and commercial transport was the horse. This chapter quantifies aspects of living standards by locating details about life in the 1870s and life around 1900. The chapter does not at this stage engage in any attempt to value new inventions but rather, as part of its task, assembles facts on prices and quantities that will ultimately allow the development of such valuation.

What were the dimensions of improvement in 1869-1900? The first improvement was achieved by the diffusion of previous inventions, particularly the railroad and the telegraph. Total railroad mileage in the U. S. more than quadrupled from a substantial 47,000 miles in 1870 to 269,000 miles in 1900 (HSUS 2005, series Df874 and Df930). This nearly six-fold increase of railroad mileage brought the benefits of cheaper goods and cheaper travel to every corner of the country.³

As the railroad lines expanded, so did the telegraph lines. The era 1870-1900 was the heyday of the telegraph, the dominant form of communication prior to the diffusion of the telephone (and in 1900 there were only 1.4 million telephones, many of which were serving businesses rather than households. Telegams sent increased from 9.1 million in 1870 to 63.1 million in 1900. Over the same period telegraph offices increased from 4 to 23 thousands. Nor was the telegraph making the postal service obsolete, as the number of stamps sold skyrocketed from 468 million in 1870 to 4, 400 million in 1900.

Already in 1870, the previous evolution of the railroad network and of the telegraph had changed the set of information available to local businesses. James Cronon has chronicled the role of the railroad in transforming American business between 1850 and 1870. From the perspective of a merchant in Iowa,

“the immediate implications of the rails pointing back toward the eastern horizon should by now be so familiar that they barely need repeating. The railroad meant speed. It meant regular, predictable schedules. It meant year-round movement, even in winter. It meant escaping the river. It meant the East, and not the South. It meant Chicago, and not St. Louis. It meant the future.” (Cronon, 1991, p. 325).

³ Railroad mileage peaked at 430,000 in the year 1930 and then began its long, slow decline.

Thus at least in most parts of the nation by 1869-70 the infrastructure of intercontinental transport and instant communication had been established and would spread further between 1869 and 1900. The nature of time-keeping changed with the adoption of standard time on November 18, 1883. Starting in the 1880s electric trolleys began to replace horse-drawn trolleys.

The most important changes between 1870 and 1900 were the development of manufactured and preserved food, often by newly emerging large firms such as Borden's evaporated milk and the 57 varieties of H. J. Heinz. Tin cans and glass bottles were used starting in the 1880s. Refrigerated railway cars increased the distance that prepared meat could travel, thus facilitating the development of large centralized stockyards like that in Chicago.

The changes most visible to consumers were the twin revolutions in marketing and distribution made possible by the large central-city department store and the mail-order catalogue. Merchants including John Wanamaker in Philadelphia, R. H. Macy in New York City, and Marshall Field in Chicago built palaces for the display of goods in previously unimagined variety. Montgomery Ward and Richard Sears ended the monopoly power of the rural general store by offering urban and rural families, no matter how isolated, a wide variety of merchandise at uniformly low prices and with the guarantee of customer satisfaction or an immediate cash refund. The success of the catalogue merchants was made possible by innovations in postal service, of which the most important was the initiation in 1896 of rural free mail delivery (Schlereth, 1991, p. 155).

These innovations brought lower prices and greater variety to the average household, and lower prices made possible by improved transportation and distribution. Prices were further lowered by the transition from individual craftsmen to large factories for everyday goods such as furniture, which from the 1880s used steam power to cut wood in the ever more elaborate patterns demanded for the middle-class Victorian parlor. While few homes were electrified by 1900, the benefits of electricity improved the quality of life away from the home, not just in the new electric trolleys and the first subways, but also in the bright lights of the 1890s department store and new forms of amusement including nickelodeons and the early motion pictures.

But what was still lacking in 1900 was any real progress in the standard of living itself. In multiple dimensions the life of consumers involved tens of hours each week on dreary household tasks that have long since been replaced by subsequent inventions, taking place in residences that were dark, ill-lit, ill-heated, and for the vast majority requiring a trip to the outhouse for personal needs. Not only was the standard of consumption low, but the working life of both farmers and industrial workers was painful, stressful, and dangerous.

As we shall see there was little improvement through 1900 in the conditions of housing. In Chapin's (1909) meticulous survey of 391 New York City working class families taken in 1907, the average family of 5.2 people lived in 3.5 rooms, of which 1.3 were "dark," i.e., windowless. Only 20 percent of housing units had bathrooms, 31 percent had private toilets, and not one of the 391 housing units in the sample was equipped with electricity (Chapin, 1909, Tables 34 and 37, and p. 117).⁴ Prior to the arrival of electricity in the average home, perhaps the greatest change between 1870 and 1900 was the replacement for lighting of kerosene and whale oil by piped-in gas. While the telephone had been invented in 1876 (Smil, 2005, p. 199), by the year 1900 there were only 1.4 million telephone instruments for 76 million Americans, and many of these were in businesses rather than in the home (Brooks, 1975, pp. 102-26).

It is important to distinguish between living standards of upper and middle class families from the working class wage-earners. The paradox that it took so long for electricity and the automobile to reach working class families is the fact that they could not afford them. Kleinberg's detailed study of Pittsburgh in 1870-1907 (1989, pp. 84-85) sharply distinguishes the benefits of modern inventions to the upper and middle classes and their absence from the lives of most working class families:

Sewers, paved roads, streetlights, piped water, garbage incineration, indoor plumbing, natural gas, and electricity all improved the urban standard of living in the last decades of the nineteenth century. Details of the allocation of the new forms of municipal technology, of who benefited from them and who could not afford them, illustrate the relative deprivation of the poorer segments of the working class and the impact that the lack of services had on women. . . . At the end of the nineteenth century, city government acted upon the principle that those who benefited from services should pay for them; hence distribution proceed along class lines and was influenced by political considerations.

Because most urban households belonged to the working class, and the middle class represented only a small minority of all American families, this chapter is largely devoted to the working class. Thus we omit numerous topics in Victorian social history, e.g., the decoration and symbolism of the "parlor" in the Victorian manse or Queen Anne stately house (see for instance the excessive attention to this topic in Foy and Schlereth, 1992). Over subsequent time intervals beyond 1900 and especially after 1950, we will need to take account of the decline in the percentage of households in the working class and the rise of

⁴ How typical were these families? From Table 15 on p. 70 we can calculate that mean household income was \$843 and mean expenditure was \$821. The distribution was quite symmetric, as median income of \$823 was only slightly below mean income of \$843. These families were slightly below the mean value of the household "consumption bundle" of \$972 for 1907 reported at the Measuring Worth website.

the middle class to majority status, which in itself will explain much of the increase of consumption per capita particularly in the first half of the postwar era.

Kleinberg (1989) is outspoken in his belief that the standard of living of the Pittsburgh working class deteriorated during the period 1870-1900, and that any increase in overall measured consumption was offset by growing inequality and negative externalities in that soot-covered City of Steel. We will return to his analysis in our section below on housing and the urban environment.

2.3 Aggregate Consumption and the Family Budget

We have already seen in Table 1-2 that Gallman’s series on real consumption expenditures, which we have expressed per member of the population, grew at 1.60 percent per year between 1869 and 1899. Growth rates are shown separately in Table 2-1 for the full 1869-99 period and decadal subintervals. These data are more disaggregated than in Table 1-2 as they are subdivided among the major categories of consumption, goods (perishable, semi-durable, and durable) and services.

Table 2-1							
Annual Per Capita Growth Rates of Consumption Components, 1869-99							
	Personal Consumption Expenditures						
	GDP	Total	Goods				Services
			Total	Perishable	Semidur	Durable	
<i>Gallman</i>							
1869-1879	2.22	2.49	2.49	2.30	3.22	2.18	2.48
1879-1889	1.64	0.80	1.34	0.76	1.25	4.54	-1.14
1889-1899	1.57	1.50	1.48	1.72	1.29	0.65	1.59
1869-1899	1.81	1.60	1.77	1.60	1.92	2.46	0.98
<i>Shaw</i>							
1869-1899			2.71	2.82	2.47	2.53	

Sources: Gallman from HSUS series Ca193 – Ca199. Shaw from HSUS series Ca175 – Ca178

Let us first examine the thirty-year average growth rates for the Gallman data and compare them with the growth rates of Shaw’s commodity output data. In principle these should be roughly equivalent for goods but not overall,

because Shaw does not provide any coverage of services. As we have already seen in Figures 1-2, 1-3, and Table 2-2, the Gallman growth rates for 1869-99 are uniformly slower than for Shaw with the single exception of durable goods.

Why might the Gallman data on perishables and semi-durables exhibit slower growth than Shaw's indexes? The most probable reason is that Gallman includes allowance for food grown on the farm or urban garden and consumed by the producer, and this kind of activity probably declined as consumers shifted to food sold on the market. In the same way, clothing made at home is included in the Gallman estimates but not by Shaw, and this could pull down the growth rate of the Gallman data on semidurables. And purchases of services, included by Gallman but excluded (by design) by Shaw grew relatively slowly, thus guaranteeing that the Gallman concept of consumption would grow more slowly than Shaw over a comparable interval.

Across the three decades of the 1869-99 period, Table 2-1 indicates that growth was relatively rapid in the 1870s and slower in the 1880s and 1890s. In particular Gallman's estimate of negative growth in service consumption in the 1880s, after robust growth in the recession-wracked decade of the 1870s, seems bizarre. Measurements of economic activity prior to 1929 are doubtless subject to major errors over intervals as short as a decade, and subsequently we will place most attention on the growth rates over 30-year intervals.

What we learn from the 1869-99 growth rates provides a story of growth that is quite the opposite of the typical postwar 1950-2007 pattern. Consumption of services grew slowly in the late nineteenth century, in contrast to the rapid growth of services in the most recent three or four decades. Consumption of manufactured perishables and semidurables in Shaw's numbers actually grew faster than growth in consumer durables. This seems consistent with an interpretation of 1869-99 as an era in which household expenditures went almost entirely to the three necessities of food, clothing, and shelter, as confirmed by the budget study reviewed below. There was little room in the tightly constrained household budget for purchases of durables, and indeed few compelling durables that were available to average families before 1900 with the partial exceptions of the bicycle and the sewing machine.

The first household budget study used data collected from families of wage earners in fifteen cities and twenty-one towns by trained agents of the Massachusetts Bureau of Statistics of Labor. It is compared in Table 2-2 with three other budget studies. Inspired in part by the Massachusetts study, the newly formed U. S. Bureau of Labor undertook large-scale studies for 1888-1891 and 1901, and these results are summarized in columns 2 and 3 of Table 2-2. We have supplemented these budget studies, all of which have their basic data

reported in the HSUS, with a lesser known budget study for New York City that we have cited previously, the extremely detailed study of household income and expenditures carried out in 1907 (Chapin, 1909). Each of these studies had different criteria for excluding observations and thus changes over time in average income or consumption are not meaningful. For instance, the 1888-91 study required that for inclusion each household had to have a husband and wife, no more than five children, none of them over 14 years of age, with no dependents or boarders, and rented rather than owned the dwelling place. The 1901 study had similar truncation rules and included households in 32 states. The New York City study provides information for all completed surveys and also for the subset with annual incomes between \$600 and \$1200 per year; average incomes and consumption expenditures are similar in the full sample and sub-sample due to the symmetry of the income distribution.

Table 2-2				
Four Consumer Budget Studies, 1874-75 to 1907				
	Massachusetts Wage Earners 1874-75	Workers in Nine Cities in U.S., 1888- 91	Working Families in 1901	Working Families in NYC in 1907
Sample Size	397	2562	11156	383
Average Family Size	5.1	3.9	4.0	5.0
Income before Taxes	763	573	651	843
Expenditures				
Total	738	534	618	823
Food	427	219	266	364
Clothing	108	82	80	116
Rent	118	80	112	170
Fuel	44	32	35	42
Sundries	44	121	124	131
Percent Expenditures				
Food	57.9	41.0	43.0	44.3
Clothing	14.4	15.4	12.9	14.1
Rent	15.8	15.0	18.1	20.7
Fuel	6.0	6.0	5.7	5.1
Sundries	6.0	22.7	20.1	15.9

Source: First three columns from HSUS series Cd456-Cd482,

fourth column from Chapin (1909, Table 15, p. 70)

Because the sample sizes differ so much, and the groups of households sampled live in different places, no overall conclusions can be reached about economic growth from the four surveys in Table 2-2. But it does appear that the truncation rules for the 1888-91 and the 1901 surveys were sufficiently similar that we can compare those two. There was growth of household consumption between the nationwide 1888-91 study and that of 1901, in both nominal and real terms. The log percent increase of nominal consumption expenditures of 14.6 percent becomes a real increase of 21.4 percent when the overall Rees (1961, p. 74) consumer price index is applied. If we date the midpoint of the first study at 1889.5, then over the 11.5 years between the two studies, the log percent annual growth rate of average real consumption per household was 1.86 percent per year. The comparable Gallman number for the annual growth rate of real per capita consumption between 1889 and 1901 was a remarkably close 1.88 percent per year.

Three of the four surveys agree that the percentage share of food in household expenditures was in the narrow range of 41 to 44 percent, with only the Massachusetts survey providing the outlier number of 58 percent. Even at 40 percent, food spending was such a dominant share of the household budget that we need to examine detailed data on what people ate in different eras and whether there were any important changes between 1870 and 1900.

Clothing and rent round out the traditional three necessities (food, clothing, shelter), but fuel for heat and light easily qualifies as a fourth necessity. Again the Massachusetts study is an outlier with only 6 percent spent on the remaining categories bundled together in the uninformative term "sundries." In contrast the other three surveys register spending on sundries of between 16 and 23 percent. The New York City survey provides sufficient detail to determine what the most important "sundries" were in 1907. Of the 15.9 percent spent on the miscellaneous items, 2.0 percent went for car fare (streetcars and subways), 2.2 percent for insurance, 2.7 percent for medical care, and the remaining 9.1 percent for miscellaneous items including tobacco, haircuts and shaves, snacks and meals away from home, furniture, union dues, church contributions, and recreation including trips to parks, theaters, and paid excursions (Chapin 1909, pp. 198-228).

2.4 Food in the Home

How much did the standard of food consumption improve between 1869 and 1900? Table 2-1 above records Gallman's estimate that real per capita consumption of perishable goods, which is dominated by the food category, increased at an annual rate of 1.60 percent, identical to the overall increase in consumption per capita.⁵ Likewise, in the decadal intervals in shown in that table, growth in perishable goods is close to growth in the total – somewhat slower in 1879-89 and faster in 1889-99. The absence of any apparent tendency of food consumption to grow more slowly than total consumption is consistent with three of the four budget studies in Table 2-2, namely the national surveys of 1888-91 and 1901, and the New York City survey of 1907. Thus the American data for this era appear to overturn Engel's Law that as income rises, the proportion of income spent on food falls and that the income elasticity of the demand for food is less than unity.

A detailed record of the consumption of particular food items is available not in the current Millennial Edition of the HSUS but in the 1960 edition (bibliographical details are provided on the combined reference list under "HSUS (1960).") These numbers were created for decades by the Agricultural Marketing Service of the U. S. Department of agriculture and deduct from the annual supply of each food item feed, seed, industrial purchases, and ending stocks. All numbers in Table 2-3 are given in pounds per capita per year, excluding eggs which are given in the number of eggs per capita per year. Meat is weighed at the wholesale level as dressed carcass. Fruits and vegetables are measured at the farm level. The item for Total dairy is the whole milk equivalent of all dairy products.

Unfortunately, data are available prior to 1909 only for scattered products and before 1899 only for butter, cheese, and sugar. Thus this table is mainly useful for tracking changes in food consumption in our second and third 30-year intervals, 1899-1929 and 1929-1959. Some of the findings in Table 2-3 are expected, including the role of potatoes and flour as inferior goods with consumption decreasing as income increases. Also to be expected are the sharp rises in the consumption of processed food, including canned and later frozen fruits and vegetables. About half of the increase in canned fruits and vegetables had taken place by 1929 and the rest by 1957. Consumption of fresh fruit excluding citrus declined by about the same amount as consumption of fresh citrus, canned fruit, canned juice, and frozen fruit increased. Roughly the same was true for vegetables. Consumption of sugar and coffee steadily increased. What is perhaps most surprising about the table is the absence of any long-term

⁵ In Shaw's (1947, p. 71) definition, perishables include manufactured and nonmanufactured food, tobacco products, drug, toilet, and household preparations, magazines, newspapers, and fuel & lighting products. In the New York City expenditure survey cited above in Table 2-2, the share of food in total perishables by this definition is about 85 percent.

increase in meat consumption. Pounds of meat consumed per capita were about the same in 1957 as in 1899, with a small shift from pork to beef.

Table 2-3						
Apparent Per Capita Consumption of Foods, 1869-1957						
(in pounds per person, except eggs)						
	1869	1899	1909	1919	1929	1957
Meat		150.7	155.2	138.9	131.2	159.1
Beef and veal		72.4	81.5	69.3	56	93.4
Pork excl lard		71.8	67	63.9	69.6	61.5
Lamb and mutton		6.5	6.7	5.7	5.6	4.2
Chicken and turkey			14.7	14.2	15.7	31.4
Fats and oils		33.8	31.5	29.1	33.2	26.5
Lard		12.8	12.5	10.7	12.7	9.5
Margerine		1.4	1.2	3.2	2.9	8.6
Butter	13.6	19.6	17.8	15.2	17.6	8.4
Fruits						
Fresh total			138.2	125	143.1	98.3
of which citrus			16.2	23.5	29.8	37
Canned fruit			3	9.7	12.3	22.4
Canned fruit juice			0.5	0.3	0.3	12.2
Dried fruit			4.2	6.9	5.3	3.6
Frozen fruit					0.6	9
Vegetables						
Potatoes, incl. sweet			213.2	181.3	181.4	112.2
Other Fresh				76.6	112.6	104.6
Canned				21.3	25.9	43.9
Frozen						7.5
Melons				24.8	32.1	25.7
Dry beans			6.8	5.4	7.8	7.5
Dairy (milk weight)			770	733	811	691
Fluid milk			343	335	340	350
Cheese	3	3.7	3.8	4.2	4.7	7.7
Ice Cream			1.6	6.8	10.7	17.9
Eggs (numbers)			293	303	334	358
Sugar	40.3	62.6	73.7	86.6	96.9	97.1
Flour			270	227.4	207.5	127.4
Wheat			217	192	177	119
Corn			53	35.4	30.5	8.4
Coffee			9.2	11.8	12.2	15.8

Source: HSUS (1960) series G552-584.

Notes: 1869 sugar is for 1875; 1909 fruit juice is for 1910; 1909 coffee is for 1910

Thus far all we know about growth in food consumption per capita during the 1869-99 interval is that it must have been substantial to produce the Gallman growth rate of 1.60 percent for perishables. And we know from Table 2-3 that butter and sugar consumption per capita increased about 50 percent over those 30 years. For further insight into the nature of increasing food consumption, we turn next to the original Shaw (1947) data on the value of food destined for domestic consumption. This strips food out from other types of perishable goods and distinguishes between manufactured and non-manufactured food.

Table 2-4			
Value of Food Destined for Domestic Consumption, per capita, 1913 Prices			
	Manu- factured	Non Manu- factured	Total
1869	12.0	12.5	24.5
1879	23.0	17.1	40.1
1889	25.9	17.3	43.2
1899	35.2	20.9	56.1
<i>Annual Growth Rates</i>			
1869-79	6.48	3.15	4.92
1879-89	1.19	0.08	0.73
1889-99	3.06	1.91	2.62
1869-99	3.58	1.71	2.76

Source: Shaw (1947), Table I-3, pp. 70-71

The top section shows per-capita expenditures in 1913 prices, e.g., \$56.10 per person in 1899. When compared to the 1901 expenditure survey in the third column of Table 2-2, which reports an average family size of 4.0, the implied total

food expenditure of \$224.40 is somewhat below the survey amount of \$266, but this is well within the range of measurement error both in Shaw's methods of imputing non-market food purchases and in the 1901 survey methodology. The growth rates are impressive for the full 1869-99 period, particularly manufactured food. Clearly manufactured food was one of the drivers of growth in the standard of living in the late nineteenth century, and much of this growth came in the initial 1869-79 decade despite the economic Depression of the mid 1870s.

Which manufactured and pre-processed foods were consumed in 1900 that were not available in 1869? A basic handicap in this section is the lack of a detailed study of the consumption of particular types of food in 1870 comparable to the copious data collected in the New York City survey for 1907. The latter provides precise quantities of foods purchased in six sample households. Here we summarize expenditures in the one of these that is closest to the \$842 annual mean income of the sample as a whole (Chapin, 1909, pp. 158-9). The father (male income-earner) is a shipping clerk making \$760 per year to which is added \$104 from a lodger. There is a wife, a boy of 12 and a girl of 3. The budget is enough to provide the father with 3685 calories per day at a cost of 35 cents per day, and amounts consumed by the wife and children are converted into "man-equivalents."

The weekly expenditures total \$7.04 or \$1.01 per day, which includes the 35 cents for the father and a total of 66 cents for the other three members of the family. From today's perspective, the 10.5 pounds of meat consumed (beef, corned beef, mutton, and chicken) seems almost extravagant, but then recall from Table 2-3 above that there was no change in pounds of meat consumption between 1909 and 1957. The family's consumption of 10.5 pounds per week or 546 pounds per year comes to 136.5 pounds per capita per year, somewhat below the national average of 155 pounds recorded in Table 2-3 for 1909. Added to all that meat was two pounds of fish and a can of salmon.

Dairy consumption included one pound each of butter and cheese, 16 eggs, and 21 quarts of milk. Cereal included 7 loaves of bread, 49 rolls, 2 boxes crackers, 3.5 pounds of flour, and one box of breakfast food. A wide variety of vegetables were consumed but quantities were not specified for some of them. Examples include four quart of potatoes and 1.5 pounds of apples. The diet included oranges, bananas, carrots, and unspecified other fresh vegetables. Finally, there is additional consumption of 0.5 pound each of tea and coffee, 3.5 pounds of sugar, unspecified spices, one pint of whisky, and an unspecified quantity of wine.

We can look at this list to identify those manufactured food products that may have existed in much smaller quantities in 1869 or not existed at all. Food that Shaw would have classified as manufactured included the corned beef, canned salmon, bread, rolls, dairy products, crackers, flour, breakfast food, jelly, tea, coffee, cocoa, sugar, whiskey, and wine. Excluding the meat, these items accounted for 53 percent of expenditures. Shaw may also have treated some or all of the meat as manufactured if it was processed in commercial slaughterhouses, and this would bring the share of manufactured food up from 53 to 83 percent. When we put the 1907 data together with Shaw's growth rates for manufactured foods, we surmise that much of the difference in the 1869 and 1907 diet consisted of those items considered as manufactured.

Schlereth (1991, p. 45) provides some additional details to support the conclusion that commercial manufacturing and wholesaling played a substantially smaller role in 1869. Before the 1880s grain was converted into flour in neighborhood or regional mills. Many butcher shops served as their own slaughterhouses. The 1869-1900 period witnessed the development of nationwide brands including Swift and Armour for meat as well as General Mills and Pillsbury for flour. While H. J. Heinz had developed his "57 varieties" by 1900, there is no evidence of spending on canned vegetables or condiments in the 1907 New York City sample food listing, and the listing of food quantities in Table 2-3 above. The iconic Coca-Cola brand was invented in 1886, but it remained a soda fountain drink until its first bottling plant was established in 1899; thus most of its growth belongs to the post-1900 periods.⁶ The same goes for prepared foods such as Jell-O, invented in the 1890s (Schlereth, 1991, p. 164).

Food processing and refrigerated shipping brought an increased variety of fruits and vegetables, and by 1903 California growers had developed a lettuce called "Iceberg" that remained fresh as it crossed the country (Shapiro, 1986, p. 96 and Levenstein, 1988, p. 25). Refrigerated freight cars were developed in the 1870s and 1880s before mechanical refrigeration and involved placing large blocks of ice in containers on both ends of a well-ventilated freight car. At the same time the use of ice boxes was spreading into American households. In the 1907 New York City expenditure survey cited above, iceboxes were present in 81 percent of the families earning \$800 per year or less and in 90 percent of the higher income households.

⁶ Source: <http://www.thecoca-colacompany.com/heritage/ourheritage.html>. None of the six detailed lists of food consumption for individual families in Chapin (1909, pp. 154-161) includes any bottled non-alcoholic drinks, although several list consumption of beer and wine and in one case hard liquor. Only in 1928 did Coca-Cola bottle sales exceed soda-fountain sales, and many of those bottles were consumed outside of the home.

The gradual transition from home production to market purchases included bread. In 1850 commercial bakeries produced less than 10 percent of the bread consumed in the U. S., and by 1900 this ratio had increased only to 25 percent (Schlereth, 1991, p. 132). An unusual feature of the New York City 1907 budget study is that only 8 percent the survey households baked their own bread. This might have been related to unusual local conditions, since Chapin (1909, p. 132) comments that in similar surveys the percentage of own-bread-baking is 89 percent in Syracuse, NY, and 70 percent in Richfield Springs, NY.

Closely related to food consumption was another perishable commodity, tobacco. Production of manufactured cigarettes increased from 0.5 billion in 1870 to 120 billion in 1920, or from 13 to 1170 per capita. Selling and distinguishing all these national brands of food, tobacco, and other types of products was facilitated by Federal legislation passed in 1881 creating exclusive trademarks. Trademarks expanded even faster than cigarette production, with over 10,000 trademarks registered in the year 1906 alone compared to a total of a mere 120 trademarks in existence in 1870 (Munn, 1913, p. 27).

Another innovation of the 1870-1900 period was the chain food store. The A&P chain was originally founded in 1859 under a different name and renamed the Great Atlantic and Pacific Tea Company in 1869 (Lebhar, 1952, pp. 23-25). By 1876 the A&P Co. was a chain of 67 stores. By the 1930s the A&P was the top grocery store chain with close to 16,000 stores.⁷ Other major chains were founded in the 1880s and 1890s and had their major impact during the 1900-1930 period. Volume buying by the chains allowed them to undercut the prices of local merchants, and anti-chain-store activists protested just as today's anti-WalMart activists protest and for the same reasons.

Just because new forms of food merchandizing were being developed does not imply that all working-class shoppers flocked to them. Working men continued to patronize more expensive neighborhood stores, rather than buy from larger retail chains. Shergold (1962, p. 121) postulates that neighborhood stores were not only more homely, but allowed the lower class worker to purchase items on credit. "The key factor, perhaps, was that neighborhood stores carried a large amount of credit trade, whereas chain and department stores were almost exclusively cash concerns" However, because workingmen usually patronized neighborhood stores, they had to pay a substantial premium for foodstuffs because of the inefficiency of small stores. "In effect, therefore, the persons who paid most for their foodstuffs were the group least able to afford it" (Shergold, 1962, p. 127). Of course the inability of poor people to obtain the lowest food prices continue to this day, especially in the urban inner-city, which

⁷ Source: <http://www.aptea.com/history.asp>

in some places are boycotted by leading supermarket chains. In other cities like Chicago in 2010, labor unions have boycotted the entry of Wal-Mart into low-income areas because that company is not unionized although the wages it pays are high enough to generate thousands of applicants every time it opens a store.

Thus well before even 10 percent of American homes had electricity or an automobile, the foundations of the nationwide food manufacturing, distribution, and trademark system had been laid. However, throughout the 1870-1900 interval and beyond, American households faced the risk of contaminated or adulterated food. For instance Kleinberg (1986, pp. 106-8) devotes considerable attention to the possible role of milk contamination as a factor helping to explain the rise in the infant mortality rate from 17.1 percent in 1875 to 20.3 percent in 1900.

Impure water supplies, impure milk, and, and inadequate waste removal all contributed significantly to infantile diarrhea. . . . Almost all U. S. cities exhibited increased infant mortality during the hottest months, a pattern that disappeared only when rising standards of living resulted in the widespread ownership of iceboxes, when public health campaigns cleaned up milk and water supplies. . .

The first pasteurized milk was introduced in Pittsburgh in 1907, and in 1913 the U. S. Department of agriculture condemned a railroad for transporting milk in unrefrigerated containers. During previous decades large distant milk producers had driven out of business the previous 700+ dairymen who lived near Pittsburgh and delivered milk daily in their own wagons. Doctors blamed mothers for feeding babies bottled milk rather than breast milk and sometimes listed the cause of an infant death as "bottle feeding" (Kleinberg, 1986, pp. 109-10).

Bettmann (1974) provides a rich trove of anecdotes and illustrations that suggest the range of dangers of contamination in the 1870-1900 era. Milk was not only contaminated but diluted, all the dealers required was "a water pump to boost two quarts of milk to a gallon." To remove the color and odor of milk from diseased cattle, dealers "added molasses, chalk, or plaster of Paris" (1974, p. 114). In 1902 the New York City Health Commission tested 3970 milk samples and found that 52.8 percent were adulterated (1974, p. 115).

Before the development of centralized slaughterhouses, beef reached the city "on the hoof", shipped live from the West in slow trains. The starved cattle were virtually dead upon arrival. Harper's Weekly complained in 1869 "The city people are in constant danger of buying unwholesome meat; the dealers are unscrupulous, and the public uneducated." Meat or fowl for sale were hung on racks or placed on market counters and according to the New York Council of

Hygiene in 1869 “undergo spontaneous deterioration . . . becoming absolutely poisonous.” Another contemporary 1872 source complained of cartloads of decayed fruit such as bruised oranges and rotten bananas (quotes from 1874, pp. 110-13).

While we lack the details on food consumption for 1869-1900 that are available for more recent eras, several main conclusions emerge from our discussion of food. Several new products can be identified as having improved the marketing, distribution, and safety of food over this period. These include refrigeration of freight cars and of ice boxes in the home, the development of new canning and bottling technology, the beginning of a system of nationwide brand names for processed food, and the spread of chain food stores that reduced prices by purchasing in volume and introducing standardized methods that the local general merchant could not match.

2.5 Clothing

Fortunately the discussion of clothing and apparel can be relatively brief, for the issues involved are much less complicated than for food. In the budget studies discussed above, clothing was the third most important category of consumption, sometimes running a close third to the second most important category of housing. One does not need to read the historical literature on aspects of clothing consumption in 1870-1900 to understand what was happening, because it is obvious in the following Table 2-5 from Shaw (1947) that is arranged identically with Table 2-4.

The top section calculates dollars of expenditure per year per capita divided between three categories: (1) dry goods and notions, (2) clothing and personal furnishings, and (3) shoes and other footwear. For 1899 total spending was \$21.30 per person, or \$85.20 for the average family size of four recorded in the 1901 national expenditure survey displayed in Table 2-2. This is remarkably close to the average per-capita spending on clothing of \$80 per household recorded in that survey, especially because the Shaw per-capita average includes all social classes while the 1901 survey was truncated to exclude anyone who was not in the working class. Thus we gain confidence that the Shaw data are consistent with what households reported that they were spending on clothing.

Table 2-5
Value of Dry Goods, Clothing, and Shoes Destined for
Domestic Consumption, per capita, 1869-1899

	Dry Goods & Notions	Clothing	Shoes	Total
1869	2.6	3.3	4.5	10.4
1879	5.0	6.8	3.9	15.7
1889	4.2	8.9	5.1	18.2
1899	4.0	11.8	5.5	21.3
<i>Annual Growth Rates</i>				
1869-79	6.70	7.14	-1.38	4.13
1879-89	-1.71	2.73	2.49	1.46
1889-99	-0.48	2.78	0.88	1.59
1869-99	1.50	4.22	0.66	2.39

Source: Shaw (1947), Table I-3, p. 72

The growth rates over decadal intervals and the entire 1869-99 interval are shown at the bottom of Table 2-5 for the three categories and for the total. Again we observe the somewhat remarkable result that growth during the 1870s, except for shoes, was much higher than in the other decades despite the Depression of the 1870s and the large negative output gap for 1879 discussed previously in Chapter 1. The same pattern of rapid growth in the 1870s was also observed in the Shaw data for food displayed above in Table 2-4.

However, the most important finding in Table 2-5 is that clothing production increased much faster than that of dry goods and shoes. This is consistent with a history in which before 1870 people made their own clothes with dry goods and notions, but they were forced to purchase their shoes due to the special complexity of shoe-making that precluded home production. However, it is clear from the growth rates that between 1870 and 1900 there was a massive shift toward purchase of commercially made clothing.

Promoting the shift from home production to market production of clothing were the two main marketing revolutions of the late nineteenth century, the large central-city department store and the mail-order catalogue. The department store was designed for urban shoppers who could reach it by public transport, initially horse drawn but increasingly electric after 1880. The mail-order catalogue was initially sent to rural families. Both the department store and mail-order catalogue reduced prices to the consumer while greatly

increasing variety over what could be kept in inventory by a traditional urban or rural general store.

The modern American department store found its roots in Bouçicaud's Bon Marché, which by 1862 had developed into a grand emporium. Here originated many of the innovations that were part of the American counterparts from their beginnings: fixed prices with no haggling, a money-back guarantee, a philosophy of low prices and high volume instead of the reverse, and customers were welcome to browse without any moral obligation to buy (Hendrikson, 1979, pp. 28-29). The development of the American imitators of Bon Marché was centered in the time period 1860-1910, implying that the benefits of these stores in lowering consumer prices, particularly on clothing and related goods, influenced the improvement of the standard of living during the 1869-1900 period.

Long before electrification entered the working class American home, electricity was adopted for lighting and other functions in the department stores. Elevators, light, and electric fans encouraged customers to visit the upper floors, helping management to improve the utilization of space and personnel. Electricity powered pneumatic tube systems that allowed centralized cashiers to provide receipts and make change. During this period the stores operated on a cash-only policy that allowed them to pay their suppliers rapidly, and they made most of their profits on discounts from suppliers (Hendrickson, 1979, pp. 43-44).

The benefits brought by the large department stores to urban dwellers were duplicated at roughly the same time by the mail-order catalogue firms, primarily Montgomery Ward and Sears Roebuck. Ward issued his first catalogue in 1872, while Sears finally issued his first multi-hundred page catalogue in 1894 after dabbling in the mail-order sale of watches over the previous decade (Emmet-Jeuck, 1950, pp. 35-37). The 1902 Sears catalogue contains 1162 pages, of which roughly 200 pages are devoted to clothing, shoes, and related goods. By then Sears sold the full range of semi-durable goods from elaborate hats to wigs to corsets to fur coats, and durable goods from bicycles to banjos to central-heating furnaces to guns. The only important category of goods not sold in the catalogue was food, except for tea and coffee.

An unintended side benefit of the catalogues is their usefulness to economic historians who need to develop improved price indexes, particularly for the years before the 1914 introduction of the CPI. The most comprehensive and important use of the Sears catalogue was made by Rees (1961), and his most important findings concern clothing and apparel, where the Rees catalogue-based price index declines substantially during its span of 1890-1914 relative to the wholesale price indexes used by Shaw and published separately by the BLS.

Table 2-6 Alternative Price Indexes for Apparel, 1913 or 1914 = 100, 1869-1914				
	Shaw from WPI	BLS WPI	Rees Sears Catalog	Rees/Shaw
1869	177.1			
1879	106.7			
1890	101.7	94.0	133.0	130.8
1900	91.0	88.0	107.0	117.6
1914	96.3	98.0	99.0	102.8
<i>Annual Growth Rates</i>				
1869-79	-5.07			
1879-90	-0.44			
1890- 1900	-1.11	-0.66	-2.18	-1.06
1900- 1914	0.40	0.77	-0.56	-0.96
1890- 1914	-0.23	0.17	-1.23	-1.00

Sources: Shaw (1947), Table IV-1, pp. 290-1,
WPI and Rees from Rees (1961), Table 29, p. 91.

Table 2-6 raises at least two questions. First, given the uniform 1.0 percent rate of decline of the Sears catalogue index relative to the Shaw WPI or BLS WPI, this creates a plausible value on the value to the consumer of the shrinkage of the retail-wholesale margin during this period. Second, the unusually rapid decline of the Shaw index in the first decade 1869-79 may in part be the cause of the rapid growth in the Shaw quantity index for clothing shown above in Table 2-5. Shaw's narrative on the sources of his price indexes for clothing indicate that the same sources were used throughout the 1869-90 interval.

At this stage in the development of the book, we defer detailed comparisons of price indexes for commodity classifications to the companion piece that will be written soon for the *Journal of Economic Literature*. A substantial amount of original research on this period is surveyed already by Officer (2009), and in the *JEL* paper the conflicting price indexes for clothing prior to 1914 will be reviewed and evaluated.⁸

This section has identified two major aspects of new product development that are candidates for quantification. The first is the value of the shift from home-made clothing to factory-made and commercially sold clothing. This will be integrated with our interpretation of previous studies of household time use, based on Ramey and Francis (2009) and Ramey (2009). The second is the value of the invention of modern retailing in its effect on reducing prices of clothing and apparel, beginning around 1870.

2.6 Housing and the Urban Environment

There is a possibility that the quality of working-class housing deteriorated between 1870 and 1900, due to the effect of urbanization and industrialization in squeezing large families into small tenement apartments. We have already seen at the beginning of this chapter that in Chapin's (1909) survey of working class families in 1907, conditions of housing were dismal. There were 1.5 persons per room, and one-third of these rooms were windowless. Only 20 percent of the units had bathrooms and none was equipped with electricity. Could conditions have been any worse in 1870? A government study cited by Kleinberg (p. 72) gives 1870 averages for working class families of 1.25 persons per room, 1.19 in Baltimore, and 1.37 in Chicago.

Schlereth (1991, p. 87) argues that increasing residential segregation was facilitated by the development of commuter railroads and electric streetcars. The wealthy moved to exclusive suburbs served by commuter railroads, while working class families were increasingly crowded into multi-family buildings. The negative evaluation is shared by Streightoff (1911, pp. 84-85), who concludes:

In most large cities, and in many smaller ones, the more poorly recompensed laborers inhabit tenements. They pay exorbitant rents for dark or dingy rooms lacking in proper toilet and bathing facilities. High rentals make it necessary to accommodate boarders and lodgers, thus fearfully overcrowding the small apartments. . . . Workmen can no longer generally own their homes—thus they lose the steadying effect of proprietorship, they have less incentive to thrift, and they are less likely to be such reliable citizens as of old" (84-85).

⁸ A detailed study of apparel prices after 1914 has already been published in Gordon (2009c).

Kleinberg (1989, p. 65) argues that at least in Pittsburgh conditions did worsen, and that there was “cramped housing in unsanitary neighborhoods for the majority of the city’s laboring population.” While Pittsburgh may have been an unusual example due to the grit and pollution of its steel mills, similarly dismal conditions must have been common in scores of other industrial towns built around mills and factories. Because the flat land was preempted for factories, workers living quarters were pushed up the surrounding hills. In one section of the Hill district density rose from 122.5 persons per acre in 1870 to 137.3 persons in 1890. Density of an outlying district rose from 11 to 45 persons per acre (Kleinberg, 1989, p. 67). Persons per housing unit were also high, 6.6 in the industrial wards compared to the Chapin (1909) average family size of 5.2 and the nationwide average in the 1901 budget study of 4.0 (Table 2-2 above).

Shergold (1962) adds additional detail to back up Kleinberg’s negative depiction of working class life in Pittsburgh. He finds that water and sewerage facilities were largely inadequate, especially for the lower classes. “By 1900 only 110 miles of the city’s 450 miles of streets were adequate sewered...Dry closet vaults (equivalent to the English pan closet) abounded in spite of their illegality...Emptied rarely, they stank and were difficult to keep clean. In tenements, where such toilet facilities had to be shared, conditions were worst, and the privies acted as a catalyst for contagious diseases with deadly efficiency” (p. 153). In addition, most lower class families in the city had to obtain their water from outside spigots or a communal tap. A 1906 study found that only a fifth of all premises contained a bathtub, or one for one in twenty five residents. In addition, crowding posed an important problem in Pittsburgh, with the majority of workers preferring to work close to mills in the center of the city. The tenements that the lower class lived in were, in addition, intended only for temporary use.

For comparison with housing in the mid to late 20th Century we need data on square feet per housing unit, which are hard to find before 1950. A typical housing unit is quoted at 500 square feet (Kleinberg, 1989, p. 72), and this cramped space housed a four-person family with four boarders!⁹ Rental income from lodgers was a standard way that a working-class family could supplement the father’s earnings in the late 19th Century; the Chapin (1909, pp. 58-59) study of New York City reports that roughly one-quarter of the families took in one or more lodgers and raised their income by roughly ten percent in doing so.¹⁰

⁹ The 500 square feet number is reported for 1909 in an investigation by the London Board of Trade. We have not yet located square feet data for a year closer to 1870.

¹⁰ Several Sears Roebuck mail-order house plans provide additional examples, although these are relevant to the subsequent time period 1900-30. Schlereth (1991, p. 86) displays model 151, a one-story 1916 bungalow with three bedrooms, one bathroom, and 1477 square feet. Foy and Schlereth (1992, p. 32) display model 1232, a two-story frame house with five bedrooms, one bathroom, and 1875 square feet. We return in Chapter 4 to determine how common houses of these dimensions were in the 1900-30 period.

No better summary of working conditions in American cities could be provided than a poem that appeared in the *National Labor Tribune* (as quoted by Kleinberg, 1989, p. 73):

In cellars chill and dingy, oft
In alleys with foul filthy ground
Or crowded to a lonely loft These toiling ones are mostly found;
An ancient stove, with sooty scrap
A box, a bench a broken chair;
A few patched duds in which to wrap
Their weary limbs, fed on scant fare.

The Pittsburgh discussion cites the indifference of mill owners like Andrew Carnegie who felt no responsibility for improving the living conditions of its workers. Carnegie bought a pre-existing steel mill and renovated it, but did nothing to change the five-hundred previously company-owned houses on the plant property, "leaving five hundred steel mill families to endure back-to-back houses with no through ventilation, cellar kitchens, no drinking water, and privies halfway up a hill, accessible only by steep steps." Conditions for the middle class were distinctly better, with single-family houses, yards, and usually more than 1,000 square feet (Kleinberg, 1989, p. 77).

We learn little about owner-occupied housing units in the early consumer expenditure surveys, in part because they usually excluded homeowners from the survey. Thus it is somewhat surprising to learn that by 1890 the homeownership rate in the United States was already 47.7 percent and remained at that level until 1930. There was then a jump to 55 percent in 1950, 62 percent in 1960, and 64 percent between 1970 and 1990 (HSUS series Dc669).

Have we been misled by the household surveys of the late 19th century, and the survey and anecdotal account portrayed of urban working-class family life? Has a substantial fraction of urban households been overlooked, with much better living conditions than have been portrayed in the sources cited above? There surely were middle-class urban Americans with much better living conditions than the respondents to the household expenditure surveys of 1874-75, 1888-91, 1901, and 1907 summarized in Table 2. This is evident from a drive through any Midwestern city, where architecture identifies the substantial middle-class and upper-class houses built before 1900.

However, there is a problem of interpretation of the home ownership percentage that may justify our negative characterization of working class living conditions in the late 19th century. In 1890 65 percent of the American population was classified as "rural", and this fell only to 49 percent by 1920 (HSUS series

Aa56 divided by Aa36). This large rural share of the population suggests that most of the owner-occupied dwellings in 1890 were actually farm residences owned by the farmer. If most farm residences were owned rather than rented, then this leaves less of a puzzle and more comfort in the conclusion that most urban residents at least in the bottom 60 percent of the income distribution were renters.

Note to Readers:

There is much still to be done on Chapter 2. So far the chapter largely ignores comparisons between rural and urban life, does not include a treatment of homesteading, sod houses, or other aspects of primitive farm life, does not yet include a treatment of health, urban sanitation, and life expectancy. A section needs to be added on communication, because in the 1870-1900 period the exponential increases in telegraph messages and urban newspaper readership are stunning.

Since it appears that conditions of work, youth, and old age did not change appreciably in 1870-1900, there will be relatively short discussions of these topics and a deferral until later in the book.