

# Patterns of productivity change in men's and boys' suits and coats

*During the 1967-87 period, multiple factors led to varying rates of productivity change, with long-term gains falling into three distinct periods*

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As measured by output per employee hour, productivity in the men's and boys' suits and coats industry increased at an annual rate of 1.9 percent between 1967 and 1987, compared with 2.5 percent for all manufacturing combined.<sup>1</sup> Employee hours declined almost twice as fast as output, dropping an average of 4.2 percent a year, against a 2.4-percent annual drop for output. The long-term trend in productivity falls into three distinct periods during which annual rates changed markedly. As the following tabulation shows, average productivity gains were high during the 1967-72 and 1983-87 periods, but were very small during the interim years:<sup>2</sup>

	<i>Output per employee hour</i>	<i>Output</i>	<i>Employee hours</i>
1967-87 .....	1.9	-2.4	-4.2
1967-72 .....	3.1	-1.7	-4.7
1972-83 .....	.7	-3.4	-4.1
1983-87 .....	6.0	-.1	-5.8

During the 1967-72 period, employee hours declined about three times faster than output, resulting in an average gain in output per employee hour of 3.1 percent. These productivity increases partially reflected the consolidation of the industry into larger sized establishments, the replacement of hand assembly operations with fusing

technologies (bonding two pieces of material together with adhesives) and sewing machine operations, and the introduction of semiautomated fabric cutting machinery.

Although further industry consolidation occurred during the 1970's, average annual productivity gains slackened to 0.7 percent, as output declines were almost evenly matched by employee hour declines. During this period, no new major production processes were introduced comparable to those of the late 1960's and early 1970's—although continual improvements were made in existing processes and techniques. In addition, the introduction of automated spreading, cutting, marking, and sewing machinery proceeded slowly, as technical problems often proved difficult to surmount—such as the tendency of laser cutters to melt rather than cut certain types of materials and the inability of automated production machinery to handle a wide variety of sizes, materials, and styles.

Since the early 1980's, productivity increases have averaged 6 percent per annum. Between 1983 and 1987, annual output remained virtually level, while employee hours dropped at a 5.8-percent average annual rate. Contributing to the slowdown in the rate of output decline were relatively stable imports and the burgeoning ability of the industry to fill retail orders quickly. This increased flexibility and the decline in employee hours reflected the widespread adoption of production machinery incorporating microprocessing technology; improvements in material handling, order processing, and basic textile quality; and

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increasing use of computer assisted design and computer integrated manufacturing techniques.

### Output and demand

The men's and boys' suits and coats industry primarily manufactures men's tailored two-piece suits and separate sport coats. These two products combined have consistently accounted for more than four-fifths of industry value of shipments.<sup>3</sup>

The long-term decline in the industry's output—which fell an average of 2.4 percent a year between 1967 and 1987—primarily reflects relatively flat demand for tailored men's apparel combined with growing import penetration. (See table 1.) Total demand for men's suits and sport coats remained fairly constant during the 1972–87 period<sup>4</sup>—oscillating between 35 and 42 million units per year—although the male population increased by about 12 percent during the same period.<sup>5</sup> While this fairly stagnant demand set a limit on the industry's potential output, actual output declined as imports increasingly captured market shares at the expense of domestic manufacturers.<sup>6</sup> The proportion of total demand for men's suits and coats filled by domestic production fell steadily from almost 100 percent in the late 1960's to around 70 percent by the early 1980's.

In recent years, the adoption of “quick response systems” has helped domestic suit and coat manufacturers maintain their market share.<sup>7</sup> Using improved manufacturing processes and techniques, some manufacturers have greatly reduced the time needed to fill retail orders. While

foreign manufacturers often require 6–8 months to turn out an order, some domestic producers can now produce an order within about 6 weeks. This large discrepancy favors domestic manufacturers because retailers—who cannot accurately forecast the demand for apparel—prefer to reorder fast selling apparel goods rather than maintain large inventories.

Changing consumer tastes as well as general economic conditions influence short-term changes in the output of different types of men's and boys' suits and sport coats.<sup>8</sup> For example, during the mid-1970's, leisure suits accounted for more than half of all domestically produced suits; within a few years, the proportion had shrunk to less than one-tenth. Similarly, suits and coats made of knit fabrics were popular during the 1970's—accounting for more than three-fourths of total output—but now these garments account for only a small proportion of domestic output. General economic conditions also influence the demand for men's apparel, with clothing purchases usually declining during recessions and rebounding during recoveries.<sup>9</sup> Output of suits and coats declined 20 percent during the 1974–75 recession, for example, and increased by 15 percent over the 1976–77 period.<sup>10</sup>

### Changing suits

Shifts in consumer demand for different styles, fashions, and fabrics force apparel manufacturers to adjust production techniques and processes and, until recently, also have imposed limits on attempts to fully automate various production processes.<sup>11</sup> Some changes, such as from two- to three-button suits, require additional assembly operations—sewing on an extra button and making an additional button hole. Others reduce the number of operations—leisure suits, for example, require fewer sewing operations than regularly tailored garments. Some shifts in consumer preferences have wider effects. To illustrate, knit fabrics not only require slightly different sewing techniques than are used for woven fabrics, but also require adjustments in cutting, spreading, sewing, and fusing techniques. Prior to the early 1980's, such large- and small-scale changes, as well as variations in the size of garments, limited the application of automated production machinery—automated sewing machines designed to make one type and length of stitch could not easily be adjusted to make other kinds. Since then, however, machines controlled by microprocessors prepare a wider variety of sizes, fabrics, and styles.

### Employment and hours

Between 1967 and 1987, employment in the men's and boys' suits and coats industry fell from 128,000 to 58,000 workers.<sup>12</sup> Overall, employment declined at a 4.1-percent average annual rate during the 1967–87 period, compared with a 0.1-percent decline for all manufacturing industries combined. Average weekly hours of suit and coat produc-

**Table 1. Productivity and related indexes in the men's and boys' suits and coats industry, 1967–87**

[1977=100]

Year	Output per employee hour	Output	All employee hours	Employees
1967	74.2	108.1	145.7	140.3
1968	75.0	112.6	150.2	143.5
1969	72.9	110.1	151.1	145.0
1970	75.1	96.0	127.9	130.6
1971	77.0	89.9	116.7	119.1
1972	90.2	112.9	125.1	123.8
1973	84.2	106.4	126.3	126.0
1974	88.8	99.0	111.5	116.7
1975	95.2	86.4	90.8	96.4
1976	90.9	89.6	98.6	98.7
1977	100.0	100.0	100.0	100.0
1978	92.6	90.8	98.1	98.1
1979	96.9	85.0	87.7	89.1
1980	97.3	82.7	85.0	84.7
1981	98.8	84.0	85.0	84.2
1982	95.2	76.8	80.7	82.7
1983	90.2	69.4	76.9	77.3
1984	96.9	76.1	78.5	72.4
1985	106.3	72.3	68.0	69.5
1986	107.5	69.2	64.4	65.3
1987	114.8	72.3	63.0	63.1
Average annual rates of change				
1967–72	3.1	-1.7	-4.7	-3.6
1972–83	.7	-3.4	-4.1	-4.2
1983–87	6.0	-1	-5.8	-5.6

tion workers were typically about 10 percent less than their counterparts in all manufacturing—36 hours per week versus 40 hours. In addition, overtime hours of suit and coat workers also fall below the average for all manufacturing—1 hour per week, compared with about 3 hours.<sup>13</sup> To some degree, differences in average weekly hours stem from both the batch production process employed by the industry, and piecework pay systems which cover about three-fourths of the industry's production workers.<sup>14</sup> Under such pay systems, workers are paid a fixed rate per piece which encourages them to finish work assignments in the shortest possible time. The preference of suit and coat manufacturers for adjusting employment levels rather than hours to meet shifts in demand partially explains the relatively low average overtime hours.<sup>15</sup>

The downtrend in men's and boys' suits and coats employment reflects both the decline in the industry's output and gains in output per employee hour. As noted, employment declined at a 4.1-percent average annual rate between 1967 and 1987, and output fell by 2.4 percent a year; while the number of suits and coats manufactured declined, each garment required fewer employee hours to assemble.<sup>16</sup>

From 1967 to 1983, average annual changes in men's and boys' suits and coats production worker employment closely paralleled changes in nonproduction employment, but since then have shown larger declines. Partially the result of increasingly automated production machinery and processes, production employment decreased at a 6.1-percent average annual rate between 1983 and 1987, compared with a 2.4-percent decline for nonproduction workers.

### Occupational structure

Despite the drive to introduce labor-saving production processes and techniques, the men's and boys' suits and coats industry remains one of the most labor intensive of all manufacturing industries. Historically, production workers account for about nine-tenths of all employees, compared with about two-thirds in all manufacturing industries combined. Sewing machine operators, predominately women, make up about one-half of total production employment; pressers, the next largest occupational group, account for slightly more than one-tenth.<sup>17</sup>

Although the industry's work force still mainly consists of production workers whose average wages fall below the average for all manufacturing,<sup>18</sup> changes in production equipment and processes over the last 20 years affected both the composition of the production work force and occupational skill levels. For example, in 1967, hand assembly occupations (such as basters and finishers) accounted for 15 percent of all production workers. By 1973, the proportion declined to 7 percent, as fusing techniques and sewing machine operations replaced hand assembly processes.<sup>19</sup> The shift towards more automated sewing and

material handling techniques also changed occupational skill requirements. The introduction of automated sewing equipment, for example, often led to job simplification. Operators of such machines are primarily loaders and positioners and require less training than operators of nonautomated machines.<sup>20</sup> By contrast, operators of automated spreading and cutting equipment require extensive training to ensure optimal operation.<sup>21</sup>

### Industry structure

The men's and boys' suits and coats industry consists of three major types of companies—manufacturers, contractors, and jobbers. Manufacturers cut and assemble suits and coats within their own establishments; contractors assemble suits and coats; and jobbers supply cut material to contractors.<sup>22</sup> During the 1967–87 study period, manufacturers have consistently accounted for about 60 percent of total industry value of shipments.

Between 1967 and 1982 (the latest year for which data are available), the number of establishments in the industry fell by more than half—from 904 to 443. The decline was less severe among large- and medium-sized firms. The number of companies employing 500 or more workers shrank by one-third during this period, the number employing 100 to 499 workers declined by about two-fifths.

One effect of these uneven decrements in the number of large- and medium-sized firms was increasing industry concentration. Between 1967 and 1982, the proportion of industry value of shipments accounted for by the four largest companies grew from 17 to 25 percent; the proportion accounted for by the 20 largest companies grew from 43 to 57 percent. Because economies of scale increase along with establishment size in the men's and boys' suits and coats industry, increasing industry concentration partially contributed to gains in output per employee hour.<sup>23</sup>

Over the 1967–87 period, men's and boys' suits and coats manufacturing became more geographically dispersed as the traditional centers of manufacturing—New Jersey, New York, and Pennsylvania—bore the brunt of output declines. During the 1967–76 period, the number of establishments in these States declined by just over two-fifths; about three times the rate for all other States combined (15 percent). The construction of new manufacturing plants in Southern and Western States during the late 1960's and early 1970's also contributed to industry dispersion. In 1967, New Jersey, New York, and Pennsylvania combined accounted for 53 percent of both industry employment and shipments; by 1982, the proportion was 38 percent.

*Capital expenditures.* Between 1967 and 1986, the industry's capital expenditures grew at an average annual rate of 1.5 percent, compared with 9 percent for all manufacturing combined. During the 1967–74 period, about one-half of total capital investment was for plants, pri-

marily new facilities in Southern and Western States. Since then, expenditures for machinery have accounted for about seven-tenths of annual capital investments.

Primarily reflecting the relatively low cost of much of its production machinery—chiefly sewing machines—the industry is among the least capital intensive of any manufacturing industry.<sup>24</sup> In 1982, for example, new capital expenditures per employee were about one-tenth as large as those for all manufacturing combined—\$328 versus \$3,905. In recent years, however, average capital expenditures per establishment have increased, mirroring both a decline in the number of small establishments and increased investment in computer controlled production machinery.<sup>25</sup> Between 1967 and 1986, the annual constant-dollar investment in new equipment per establishment increased by almost 40 percent—from \$39,000 to \$54,000.<sup>26</sup>

Capital expenditures, of course, varied from year to year, mainly reflecting changing business conditions and industry expectations. Between 1967 and 1986, most year-to-year changes fluctuated by 25 percent or more.

### **Manufacturing techniques and technologies**

The manufacture of men's and boys' suits and coats is a batch process in which garment parts are progressively taken from one sewing operator to another until the garment has been completed.<sup>27</sup> The process consists of three major stages: spreading, marking, and cutting; sewing and assembly; and pressing.

In the first manufacturing stage, the incoming fabric is inspected for faults and then spread flat, in multiple or single layers, on a spreading table. Paper patterns of garment parts which act as templates for cutting the fabric are then laid on the pile (marking). After cutting, the parts are gathered into bundles which are delivered to sewing machine operators, each of whom performs separate assembly operations. About 150 such operations are performed for a typical suit. During and after the assembly process, finished and partially assembled garments are pressed and inspected. Since 1967, major changes have occurred in both production equipment and manufacturing processes.

*Production equipment.* Starting in the late 1960's, many new types of cutting machinery were introduced—a surge partially stemming from changes in labor-management agreements which allowed for increased mechanization in the production process.<sup>28</sup> The first generation of this equipment covered a broad spectrum, ranging from improvements in reciprocating blade techniques to more esoteric cloth-cutting methods such as laser beams, water jets, and ultrasonics.<sup>29</sup> While the more successful innovations led to lower fabric waste and reduced the time spent on trimming and inspection (due to better cutting accuracy), by the mid-1970's, the industry abandoned some

techniques in the face of multiple problems.<sup>30</sup> Laser cutters, for example, tended to fuse fabric plies together while water jets meshed the edges, making it difficult to separate fabric layers. Changes in spreading and marking equipment advanced at a relative slow pace during this period.

The next major advance in cutting room machinery occurred in the late 1970's and early 1980's with the introduction of computer controlled design, marking, and cutting equipment and automated spreading machinery.<sup>31</sup> By the mid-1980's computer assisted design and marking systems were capable of producing patterns an average of two to three times faster than conventional systems,<sup>32</sup> while automated spreaders often reduced employee requirements by one-half.<sup>33</sup>

Sewing machines also underwent transformations during the 1967–87 period. Because sewing machine operators spend about three-quarters of their time handling and positioning garment pieces rather than sewing pieces together, the focus of improvements has been on material handling. Preceded by mechanically-activated thread trimming attachments in the 1950's and 1960's, a variety of work aids, such as needle positioners, stackers, and air lifts, were introduced in the 1970's which reduced material handling time, operator fatigue, and, in some cases, eliminated separate sewing operations.<sup>34</sup> This trend toward reduced material handling accelerated during the 1980's with the development of sewing machines that mechanically manipulate garment pieces while they are under the needle—machines such as belt loop attachers, hemmers, and buttonhole and button sewers.<sup>35</sup> These machines can also handle a wide variety of styles, fabrics, and sizes—a buttonholer can be adjusted to produce as many holes as style dictates; a seamer can sew a 28- or 38-inch inseam. It should be noted that while these machines are developed and manufactured outside the industry, many simple sewing machine attachments and work aids are invented and built by suit and coat manufacturers themselves.<sup>36</sup>

Traditional pressing machines prevailed in the industry until the late 1970's. Since then, they have been increasingly replaced by mechanized pressing systems and carousel style machines which process more garments per operator; in recent years, they have evolved further with the introduction of microprocessor controls and automated unloading systems and machines that combine pressing and fusing operations.<sup>37</sup> As an example of increased output, the per-shift capacity of a conventional leg presser operated by one worker averages about 600 pants, compared with the 1,200 pants of a carousel double leg presser.

*Manufacturing processes.* In addition to changes in production equipment, the industry also underwent major changes in manufacturing processes during the 1967–87 period. Foremost was the introduction of fusing tech-

niques in the late 1960's. Initially, fusing was most successfully used to replace basting (temporary sewn stitches) and manual handling of interlinings—reducing the amount of labor required to perform these assembly operations.<sup>38</sup> Replacement of sewn seam construction in other areas of the garment, such as pockets, belt loops, and lapels, however, was not achieved until the early 1980's, with the advent of improved adhesives and fusing processes.<sup>39</sup>

Another major change in the manufacturing process was the almost total elimination of hand assembly work. Men's suits and coats used to include many hand-assembled parts, such as hand-stitched lapels and buttons, and were often graded according to the number of such parts.<sup>40</sup> After World War II, hand assembly work was gradually replaced by sewing machine operations, reducing the employee hours required to assemble a typical suit or coat. Between the late 1960's and early 1970's, the last major hand assembly operations—mainly finishing and basting work—were replaced by sewing machine operations and fusing technologies.<sup>41</sup>

## Outlook

Future changes in output per employee hour in the men's and boys' suits and coats industry will hinge on evolutions in production equipment and manufacturing processes.

With production equipment and manufacturing processes, three major trends are evident: continued advances in automated machinery, application of computer integrated manufacturing technologies, and improvements in existing manufacturing techniques and processes. Some recent developments in these areas are automated sleeve sewers, pressers that finish entire garments and underlinings in one operation; totally integrated computer assisted design, marking, spreading, and cutting systems; and direct computer links between retail stores, textile producers, and apparel manufacturers (retail orders are electronically transmitted to textile and apparel manufacturers leading to increased coordination between textile delivery and garment assembling and decreased order processing time).<sup>42</sup> Among the hurdles facing these innovations are relatively high initial costs, difficulties in handling limp fabric, and problems posed by the wide variety of apparel styles, sizes, and fabrics.

The three major sources of innovations in apparel production processes and machinery are manufacturers of apparel production machinery, individual industry establishments, and the Textile/Clothing Technology Corporation. Funded by textile and apparel manufacturers, unions, and the Federal Government, this corporation, founded in 1980, demonstrates the latest production equipment and processes, fosters the utilization of these systems through the industry, and carries out short-term development projects.<sup>43</sup> □

## FOOTNOTES

<sup>1</sup>The men's and boys' suits and coats industry is designated as SIC 2311 by the 1987 *Standard Industrial Classification Manual* of the Office of Management and Budget. This industry consists of establishments primarily engaged in manufacturing men's and boys' tailored suits, coats, and overcoats from purchased woven or knit fabrics. Establishments primarily engaged in manufacturing uniforms (except athletic and work uniforms) are also included in this industry.

Average annual rates of change are based on the linear least squares of the logarithms of the index numbers. Extensions of the indexes will appear in the annual Bureau of Labor Statistics bulletin, *Productivity Measures for Selected Industries*.

<sup>2</sup>Although production processes, techniques and technologies, employment patterns, and output differ greatly among industries, the relatively low average productivity gains registered by the men's and boys' suits and coats industry during the 1970's parallel similar slow-downs in average productivity gains among other manufacturing industries, and of the manufacturing sector as a whole. See Peter K. Clark and Jane T. Haltmaier, "The Labor Productivity Slowdown in the United States: Evidence From Physical Output Measures," *The Review of Economics and Statistics*, August 1985, pp. 504-08.

<sup>3</sup>A similar degree of specialization is found in most other apparel manufacturing industries, such as women's and misses' dresses, men's and boys' shirts, and so forth, and primarily reflects the distinctive manufacturing processes used to assemble various types of garments.

These relatively high specialization ratios may have contributed to the industry's vulnerability to imports—a surge in the importation of a specific type of apparel would have a much greater effect on firms specializing in that apparel type than on firms producing a wide variety of garments. See, Jeffrey S. Arpan, Jose de la Torre, and Brain Toynee, *The U.S. Apparel Industry: International Challenge, Domestic Response*,

Research Monograph No. 88 (College of Business Administration, Georgia State University, 1982), pp. 35-41; and industry sources.

<sup>4</sup>During the 1948-64 period, suit and coat consumption averaged between 25 million to 30 million units per year, increasing to between 31 and 36 million during the 1964-71 period.

The average overall demand for men's tailored suits and coats is influenced by varied factors such as population growth and location and changes in taste. Since 1972, for example, the demand for suits and coats has been influenced by the entrance of the baby-boom generation to the work force (although older men continue to buy and own more suits per capita), population shifts towards the West and Southwest where informal apparel holds sway, and changing attitudes towards tailored apparel. See Harry A. Corbin, *The Men's Clothing Industry: Colonial Through Modern Times* (New York, Fairchild Publications, 1970), pp. 348-52; *Men's Clothing, Tailored Sportswear and Rainwear* (New York, Fairchild Publications); and industry sources.

<sup>5</sup>*Statistical Abstract of the United States 1988* (U.S. Department of Commerce, Bureau of the Census), table 13.

<sup>6</sup>The growth of imports since the late 1960's has affected almost every segment of apparel manufacturing. For example, the proportion of men's and boys' knit shirt production accounted for by imports increased slightly from 13 percent in 1967 to 17 percent in 1976; for women's and misses' knit shirts, however, imports increased from 20 to 46 percent. See Arpan, Torre, Toyne, *The U.S. Apparel Industry*, pp. 57-91.

It should be noted that the exact relationship between import levels and domestic apparel production, employment, prices, and demand is difficult to determine. For a comprehensive discussion of the issues involved, see U.S. Congress, Office of Technology Assessment, *The U.S.*