Productivity in Services Industries: Trends and Measurement Issues

Chapter 4
Output and Productivity in Retail Trade

The retail trade sector has been the largest single contributor to the post-1995 resurgence of productivity growth. This is a surprise to many – particularly those who wish to identify the productivity growth with the emergence of a new more glamorous high-tech economy. Retail trade is among the oldest of industries; and at least in the United States, it has concentrated increasingly on employing the least-educated and least-skilled. Between 1975 and 2000, average hourly earnings in retail trade declined from 88 to 78 percent of the private sector average, while the employment share fluctuated in the range of 16-19 percent of the total. Retailing has been greatly impacted by many of the most prominent technological changes of the last few decades. The development of computers, scanners and the network opportunities of the internet have all contributed to the rapid pace of innovation in the industry.

One objective of this report is to simply determine whether productivity growth has accelerated in retail trade, or is it an illusion of faulty data or concepts. The following section summarizes the trends in retail output and productivity as reported in the BEA industry data set and the industry productivity program of BLS. However, there are questions about the appropriate measure of the output of the retail sector, gross sales or the gross margin (sales minus costs of goods purchased for resale). This issue is the subject of the second section. Third, we review the methodology of the Consumer Price Index program with respect to the use of the price indexes to compute real output at the level of sub-groups of retail stores. Fourth, we look at some recent research on the sources of productivity in the general merchandise segment of

retail trade, where the innovations seem most evident. We conclude with an examination the implications for productivity growth of electronic shopping and e-commerce.

Overview

Information on productivity trends in the retail sector is available from both BLS and BEA. The strength of the BLS program lies primarily with the detail that they provide for individual segments of the retail trade sector. With their latest release, they have shifted over to the North American Industry Classification System (NAICS) and publish measures of output, employment, and output per hour for total retail and twelve sub-sectors below the aggregate. BLS also publishes data for 24 industries below the sub-sector level. The information extends over the period of 1987-2001. The primarily limitation of the BLS data is that the analytical measures stop with labor productivity. The BLS program defines output as the real value of sales, using CPI indexes as price deflators. The labor inputs are measured in terms of hours, not employees – an important adjustment for retail trade – but no information is available on inputs of purchased materials or capital.

The BEA includes total retail within it industry data set, but information on underlying industry trends is limited to measures of nominal and real output for 24 sub-sectors. However, as discussed in chapter 1, the BEA data can be extended with information on inputs of capital services from BLS to provide estimates of the change in MFP as well as labor productivity. The BEA data are still reported on the Standard Industrial Classification (SIC) system. The primary implications of the shift from SIC to NAICS is to exclude eating and drinking establishments from retailing and move some establishments that sell both to households and business from

wholesale to retail trade. The latter change is important for building materials and office supplies.

Both BEA and BLS rely on the Census Bureau's annual survey of retail trade and the CPI for their basic source data. The most important distinction between the BLS and BEA data for the retail trade sector is that BEA relies on a concept of the gross margin, sales minus the cost of goods purchased for resale, to define output, as opposed to the sales measure of BLS. As discussed in chapters 3b and 3c, this notion of a margin as the definition of output also arises in insurance and banking. The implication of a focus on margins versus sales is discussed more fully in a later section.

A brief overview of the industry is provided in table 1. Columns 1 and 2 show the distribution of sales and employment in 2001 among the twelve major sub-sectors. Aggregate retail sales were $3.1 trillion and employment totaled 16.1 million. Motor vehicles and electronic shopping stand out with the highest volume of sales per employee, while sporting good and miscellaneous retailers have the lowest. There is also a wide variation in gross margins, ranging from a high of 43 percent for furniture stores to a low of 17 percent for motor vehicle dealers. Gasoline dealers and other general merchandize have particularly low margins. The general merchandize category is divided between department stores and other general merchandize because it has emerged as an area of intense competition, with Walmart and similar large format stores being classified within other general merchandize.[1] Additional detail is also shown for nonstore retailers in order to highlight the growth of electronic shopping.

The BLS data show a sharp acceleration of growth in the real value of retail sales and labor productivity after 1995. Electronic stores, other general merchandize, and electronic

shopping have double-digit rates of growth in both output and labor productivity. Productivity growth rates are lowest for food stores, gasoline stations, and department stores. However, only gasoline and miscellaneous retailing fail to record an acceleration of productivity growth in the post 1995 period.

A comparison of the BEA and BLS data at the level of total retail is provided in table 2. The two sources yield nearly identical measures of the growth in real gross output, despite the inclusion of eating and drinking establishments in the BEA data. Under the old SIC classification, the BLS methodology yielded a slightly lower rates of overall output growth. However, the alternative output measure, real value added from BEA, has a significantly higher rate of growth after 1995 that can be traces both to a rise in the nominal share of value added in the gross margin and a lower rate of price increase. The labor productivity measures are also very similar in indicating a strong post-1995 acceleration of growth. Again, the largest difference results from the inclusion of eating and drinking establishments in the BEA data because they have a below-average rate of improvement in productivity.

Finally the BEA data on purchased inputs and capital services can be used to extend the calculations to estimate the role of increased capital per worker, purchased inputs other than goods for resale, and MFP. Those calculations are shown in the lower part of table 2. It is interesting to note that the contribution of purchased inputs is actually negative after 1995, and there is a positive but small acceleration of growth in IT capital. As a result, all of the acceleration in labor productivity growth is attributed to a greater rate of improvement in MFP.

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[1] The classification system hides much of the economics of Walmart since its smaller stores are in NAICS 452112 (discount department stores) and the larger stores plus Sam's Club are in NAICS 4529. In addition, the distribution centers, which some believe are the source of much of Walmart's advantage, are in NAICS 493 (warehousing).

Measuring Output: Gross Margin Versus Sales

The above discussion of the BEA and BLS measures of retail trade output noted the close correspondence of their estimates of the growth in output and productivity. Yet the two agencies use much different conceptual definitions of output. The BLS productivity program employs a consistent methodology for all of its estimates of industry output, focusing on a concept of gross output that is equivalent to total shipments (adjusted for inventory change) or sales. In general, a gross output concept is most consistent with notion of an underlying production function that allows a full consideration of substitution between purchased inputs, capital, and labor.

In contrast, the BEA focuses on the concept of a gross margin, sales less cost of goods sold, as its primary measure of output. While much narrower that total sales, the gross margin is more inclusive than value added because it includes the cost of a broad range of purchased inputs -- such as rent, electricity, and advertising – that are inputs to the production process. In its use of the gross margin BEA is following a standard national income accounting practice. As shown in table 1, the gross margin averages only about one-fourth the value of retail sales.

Yet, the striking feature of the comparison of the BEA and BLS estimates is that they yield nearly identical measures of the growth in real output. The reason is that, lacking a means of adjusting its measure of the gross margin for price changes, BEA extrapolates the real value of the gross margin with an estimate of the real value of retail sales. It computes the gross margin in both current and constant values for 34 industry groupings within the retail sector. In nominal terms, the gross margin is readily available information from the retailer and it is reported as part of the Census Bureau annual survey. However, BEA constructs the constant value measure by assuming that it is a fixed proportion of sales at the lowest level of detail:

$$R_i = r_i \bullet Q_i.$$

Thus, the gross margin is simply a proportionate rescaling of output at the lower level of detail; and with aggregation, it differs from an aggregate measure of sales only in reflecting changes in the distribution of sales among stores with different margin rates. The BEA procedures for estimating total real sales are virtually identical to those of BLS – deflation of merchandise line sales with corresponding components of the CPI.[2] Despite the common result, the issue raised by the choice between sales and the gross margin is an important one, what is the output of a retail establishment?

Walter Oi (1992, 2000) has stressed the output of a retail firm is a composite bundle of services that surround the product that it sells. Betancourt and Gautschi (1993) suggested a grouping of those services into five broad categories: convenience of location, assortment, assurance of delivery in the desired form and at the desired time, information and ambiance. Since the returns to many of these services are embedded in the price of the product, it is difficult to decompose the retail sale into its constituent elements.

The approach of the BLS productivity program is to maintain that the deflated value of sales is the natural unit for measuring the output. Thus, they simply apply their standard framework, used in other industries, to the retail trade sector. In considering a production process with substitution between capital, labor and purchased inputs, they would argue that there is no particular justification for distinguishing between purchased goods for resale and other purchased goods and services that go into the delivery of a final product. In a technical sense, the deduction of costs of goods sold in order to focus on the gross margin requires an assumption of separability in the overall production function. A simple example where this assumption does not hold is provided by the sale of bicycles that used to be delivered to the

[2] The growth in the BEA output measure will also differ from that of BLS, because it adjusts its estimate to benchmark values every five years.

retailer fully assembled, but may now arrive in a box where customers have a choice of having the store arrange for assemble or doing it themselves. The shift to delivery in a box reflects a tradeoff between wages at the factory plus delivery costs compared to the costs of labor to the store or the opportunity costs of the consumer. Furthermore, it is often argued that one of the keys to Walmart's success has been its efforts to get suppliers to do more of the work of delivering the product to the store shelf (Oi, 2000). This implies a potential for substitution between cost of goods sold and in-store labor.

The use of sales as a measure of output, however, can have the effect of rendering largely meaningless the BLS focus on the growth in labor productivity. This is evident in table 1 where output per hour is reported as rising at a phenomenal 15 percent per year in electronic stores compared to an average of 3.6 percent in retailing as a whole. Despite the fact that the nominal sales of electronic stores grew more slowly than total retail, the prices of the products they sold, dominated by computers, decline at a 12 percent annual rate. As a result, real sales grew 19 percent per year; and with a relatively modest 3.5 percent gain in labor, reported labor productivity soared. Electronic stores are in the business of selling boxes that they obtain from the manufacturer. The fact that the machine inside has experienced dramatic technical improvement should have little implication for efforts to measure the productivity of workers in the retail establishment. An index that combines the improvements within the box with changes in the number of boxes bears little relationship to the actual activities of the retail store. A similar, though less dramatic, problem arises for electronic shopping, which includes Dell's internet sales of computers.

The emphasis the retail margin can be seen as an effort to focus more narrowly on activities within the retail establishment. The BEA largely defeats the value of this concept,

however, when it assumes that the margin is a fixed proportion of sales in real terms. If BEA published its measure of labor productivity at the level of electronic stores, for example, it would behave the same as that of BLS. Yet, the development of a meaningful measure of the real value of the gross margin is a challenging task. One approach would be to follow the double-deflation approach the BEA employs elsewhere to obtain real measures of value added. That is, purchased goods for resale would be deflated by an index of producer prices plus transportation, paralleling the use of the CPI to deflate the sales. The real value of the margin would be the difference between two deflated values. However, many analysts doubt that indexes of sufficient accuracy could be developed to obtain, in effect, the real value of the margin as the residual of changes in two large numbers.

An alternative, currently being implemented by BLS, seeks to directly price the margin by asking stores to report the difference between vendor price and the sale price of specific items. That program is discussed more fully in the following section. Furthermore, it may be possible to identify those characteristics of store formats that account for variation in the gross margins; and to construct a hedonic index based on changes in those characteristics or their prices. As part of its current program to directly price the margin, the BLS is collecting information on the store characteristics, such as number of SKUs, square footage, storage area, and whether the store is a discount, gourmet, warehouse, or combination outlet. This will provide a data set that will allow for the exploration of the sources of variation in retail margins.

Walter Oi (2000) has argued that a focus on the gross margin is not a particularly useful concept of the output of a retail firm. The gross margin, as a measure of the difference between retail and wholesale prices is likely to be strongly influenced economies of scale and volume

discounts. Margins can also change in response to variations in monopoly power. Thus, he favors the BLS reliance on the real value of sales.

However, the issues that arise in connection with computing the gross margin will also arise in any effort to go beyond the simple idea of labor productivity to undertake a full growth accounting exercise where the objective in to measure to the contributions of all of the inputs. Even if output is defined as the real value of sales, we still need a measure of the real value of purchased inputs. If the production relationship is viewed as having two categories of purchased inputs, goods purchased for resale (I_1) and purchased inputs that are included in the gross margin (I_2), together with capital (K), labor (L), and changes in technology (A), the production function can be represented as:

(1) $Q = F(I_1, I_2, K, L, A)$.

Cost shares, v_i, can then used to decompose the overall growth in output into the contribution of growth in each of the inputs and the residual of multifactor productivity:

(2) $$\Delta \ln Q = \bar{v}_1 \Delta \ln I_1 + \bar{v}\ \Delta \ln I_2 + \bar{v}_k\ \ln K + \bar{v}_l\ \ln L + \Delta \ln A$$

However, the calculations require physical measures of the growth in each input. In that process, the deduction of the contribution of the first input, I_1, is equivalent to obtaining a measure of the real value of the gross margin. Furthermore, by carrying out the decomposition with chain indexes the empirical importance of any lack of separability in the underlying relationship is minimized.

While the gross margin data from BEA allowed us to compute the full decomposition of labor productivity in table 2 and report an estimate of MFP, it required a huge simplifying

assumption that growth in the real value of the margin parallels the growth in sales. The BEA treatment leads us to attribute to retail trade developments that more rightly should be associated with the supplying industries. In some categories, such as electronic stores, it overstates the role of the retailer, and undervalues the contribution of the manufacturer. In other cases, such as general merchandizing, the contribution of the retailer may be undervalued.

Retail Price Indexes

In constructing their measures of real output, both BEA and BLS rely on matching sales data by merchandise line with price measures from the CPI. The store is one of the characteristics that BLS holds constant in selecting a specific product for price. Since BLS gradually rotates the sample of retail outlets from which it collects prices, the procedure will gradually capture the changing mix of outlets that customers patronize. By pricing a fixed set of products within a fixed store format, the CPI should correctly adjust for price change, leaving other sources of change in nominal sales to be reflected in the measures of real output. However, retailing has been a highly competitive sector with a rapid pace of innovation that takes the form of new stores replacing old stores. In many cases this process of change involves the introduction of new store formats that combine the above-mentioned composite bundle of services in new ways. Some of these new store formats may involve a quality improvement, but just as often they combine reduced services with lower prices. Examples of the latter are provided by the rapid growth of the large warehouse clubs and superstores.

Thus, there is a concern about the ability of the pricing programs to capture the effects of the shifts of sales among store formats. When a new store enters the sample, all of the difference in price of an item between the new and old outlets is assumed to reflect differences in quality or

that associated services that are provided. None of it is recorded as a price change. This procedure will capture most of the implications of changes in store formats. However, the procedure may introduce a bias if the opening of new stores in an area and the shift of consumers towards those stores reflect a reduction in the quality-adjusted price. The problem is lessened if competition forces the stores that are still in the sample to match the pricing of the new entrant before they are rotated out. But, it appears that the shift to new outlet types is an ongoing incomplete process. Thus, the potential for bias is closely related to the problems raised by the introduction of new products in the CPI.

The issue of outlet substitution in the CPI and the potential for bias was examined by Reinsdorf (1993) who compared average prices of stores that were being rotated into the sample with those that were leaving. He found a price differential of about 1.25 percent. Given a sample rotation of 5 years, the difference in affected categories of retail would be about 0.25 percent per year. We do not know how to divide the price difference at two outlets between quality and a pure price component, but the continual shift of consumers toward the new discount stores suggest that some of it is related to price. Other authors adjusted the outlet price differences reported by Riensdorf for the subset of items that are affected by outlet bias, further lowering the estimated effect.[3]

On balance, most studies suggest that the outlet bias is relatively small, and the CPI does capture a large portion of the change in prices that accompanied the structural evolution of the retail sector. The problems are the same that have been raised before with respect to the adequacy of the CPI to measures overall price changes. The CPI is the primary basis for

[3] The issue is discussed more thoroughly in National Research Council (2002).

adjusting personal consumption expenditures in the national accounts, and it should be no less appropriate for valuing retail store output.

Instead, the more basic problem arises with the effort to develop input price indexes for retail trade. Such indexes are needed if we wish to move beyond simple measures of output per labor hour to examine the sources of productivity gains in retailing. As mentioned above, the PPI program of BLS has introduced a new initiative to focuses on the gross margin as the appropriate measure of output in the retail trade sector. The margin price is defied as the difference between the retail price of an item and its acquisition cost. An effort is made to include any discounts from the vendor or offered by the retailer to consumers. In the case of establishments that also provide a range of directly-priced services, such as the service shops of auto dealerships, the combined price index incorporates both a margin measure and the price of the services.

Data are available only since the beginning of 2000, and currently only for a portion of retailing (food, automotive, gasoline, drug, and miscellaneous retailing). For those few situations where a match can be made with the CPI price indexes that are used to deflate retail sales in the BLS productivity program, it is evident that the margin prices are quite different. For example, the margin price for food stores in 2001 averaged 10 percent above the December 1999 initial value. In contrast, the sales price deflator for food stores rose by only 2 percent between 1999 and 2001. A similar result is obtained for auto dealerships: the margin prices rise faster than the final goods prices.

If the margin prices were used to compute output and productivity, this limited sample suggests a significantly lower rate of productivity growth in the retail portion of the production chain. However, the data are still too limited to provide an assessment of the usefulness of the

margin price indexes. The PPI program has yet to release price indexes for electronic stores and non-store retailers, categories where we would anticipate large differences between the margin and final good price indexes.

Productivity Growth in General Merchandize

As reported in table 1, general merchandize is both a large portion of overall retail trade and a category of particularly rapid growth in labor productivity. It has generated a lot of interest from a productivity perspective both because of the format innovations introduced by Walmart and other warehouse or superstore operations, and because of the suggestion that innovations in IT technologies played a major role in their success. Retail trade, however, is not a large overall user of IT capital. IT capital income is only 2.5 percent of value added over the 1987-2001 period, compared to a 5.5 percent average for nonfarm business as a whole, and 33 percent in telecommunications. However, its contribution to growth was rising throughout the last decade (table 1).

The influence of Walmart is difficult to isolate in the industry data because its operations are spread across several SIC and NAICS groupings. However, The McKinsey Global Institute MGI) (2001) used internal corporate data to estimate the source of gain in Walmart's labor productivity and its contribution to the general merchandise segment. They argue that Walmart has maintained a substantial productivity advantage over it competitors of 40 to 50 percent. The productivity advantage is attributed in turn to managerial innovations, intensive use of IT applications (including scanners using UPC codes, computer systems to track inventory and facilitate communications, and the early adoption of electronic data interchange), and economies of scale. The MGI authors also argue that Walmart has achieved significant efficiency gains in

their use of capital, though they do not present a formal analysis. The productivity advantage fueled a rapid growth in Walmart's share of the market, and more recently emulation by other retailers. Their analysis suggests that rapid productivity gains can be sustain in future years as the Walmart model spreads to its competitors. It is a story in which the IT applications are an important, though not the only source of the increased productivity.

E-Commerce

The development of the internet has opened up a wide range of new commercial activities. The sudden emergence of e-commerce activities in the later half of the 1990s created a lot of confusion about how to measure the e-commerce and there were wide disparities in the estimates of its projected growth. In addition, there has been a very active discussion and research on the implications of e-commerce for the structure of markets and its impact on productivity growth in the overall economy.

On the issue of measuring the volume of e-commerce and its growth, considerable progress has been made. Beginning in 1999, the Bureau of Census publishes estimates of e-commerce transactions at the retail level on a quarterly basis, and it has incorporated questions about e-commerce sales in the annual surveys of manufacturing, wholesale trade, retail, and selected services (Mesenbourg, 2001). The results for 2001 are reproduced in table 3. It is evident that business-to-business (B-B) sales are the dominant source of e-commerce, 93 percent of the total. This reflects a pre-internet practice of exchanging data over electronic exchanges. Within business, e-commerce sales have become a standard mature practice and are now a slowly growing share (15 percent in 2001) of the total.

At the retail level, e-commerce is only about 3 percent of total sales, or $70 billion in 2001; but as show in figure 1, it is growing at about 30 percent annually. However, this growth is far below the projections of a few years ago (Bakos, 2001). Among fixed-location retailers, e-commerce is important for automotive dealers, but the most of the remainder is undertaken by non-store retailers (electronic shopping and mail order) like Amazon. In services, e-commerce is a major factor only for travel reservations, where it was about one quarter of the market in 2001. The rapidity with which the Census Bureau developed its report, suggests that e-commerce will not pose a major measurement problem for the statistical agencies.

The effects of e-commerce activities on the economy and productivity in particular, are more uncertain. The non-store retail component has an extraordinary 16 percent annual rate of productivity growth in the BLS data provided in table 1. But as previously discussed, the BLS measures do not provide an estimate of productivity growth within the retail component of the supply chain, particularly when sales are dominated by high-technology items whose prices are falling rapidly. Dell Computer, for example, is part of the nonstore segment. Instead, a more complete picture of the efficiency of e-commerce requires more detailed information on its costs. Furthermore, the nonstore segment's share of retail sales is too small to have accounted for a significant portion of the reported acceleration of labor productivity in total retail. At present, the surveys of the Census Bureau do not collect detailed cost information for these segments of the retail industry, and a more informed picture may need to wait upon release of information from the 2002 economic census.

At its heart, the Internet is a system for transferring information, and it can do so at vastly reduced cost; but it is not so evident how that increased flow of information will affect commerce. Buyers could use the information to improve their evaluation of their options,

leading to an intensification of competition. Alternatively, sellers could the information about buyers to promote greater price discrimination or to tailor the product to the buyer. For some types of goods, electronic sales will reduce delivery charges, but in other cases the electronic sale is going against a long trend of substituting the customer's time for in store labor and delivery. Just as some buyers will go to a conventional store to observe the options before purchasing over the Web, others will use the Web to inform themselves before purchasing at an off-line store. The information services of the internet offer dramatic economies of scale; but it is not at all evident how those rents can be captured by a specific vendor, since buyers can easily separate the decision of what to buy from where to buy.

In an early assessment of the role of the internet, Smith, Bailey and Brynjolfsson (1999) suggested that the low search costs of internet-based transactions should intensify competitive pressures and improve market efficiency in producing lower prices, reduce the cost of changing prices, and lead to less price dispersion. In their summary of the empirical research, however, the most surprising finding was the relatively high dispersion of prices on the internet. Later studies also have found substantial price dispersion, implying that the gains in market efficiency have not been that substantial.[4]

Lucking-Reilly and Spulber (2001) suggest that the most significant economic aspects of e-commerce are likely to lie within the area of business-to-business and that they can be divided into four areas: (1) efficiencies in automated transactions. (2) new market intermediaries, (3) consolidation of demand and supply through organized exchanges and (4) changes in the extent of vertical integration of companies. In particular, the internet enables companies to coordinate geographically-dispersed production processes. It should enable them to exploit differences in

[4]For examples and additional citations, see Clemons, Hann, and Hitt (2001), and Pan, Ratchford, and Shankar (2001).

prices over much grater distances (the development of call centers in the Philippines). Many of these changes will lower costs, without necessarily improving productivity.

Moreover, as mentioned earlier, recent growth in the B-to-B component has been quite modest, suggesting that additional economic benefits may be limited. One explanation is that electronic transactions among businesses is an older technology than our current infatuation with the internet would suggest (the use of private electronic data interchanges for example), and many of the largest gains have been realized. Certainly, earlier forecasts of the growth of B-B e-commerce have been wildly off-target (Lucking-Reilly and Spulber 2001, p. 55)

Conclusion.

Retail trade has often been identified as a significant source of the post-1995 resurgence in productivity growth. However, as discussed above, part of that conclusion may be the product of a measurement system that credits to retailing the benefits of improvement that should more properly be assigned to other parts of the economy. The fundamental shortcoming of the statistics results from the lack of price measures of the cost of goods sold by retailers that would allow us to distinguish their contribution to the final product. The Producer Price Program of BLS has moved to address this problem with a new effort to collect information on retail margins. However, the data are still too limited in coverage and available time periods to enable an evaluation of their usefulness for separating the contribution of retailing from the rest of the production and distribution process. In addition, a successful introduction of margin price indexes will still leave a large problem of relating current development to past trends. Without an historical benchmark, it is often difficult to evaluate the significance of the new.

However, there can be no doubt that retailing has been an area of dramatic change and technological innovations that may have improved productivity substantially. Certainly, the data do suggest that the superstores and warehouse clubs have been an important market innovation since we can observe large changes in the pattern of consumer expenditures; and the example of Walmart suggests that here have been large cost reductions in supply-chain management.

In addition, e-commerce is a small but rapidly growing segment of retailing, although we have little direct information on its influence on productivity. Substantial progress has been made by the Census Bureau in providing data on e-commerce sales, but little is known about the segment's cost structure. Also it seems evident that the internet and other aspects of the electronic transfer of information will lead to many changes in the structure of conventional retailing that may be more important than the development of e-commerce alone.

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Table1. Growth of Output and Labor productivity by Major Sub-Sector of Retail Trade, 1987-2001
annual percentage rate of change

Code	Industry	Percent of sales 2001	Percent of employment 2001	Gross Margin (percent of sales) 2001	Output		Output per hour	
					1987-95	1995-2001	1987-95	1995-2001
44,45	Retail Trade	100.0	100.0	26.7	3.0	4.8	2.0	3.6
441	Motor vehicle and parts dealers	26.8	13.3	16.8	2.5	3.9	1.6	1.9
442	Furniture and home furnishings stores	2.9	4.1	43.5	3.3	5.6	2.7	3.6
443	Electronics and appliance stores	2.7	3.9	26.2	13.3	18.8	11.5	14.7
444	Building material and garden supply stores	9.2	8.4	29.2	3.5	6.5	2.3	3.5
445	Food and beverage stores	15.3	19.5	28.3	0.0	1.0	-0.9	0.7
446	Health and personal care stores	5.3	5.9	29.5	2.2	5.7	1.0	3.2
447	Gasoline stations	7.8	6.0	19.8	1.6	1.0	1.8	1.3
448	Clothing and clothing accessories stores	5.3	7.5	41.6	3.5	5.7	3.9	5.1
451	Sporting goods, hobby, book, and music stores	2.5	4.2	37.7	5.6	5.7	3.2	5.0
452	General merchandise stores	13.7	15.5	25.2	4.9	6.2	2.9	5.1
4521	Department stores	7.3	9.0	30.3	4.2	2.7	1.0	1.6
4529	Other general merchandise stores	6.4	6.5	19.4	6.6	11.9	6.1	10.9
453	Miscellaneous store retailers	3.3	7.4	39.8	6.4	4.7	4.5	3.1
454	Nonstore retailers	5.1	4.2	40.4	6.8	12.9	5.6	12.4
4541	Electronic shopping and mail-order houses	3.5	1.8	37.7	13.8	21.6	8.9	16.3
	Total	$3.1 trillion	16.1 million	$841.1 billion				

Source: Industry Productivity Program of the Bureau of Labor Statistics, and Bureau of the Census, Annual Benchmark Report for Retail Trade and Food Services, 2003

Table 2. Alternative Measures of Output and Productivity Growth in Retail Trade, 1987-2001
Annual percent change

	1987-95	1995-2001
Output		
BEA output	2.9	4.9
BEA value added	2.9	6.8
BLS output	3.0	4.8
Employment		
BEA	1.7	1.7
BLS	1.1	1.3
Labor productivity		
BEA	1.2	3.2
BEA value added	1.1	5.0
BLS	2.0	3.6
Contribution of:		
Intermediate inputs	0.5	-0.1
Capital	0.3	0.3
IT capital	0.1	0.3
Multi-factor productivity		
BEA output	0.4	3.0
BEA value added	0.6	4.5

Source: BEA industry data set, BLS industry productivity program, and authors' calculations.
note: The BEA data are on an SIC basis, while the BLS estimates are reported using the 2002 NAICs.

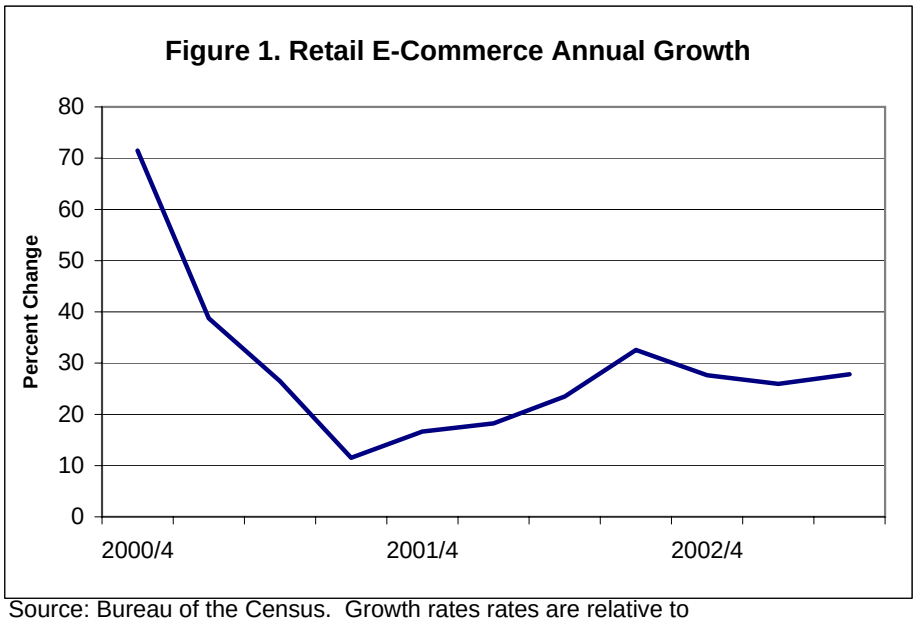
Table 3. U.S. Shipments, Sales, Revenues and E-Commerce: 2001 and 2000

[Shipments, sales and revenues are in billions of dollars.]

Description	Value of Shipments, Sales, or Revenue				Year over Year Percent Change		Percent Distribution of E-commerce	
	2001		2000					
	Total	E-Commerce	Total	E-Commerce	Total	E-Commerce	2001	2000
Total*	14,572	1,066	14,657	1,062	-0.6	0.4	100	100
B-to-B*	6,676	995	6,950	997	-3.9	-0.2	93.3	93.9
Manufacturing	3,971	725	4,209	756	-5.7	-4.1	68	71.2
Merchant Wholesale	2,705	270	2,741	241	-1.3	12	25.3	22.7
B-to-C*	7,896	71	7,707	65	2.5	9.2	6.7	6.1
Retail	3,141	34	3,059	28	2.7	22.1	3.2	2.6
Selected Services	4,755	37	4,648	37	2.3	-1.4	3.5	3.5

Source: Department of Commerce, *E-Stats* , March 2003

The allocation between B-to-B and B-to-C e-commerce is based on several simplifying assumptions: manufacturing and wholesale e-commerce is entirely B-to-B, and retail and service e-commerce is entirely B-to-C. Definitional differences among shipments, sales, and revenues are also ignored.



Source: Bureau of the Census. Growth rates rates are relative to same quarter of prior year.