Apparel Prices 1914-93 and the Hulten/Bruegel Paradox

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ABSTRACT

While the CPI may have overstated inflation in the mid-1990s by about one percent per year, as concluded by the Boskin Commission, it does not make sense to extrapolate that rate of bias backwards over long periods of time. The "Hulten-Bruegel paradox" shows that any such exercise in backward extrapolation yields levels of real consumption two or four centuries ago that are implausibly low, barely providing an average household with a pound of potatoes per day, with nothing left over for clothing or shelter. The paradox raises the possibility that at some point in the past price index bias, at least for some important products, may have been zero or negative rather than positive.

This paper studies apparel prices over the long period 1914-93, developing new price indexes based on data from the Sears catalog for that interval. The research is based on roughly 10,000 exact comparisons for a matched model index of many different types of apparel, and on another 6,500 observations used to develop a hedonic price index for womens' dresses over the period 1914-88. All of these roughly 17,000 data observations were manually copied from the Sears catalog by a succession of devoted undergraduate research assistants.

The Sears matched-model indexes do not exhibit a consistent negative or positive drift relative to the CPI. For womens' apparel the drift is always negative but for mens' apparel there is a turnaround, from negative before 1965 to positive thereafter. Both the matched-model indexes and the CPI rise less rapidly for womens' apparel than for mens' apparel, which would be consistent with the hypothesis that price changes accompanying model changes (and thus linked out of both the Sears matched-model index and of the CPI but not in the hedonic index) are more frequent for womens' apparel, since models change more frequently.

The main conclusion of the paper is based on the hedonic study of womens' dress prices, which exhibits a price index increase of many orders of magnitude faster than either the Sears Matched-model index developed from the same source data or as compared to the CPI. . To the extent that the Sears hedonic and matched model indexes are based on the same data, the results provided here may offer a complement to past research on computer prices, which also found that price changes were contemporaneous with model changes. Just as hedonic price indexes for computers almost always drop faster than matched-model indexes for computers, we have found the opposite relationship for apparel prices, although presumably for the same reason. The results in this paper suggest that the CPI for apparel may incorporate a significant downward bias, at least for the 50 years since 1945 and perhaps over a longer period.

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I. Introduction

So much evidence has been produced over the years demonstrating an upward bias in the CPI and NIPA deflators, especially for consumer and producer durable goods of relatively recent invention, that it requires a sharp adjustment in one's mind-set to contemplate the opposite, that for major consumption components over long intervals the CPI may have incorporated a significant *downward* bias. Yet the Hulten-Bruegel paradox as interpreted here makes a convincing logical case that at some point in the past there *must have been* a downward bias in the CPI for several major components. This paper demonstrates that one of these components is apparel, one of the three "necessities" (along with food and shelter), and a companion paper (Gordon and VanGoethem, 2004) reaches the same conclusion for rental shelter. Both papers are unique in covering most of the twentieth century, 1914-93 in this paper on apparel and 1914-2003 in the companion paper on shelter.

Viewed as a contribution to the price index literature, this paper joins others that have explored differences in hedonic and matched-model indexes developed from the same data. Several previous studies have found that computer prices tend to be reduced upon the introduction of new models, leading hedonic price indexes to exhibit more rapid rates of price decline than matched-model indexes from the same data.[1] The

1. Among studies that examine differences between matched-model and hedonic indexes for personal computers and/or software are Berndt, Griliches, and Rappaport (1995), Berndt and Rappaport (2003), Doms, Aizcorbe, and Corrado (2003), and Triplett (2004).

matching process appears to exclude price declines when new computer models are introduced. There has long been a suspicion in the apparel price literature that price *increases* occur with changes in models or styles and are missed by the matched-model procedures of the CPI, and this paper is perhaps the first study to demonstrate this systematic difference between hedonic and matched-model indexes from a uniform data set for apparel over a long historical period of time.[2] A striking corollary of the results is that quality change in apparel over the long period 1914-93 has been negligible, in the sense that the new hedonic index tracks raw unadjusted price change relatively closely, while changes in the implied index of average quality are relatively minor.

This paper represents the fulfillment of a longstanding goal to extract from the Sears catalog a new history of apparel prices over the entire history between the beginning of the CPI in 1914 and the final year of the Sears catalog in 1993 (the catalog itself began in 1893, two decades after the Montgomery Ward catalog's initiation in 1872).[3] Initially the goal of this project was to duplicate the CPI matched-model methodology with catalog data and compare CPI apparel sub-components with the

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2. For history buffs, the time period of this study, dictated solely by the starting date of the CPI and the termination date of the Sears catalog, echoes dates signifying the start and end of the most terrible events of the 20th century. In the words of Eric Hobsbawm (1994, p. 3), the interval 1914-91 marks the "short twentieth century" bookmarked by the start of World War I and the final collapse of the Soviet Union.

3. Sears catalog data for 1893-1914 were previously analyzed by Rees (1961), as discussed further below. A history of the Sears Roebuck and other mail-order catalogs and further references can be found in Gordon (1990, pp. 419-23).

corresponding Sears matched-model indexes. Subsequently it became apparent that the same Sears data could be used to develop hedonic price indexes for at least one product, womens' dresses, where an ample number of data observations are available in the catalogs. The resulting differences in the hedonic and matched-model indexes for womens' dresses provide convincing evidence that the matched-model technique misses a significant portion of price increases that occur when styles and models change.

The Hulten-Bruegel Paradox

Numerous economists have speculated about the implications for estimates of long-term economic growth of bias in official price indexes. In an important and influential example, Nordhaus (1997) speculated that, when plausible rates of upward price index bias are extrapolated backwards for two centuries, the increase in real wages from 1800 to 1992, which in the official data is by a factor of 13 to 18, might have been by a factor of 40 with a low estimate of price index bias (0.5 percent per year) or by a factor of 190 with a higher estimate of bias (1.4 percent per year).

Nordhaus' conference discussant, Charles Hulten, pointed out the implausibility of this thought experiment; the high bias estimate implies (in my own numerical example that makes Hulten's point with different numbers than his) that median

household income in the year 1800 was $143 in 1992 prices, or $0.39 per day, enough to buy a mere 1.3 pounds of potatoes per day for the household, with nothing left over for shelter, clothing, or anything else.[4]

But why stop there? The "Hulten paradox" should be renamed the "Bruegel paradox," after the landmark painter Pieter Bruegel the elder (1525-1569). Even if we assume that the then-unavailable official estimates would register no increase in the real wage from 1569 to 1800, when we extrapolate Nordhaus' high bias estimate back to the last year of Bruegel's life, we find the implication that the real wage should have increased from 1569 to 1992 by a factor of 5482, making median *annual* household income in the earlier year equal to $5.59, enough to buy exactly 0.8 ounces of potatoes per day, with nothing left over for food or shelter.[5] Yet the happy burghers in Bruegel paintings often look overfed, content, well-clothed, and with solid-looking houses in the background.

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4. 1992 current-dollar median household income was $30,786 and the 1992 price of a pound of white potatoes was $0.31. *Statistical Abstract of the United States*, 1994, Tables 707 and 763, respectively. Extrapolating backwards a growth rate of real wages of 2.8 percent per year yields a ratio of real wages in 1992 divided by the year 1800 of 216. ($30,786/216 = $142.50)

5. The factor of 5482 equals the factor of 216 implied by the high-bias estimate (a bias of 1.4 percent per year added to the official growth rate of real wages of 1.4 percent per year), multiplied by an additional factor of 25.3 to take account of a 1.4 percent bias in the 231 years from 1569 to 1800.

The Application to Apparel

In setting a research agenda to look for the possibility of negative CPI bias, one looks first to the three traditional consumer necessities, food, apparel, and shelter; these are the "big three" items of consumer expenditure and have a sufficient weight to "matter" in arriving at an eventual resolution of the Hulten/Bruegel paradox. While there might be some long-term bias in the CPI for food, I have sidelined that category to the back burner for lack of an obvious data source that would incorporate developments over time in the increased degree of processing of food (canned food, frozen food, delis in the supermarket, etc.) Instead, the research payoff looks more promising for the remaining two necessities, apparel and shelter, for two reasons. First, there is prima-facie evidence, reviewed below for apparel (and equally true for structures) that raw (non-quality-adjusted) price data for a given type of apparel sold in mail-order catalogs increase far more over the 1914-93 period than the CPI. Second, apparel is one of the three main areas where critics have suggested that the CPI may incorporate a downward bias (the others being housing and autos, see Wynne and Sigalla 1994, pp. 10-11).

Among the reasons suggested for the downward bias in apparel is the strong seasonal pattern in clothing styles and prices, leading to possible inaccuracy in linking prices for old styles sold at low close-out prices with new styles sold at high initial

prices. In suggesting that "style" goods are a souce of the bias problem, Wynne-Sigalla cite the difference between the 1967-87 CPI inflation rate of 6.0 percent for "infants' and "toddlers'" apparel with those for mens' and boys' apparel (3.4 percent) and womens' and girls' apparel (2.9 percent). A much more comprehensive study of "style" and "fashion" goods is provided by Pashigian and co-authors (1988, 1991, 1995) and indicates that seasonal fluctuations in the prices of womens' apparel are greater than for mens' apparel, and that prices of womens' apparel start high because of uncertainty by retailers about what styles will be popular and prices later decline as "sales" are necessary to clear out inventories of unpopular merchandise. Without extreme care in linking old styles last year to new styles this year, any price index based on linking is subject to possibly major errors.

Plan of the Paper

Our review of the evidence begins with comparisons over the long 1914-93 period between changes in the CPI and in raw price changes for selected items from the Sears catalog; the much faster increase in the Sears prices could be reconciled by a rapid quality change, by an atypical rate of Sears increase relative to economywide apparel prices, or by a downward bias in the CPI. To address the representativeness of Sears catalog prices, we then turn to a consideration of advantages and disadvantages of the

catalog as a data source.

The rest of the paper develops the matched-model (MM) for numerous apparel product categories and the hedonic index for womens' dresses. The MM indexes are based on more than 10,000 data observations, and the hedonic index on roughly 6,500 observations. The discussion of the MM indexes and a comparison with the CPI is followed by a detailed presentation of the hedonic results. The case for a downward bias in the CPI rests primarily on the hedonic regression study of womens' dresses, which exhibits a much faster rate of price increase than either the Sears MM index for womens' dresses or the CPI for womens' dresses. The negligible rate of quality improvement for womens' dresses is extrapolated to other types of apparel to reach the general conclusion of downward bias in the CPI not just for womens' dresses but for all apparel.

II. Further Motivation for a Study of Apparel Prices

Between 1914 and 1993 the CPI implies that apparel prices on average rose by a factor of 7.6 (an average annual growth rate of 2.6 percent per annum). However, a quick glance at any Sears catalog in the era prior to World War I reveals prices that seem much too low relative to 1993 to be consistent with the CPI. In 1914 cotton percale house dresses, trimmed with braid and ruffles, could be purchased fo $0.98 and a taffeta

silk jacket for $6.75. Men's all-wool pants were $1.35, an all-wool suit was $4.50, and an all-wool overcoat was $7.00.

The impression that the catalog prices have increased far more than the 1993/1914 price ratio of 7.6 for the CPI can be quantified. Taking the median dresses (ranked from most to least expensive) sold by Sears in 1993 and the median sold in 1914, the 1993/1914 price ratio is 32.7. For the two most expensive dresses in each year the ratio is 27.4, while for the two least expensive dresses the ratio is 59.5. It might seem easy to dismiss this discrepancy between the CPI increase and the median increase in catalog dress prices by arguing that quality has increased commensurately, but in fact an inspection of the photos and specifications in the catalogs suggests that, if anything, quality was higher in the earlier era, with higher quality fabrics (silk, cashmere) and more decorative elements (ruffles, braids, etc.).

Experts at the BLS have long suspected that the CPI for apparel, at least prior to 1988, might incorporate a downward bias.[6] Both the CPI and Sears MM indexes may understate the true rate of quality-adjusted price increase. If our hedonic regression results consistently display a faster rate of price increase than the MM indexes from the same catalog data, then this would support the view based on the raw (quality-

6. Further discussion of possible bias in the CPI for apparel is contained in Armknecht and Weyback (1989) and Liegey (1993). Recent experiments with hedonic price indexes for apparel are described in Liegey (1994).

unadjusted) comparisons cited above that the CPI may understate secular inflation in apparel prices, thus helping to explain the Hulten/Bruegel paradox.

Other Aspects of this Research

Part of the goal of this research is to determine if for important product groups like apparel and shelter that there is any case to be made for a downward bias in the CPI over any significant period of time. Another goal is simpler and more direct, to create a complementary study of price changes to that of Rees (1961), who carried out detailed studies of apparel prices from catalogs as well as for other products (e.g., shelter prices from newspaper advertisements). Rees covered the period 1890-1914, that is, the years between the establishment of the WPI and of the CPI. The coverage in this paper of apparel prices for the period after 1914 complements the study by Rees and sheds new light on his results, since his study was based entirely on matched-model methodology and did not make any use of hedonic regression techniques.

The research in this paper is based on much more evidence on MM indexes than on hedonic indexes. MM indexes have been created for most types of apparel covered by the CPI over the entire period 1914-93. Our hedonic study is of necessity limited to womens' dresses, because of inadequate sample sizes for other types of apparel.

Advantages and Disadvantages of Catalog Price Data

In my past work on price measurement (Gordon, 1990), an important preliminary step has been to discuss advantages and disadvantages of using mail-order catalogs as a supplementary source of price index numbers to be compared with official price indexes like the CPI. This comparison of advantages and disadvantages needs to be put in perspective by two sets of factors. First, for many durable goods examined in my book (Gordon, 1990), price indexes based on *Consumer Reports* were so clearly superior in the extent of industry coverage and attention to the collection of true transaction prices that, whenever available, *Consumer Reports* indexes were used in preference to catalog indexes. For this study of apparel, the first consideration is irrelevant, since *Consumer Reports* has never compiled ratings, quality evaluations, or prices of apparel. Second, the emphasis in this paper is more on differences in methodology to extract alternative matched model vs. hedonic indexes from the same data than it is on differences in implied price changes between catalog indexes and the official CPI. Thus differences in the validity of catalogs vs. the official CPI are less important. Nevertheless, it is worthwhile to review the advantages and disadvantages of catalog data, especially for this study of apparel that goes back to 1914.

Advantages of Catalog Price Data

Among the most important advantages of catalog price indexes are the following:

1. Most important, specifications and illustrations published in catalogs allow closer control for changes in quality than in the official price indexes. The continuity of item codes from one catalog to the next is often helpful in following a particular item, and there is usually a long list of specifications that can be checked to insure that the models being compared are absolutely identical. In the CPI exact specifications are not available and accessible over any kind of long historical period. The consistency of specification listings in catalogs also makes them preferable to newspaper advertisements as a data source.

2. The matched-model methodology used to compare catalog items over time insures that price comparisons are included only for items that are absolutely identical in every dimension reported in the catalog specification. In contrast, since 1978 the CPI has not been based on published specifications, and even before 1978 — the time period most relevant for this study — the CPI made direct comparisons between nonidentical goods if both fell within the same specification description.[7]

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7. This statement about the CPI comes from Rees (1961b), who states "the BLS makes direct comparisons between nonidentical goods if both fall within the same specification." Triplett (1971, p. 186, Table 6.1) quotes a study showing that for nonfood items in the CPI in April, 1966, more than half of all product substitutions were

3. Related to the first two advantages is the fact that catalog price indexes can in principle be replicated by anyone with access to a library containing historical catalog volumes. In contrast, there is no way that CPI indexes at either the lower or upper level can be replicated by anyone except BLS employees. As a practical matter, for historical periods several decades in the past, original source data for the CPI may not be available at all.

4. The selection of products and individual models sold in catalogs responds automatically to the needs of the marketplace. It has always been true that "space to items always having been allotted on the basis of sales" (Hendrickson 1979, p. 249). This gives catalog price indexes two inherent advantages over the CPI, especially prior to the introduction of the current CPI sampling framework in 1978. First, for products sold in a large number of models or varieties, "it seems reasonable to assume that the number of different detailed varieties in the catalog will be greatest where the volume of sales is greatest, so that we probably weight the major varieties of an item in rough proportion to their importance" (Ress, 1961b, p. 141). There is no such assurance that product indexes are sales weighted across models within a product cateogry in the CPI, at least prior to 1978.

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handled by direct comparison of prices of the old and new model, and well under one percent were handled by an "explicit size or quality adjustment."

Also, products tend to be introduced into the catalogs soon after they become marketable, in contrast to the CPI which often has introduced new products many years after they become commercially important. This factor, which is crucial for durable goods like room air conditioners (introduced into the Sears catalog in 1952 but not in the CPI until 1964), is presumably less important for apparel. Prior to 1978 the CPI adhered to fixed specifications over a long period of time, which could lead to a disproportionate weight for obsolete items.[8]

5. Prices printed in the catalogs are actual transaction prices. If retail and wholesale outlets that compete with catalog firms price items at varying discounts, catalog houses must adjust their published prices to remain competitive (occasionally in the past few decades speciality catalogs for particular products advertising sale prices would be mailed between the issuance of the bi-annual catalogs — since these interim sale catalogs are not collected by libraries, we cannot use them in this research).

6. Since postage and shipping costs, credit charges, and taxes (except for Federal excise taxes when applicable) are not included in the published catalog prices, the services provided with each item are held constant. In contrast, the CPI may reflect a

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8. As reported by Rees (1961b, pp. 141-2), " . . . it seems probable to us that the selection of specified-in-detail items for the CPI is often at too low a quality level for the index population, probably because the index population moved up to better qualities after the item was specified. In a number of cases were were unable to find any variety of an item in the catalogs . . . whose quality was as low as that specified by the BLS." Rees further reports (p. 142) that rigid adherence to BLS specifications would require excluding a large fraction of the observations that can be collected from the catalogs, in one case reducing the sample by a factor of ten.

changing mix of services (e.g., some full-service department stores eliminated free delivery in the 1970s under pressure from discount-store competition). CPI and catalog indexes can differ due to the inclusion in the CPI of state and local sales taxes.

Disadvantages of Catalog Price Data

The case against catalog price indexes takes two forms. First, there are clear disadvantages of relying on catalogs. Second, criticisms can be offered of the advantages listed above.

1. The most serious problem in the use of catalog prices is the possibility of a systematic difference in the secular growth rates of the same product sold by catalog and non-catalog outlets, due, for instance, to differential growth in the efficiency of catalog operations or changes in pricing policies. Regarding efficiency, for any comparison with the CPI catalog prices include payment for warehouse and distribution sevices and would have a slower secular rate of increase than prices of retail competitors if the growth of efficiency in the provision of these services by catalog houses had been relatively rapid compared to the services provided by retail stores. It is hard to believe that such a bias could be important, since innovations in warehouse technology are likely to have been adopted by non-catalog competitors, and indeed Wal-Mart has outpaced Sears in warehouse and distribution efficiency over the past

several decades.

In fact it seems to be the catalog merchants who were more efficient than standard retailers in the early decades of the twentieth century and less efficient in the later decades. Model-by-model price comparisons for consumer appliances in my book (Gordon, 1990, pp. 422-23) between the Sears catalog and *Consumer Reports* indicated that the catalog models tended to be at the lower end of the price range in the early postwar period but drifted toward the middle of the price range over time. Such behavior is consistent with a change in pricing strategy by Sears in the late 1960s and early 1970s ("we're selling last year's goods at next year's prices"). This evidence, if applicable to apparel as well as to consumer appliances, would predict that Sears catalog price indexes for apparel would drift upwards relative to the "true" universe of prices that should be compared with the CPI. Any difference between the representativeness of the Sears data and the CPI is, of course, not relevant to our comparison of MM and hedonic indexes for womens' dresses, which is based on an identical data base from the Sears catalog.

Another criticism of the preceding section on advantages of catalog price indexes concerns reproducability, where we need to distinguish two issues. First, an unambiguous advantage of a catalog pirce index is that *in principle* it can reproduced by anyone with access to the same cataloguies. Second, we would not claim that any such

reproduction would necessarily yield an identical index, because subjective decisions must inevitably be made in situations where models change without an overlap period, or when only a subset of available information is used in order to economize on research time. The methods used to develop the catalog indexes were, however, designed to minimize subjective decisions, since the actual data collection was carried out by a succession of research assistants.

Weighing the Advantages and Disadvantages

In the goal of finding alternative sources of price data to compare with official price indexes, particularly for earlier decades when the official methodology was not as refined as it is today, catalog price indexes are no panacea. Even if catalog prices are fully corrected for quality change, they may not accurately reflect the unobserved true quality-corrected price index for all suppliers, because of differences between catalog firms and all firms in the gorwth of efficiency or in the evolution of pricing policies. In comparisons of catalog prices with the CPI for apparel, there is the problem that the selection of models or types of apparel sold through catalogs may be different from those sold by other outlets, e.g., if catalogs typically sell more items which are small or lightweight in order to minimize shipping costs. We might also expect that the product mix sold in catalogs would be more heavily wegihted to standard utilitarian items and

less heavily to fashion goods. This difference could make the catalog indexes behave differently than the closest comparable CPI strata indexes, although there is no presumption for the direction of the drift.

Further, catalog prices may not adequately control for all types of quality change. Some changes may be introduced without being explicitly acknoweldged in the printed catalog descriptions. Indeed, catalog indexes based on the matched-model method are as vulnerable as the CPI to deleting price change that occurs when new models are introduced. Matched model indexes based on catalog prices or in the CPI may be biassed downward if the timing of price increases typically coincides with the introduction of new models (in the apparel case) or biassed upward if improvements in performance-price ratios coincide with the introduction of new models (as for computers and other electronic goods).

III. The Methodology of The Matched-Model Research

A close analogue to this study is the catalog price index for 36 clothing items developed by Rees (1961a) for the period 1890-1914. Rees's study differs from the approach taken here, not only that he was comparing with the WPI since the CPI did not yet exist, but also in that he did not attempt to match catalog price indexes with WPI indexes on an item-by-item basis, but rather used catalog prices and expenditure survey

weights to construct a completely new index that might be compared with the overall WPI for clothing and for home furnishings. Because Rees made no attempt to compare identical items, his index might differ from the WPI due to a different selection of items and the earlier introduction of new items. In contrast, the drift in the catalog/CPI ratios recorded in this paper relates to identical items within the limits of feasibility in matching catalog products with CPI strata indexes for apparel.

For any given investment of research resources, there is a trade-off between the number of different catalogs consulted for a given product and the numer of separate products that can be included. An initial decision (in Gordon, 1990, and carried over to this paper) was made to limit this study only to Sears, the largest catalog house, and thus to allow time to copy data for additional varieties and products. This procedure is supported by Rees' conclusion (1961b) that the Sears and Wards catalogs gave similar results in his research. Sears' catalog sales in the 1970's were triple Wards' and equal to Wards' sales and the sales of the next three catalogs combined. To allow time to copy prices for more products, prices were copied only from one catalog per year (spring-summer), even though two catalogs were published annually. This decision has the disadvantage that the resulting indexes may understate the degree of short-run flexibility in the catalog prices.

Timing

Since the primary purpose of this study is a comparison of the catalog prices with CPI indexes for the same apparel products and time periods, a decision was required on the choice of time periods for that comparison. The catalog data in this study were collected from the Chicago-area edition of the Sears, Roebuck spring-summer general catalog. According to a Sears official, however, prices are set long in advance of catalog distribution. Since the spring-summer catalog went to press in October of the previous year, and final price decisions were made in October, the most closely comparable CPI indexes would be those for October of the year previous to the date printed on the catalog. However, another interpretation is that the correct BLS index is that of the following spring, contemporaneous with the period during which the catalog prices are in effect, because aspects of Sears' pricing strategy were forward looking. For instance, in some past periods, Sears purchased futures in goods like cotton and rubber to cover anticipated sales in the following six months. They also owned parts of corporations supplying them with products and arranged to buy forward at a price established for conditions of the following six months.

While in some early stages of the research on the 1990 book, BLS prices in year *t-1* were compared with prices in the spring-summer catalog for year *t* , in the end, both were compared in year *t*. It might have been preferable to use monthly BLS indexes for,

say, September or October of the year prior to the date on the catalog, but monthly data for BLS commodity indexes were not as complete as for annual data. This choice to adopt contemporaneous pricing is made partly because it is probably more accurate and also to simplify the presentation of the results. Slight inaccuracies may be introduced on the timing of major cyclical movements in prices, such as those in the Great Depression, but there is unlikely to be any effect on the measured rate of change of the Sears/CPI ratios over periods of a decade or more.

IV. Matched-Model Catalog Indexes for Apparel, 1914-93

Which products are chosen for study? For the apparel matched-model (MM) indexes the approach is straightforward. Historical CPI strata indexes are available for broad groupings, e.g., "women's separates and sportswear." We turned to the Sears catalog and selected virtually every category of apparel that corresponded to each CPI stratum description. Table 1 lists the 39 separate apparel categories for which Sears catalog matched-model indexes were constructed, the average number of annual price comparisons carried out for each category, and the CPI strata with which groups of categories were compared. The table is divided into three sections, corresponding to the three intervals of the 1914-93 period for which research was carried out at separate stages.

Method of Comparison

Price comparisons for each pair of years are facilitated by Sears' policy of carrying several models in each product category. Changes in specifications usually affect only a subset of models in any one year, so for almost every product at least a few identical models are available for a price comparison between a pair of years. Because model changes occur at irregular intervals, the number of price comparisons of identical models for any given product may be on the order of seven for a series of years and then collapse to two or three in a year of substantial model changes. Price changes for models that are discontinued, newly introduced, or subject to quality change are imputed to the price changes of models that remain completely unchanged in a given comparison of prices in years *t* and *t-1.* In the subsequent comparison of prices in *t+1* and *t*+2, a different set of models is covered, perhaps including one or more models newly introduced in year *t+1* and excluded in the previous comparison of *t* with *t+1*.

Thus each pair of years is treated separately and the list of models is allowed to change annually. This approach allows much more frequent model changes than in the CPI as it was constructed prior to 1978, when CPI field agents were required to find prices for models according to a detailed description that might well have become obsolete. Extra models can be included that appear and disappear between major CPI revisions. Ideally, this approach should lead to the inclusion of more models per

product than in the CPI.

The matched model indexes were developed by comparing all identical models in every pair of adjacent years. For a comparison to be made, the adjacent-year observations had to have the same serial number (subject to qualifications below), the photo or drawing depicting the model must have been identical, and the description of the model must have been identical. Identical catalog numbers do not always ensure that two models are identical, just as dissimilar catalog numbers do not necessarily signify differences between models. Therefore the determining criterion for the direct comparison of models relied heavily on the match of product descriptions. Nevertheless, the model numbers are very useful for quickly spotting models that are likely to be identical or for spotting changes in characteristics in the set of models available for two adjacent years.

Figure 1 presents a schematic diagram of the method of matching models for the important example of womens' dresses. This method was carried out not only for womens' dresses but for all apparel types in developing all the indexes reported in Tables 2 through 7 of the paper. The criteria for matching are very tight and the resulting MM price indexes are surely representative of apparel "models" that have almost exactly the same quality. The defect of the MM method is that these tight criteria often exclude models which change in minor ways but for which prices increase much

more than for the models that are matched. The irony of the MM method is that it can control completely for changes in quality without providing an accurate measure of changes in price, a phenomenon that only becomes evident when comparing the MM indexes with hedonic indexes for the same products.

The lowest-level observation for the catalog matched-model price indexes is the log change in price between two adjacent years for a given model that has been determined by the above process to have remained identical across the two years. Then these price changes are aggregated. Log price changes (e.g., for an identical dress in two adjacent years) are aggregated into log product price changes for a product category (e.g., "womens' dresses") by applying an equal weight to each model in any given pair of adjacent years. The absence of model-by-model sales data necessitates the use of equal weights for each model of a given product. Some response to market sales is incorporated to the extent that the mix of models that Sears carries for a given product responds to the relative volume of sales.

Product price changes are aggregated into subgroup price indexes, where the subgroup refers to the lowest level of aggregation available in the CPI. Equal weights are applied to each product in forming subgroup price indexes. Then subgroup price indexes are aggregated into groups and totals, using the apprropriate CPI weights for each subgroup. The indexes created in this paper have the advantage that they are

open to public inspection and can be reproduced by anyone with access to a library that holds back issues of the Sears catalog. As stated above, the catalog indexes are subject to the same problem as any MM index, including those compiled by BLS. Any price change that occurs upon the introduction of a new model is deleted. If manufacturers typically postpone price increases during the life of a model for the occasion of a new model introduction, then deletion causes the exclusion of major price changes and leads to a downward secular bias in price indexes. If, on the other hand, quality improvements in new models tend to be introduced with no change in price, the deletion technique causes the exclusion of reductions in "true price" and leads to an upward secular bias. We learn subsequently in the comparisons of the hedonic and MM indexes for womens' dresses that the former phenomenon dominates and causes a significant downward bias. As we will point out below in discussing the hedonic index for womens' dresses, a striking aspect of the MM indexes is that they are based on *so few observations.* In contrast, for many pairs of years the hedonic sample size is more than 300, or more than 150 observations per year for just a single product. This reflects the tightness of the matching criterion used in developing the MM indexes, i.e., how hard it is to find exactly the same item in the catalogs for two successive years.

The new MM price indexes for apparel cover 39 types of womens', mens', girls' and boys' apparel over part or all of the period 1914-93, covering the years from the

beginning of the CPI in 1914 to the date when Sears discontinued publication of its general catalog in 1993. Details on the types of apparel are shown separately for 1914-47, 1947-65, and 1965-93 in Tables 1A, 1B, and 1C. The sum of matched-model comparisons in these tables is 10,385, an average of 52 per year during 1914-47 (for a total of 1,719), an average of 146 per year during 1947-65 (for a total of 4,432), and 151 per year during 1965-93 (for a total of 4,234).

Matched-Model Results, 1914-47

For the 1914-47 period the matched-model indexes cover 37 types of womens' and mens' apparel, as shown in Table 1A. There are an average of 1.5 model comparisons each year for each of the 37 product groups. Separate catalog price indexes and comparisons with the CPI are displayed in Tables 2 and 3 for womens' and mens' apparel; the comparison for each is with the total CPI apparel index before 1935, since the CPI began to break out separate aggregates for womens' and mens' apparel only in that year. Figures 2 and 3 plot the numbers listed in Tables 2 and 3.

As shown in Table 8, for womens' apparel the 1914-47 annual growth rate of the Sears matched model index is 1.68 percent per year, considerably slower than the CPI increase of 2.87 percent per year, implying growth rate of the Sears/CPI ratio of -1.19 percent per year. The difference is similar for mens' apparel, 1.74 percent per year for

Sears vs. 3.10 percent for the CPI, implying a growth rate of the Sears/CPI ratio of -1.36 percent per year.

A striking aspect of the results is that much of the decline in the Sears/CPI ratio occurs during a single pair of years, 1934-35; this is particularly evident in Figure 5, which plots the Sears/CPI ratios. The most obvious explanation would be a major mistake in transcribing the Sears prices, so we have double-checked and triple-checked the 1934-35 comparisons. Here are some sample prices for this pair of years for particular closing items classified as identical by our matched-model procedure:

	1934	*1935*
Mens' Suits	13.50	11.95
Mens' Union Suits	0.79	0.59
Mens' work socks	0.17	0.12
Mens' wool pants	4.85	4.45
Mens' "Chieftan" overalls	0.88	0.77
Womens' silk slips	1.98	1.69
Womens' cotton hosiery	0.33	0.25
Womens' washfast house dresses	0.95	0.49
Womens' rayon glovers	0.98	0.59
Womens' rayon pajamas	1.00	0.59

It is possible that Sears changed its pricing policy relative to the rest of the marketplace in 1935, but it is also possible that the CPI missed a shift in the availability of discount outlets during the Great Depression — perhaps an early example of "outlet substitution bias."

Matched Model Results, 1947-93

Tables 2 and 3 provide postwar data on the Sears MM indexes and a comparison with the CPI for womens' and mens' apparel, and Tables 4 and 5 cover girls' and boys' apparel. Table 8 provides a summary of growth rates of the Sears and CPI indexes over the entire 1947-93 period and various subperiods. Several patterns can be picked up from the results. First, there is a consistent downward drift in the Sears/CPI ratio for womens' apparel in all periods but the last, 1978-93. Second, there is a distinct turnaround in the drift of the Sears/CPI ratio for mens' apparel from negative over 1914-65 to positive during 1965-93, with a small overall negative drift over the entire period. Third, there is a consistent tendency for the inflation rate in women's apparel to be a smaller positive rate or larger negative rate than for mens' apparel, and this difference is more pronounced for the Sears indexes than for the CPI. This finding is consistent with the view that matched-model indexes "link out" more quality change for womens' apparel which are subject to more frequent changes in styles. Averaging together womens' and mens' apparel for 1914-93 with girls' and boys' apparel for 1978-93, the Sears indexes increase less than the CPI during 1914-78 and by more during 1978-93, and the overall drift in the Sears/CPI ratio for the entire period is roughly -1.0 percent per year. The annual data presented in Tables 2, 3, 6, and 7 are also displayed in Figures 2-5.

V. Hedonic Price Indexes for Womens' Dresses

This section discusses the application of standard hedonic regression techniques to apparel. In this study we have chosen to do an intensive investigation of a single type of apparel, womens' dresses, because the available data allows much larger sample sizes in the regressions than for any other apparel product. The choice of variables is limited to those provided in the catalogs, which differ from year to year. Womens' dresses are complex products and many of their features are visible only in photos (e.g., decorative items, pockets, belts, etc.). Thus the large data set used in this hedonic regression study was custom-built by several research assistants who examined the photos as well as the detailed specifications as published in the catalog to assign values to the quality characteristics entered into the regressions.[9]

Determination of Explanatory Variables and their Mean Values

The list of variables is displayed in Table 9. Of these the most important is weight, which proxies the quality of fabric, amount of fabric, complexity of construction, presence of linings, etc., and would be expected to have a positive coefficient. In addition several dummy variables are included to indicate the presence

9. I am particularly grateful to Jayun Kim for her understanding of the nuances of womens' dresses and acknowledge that she designed the final form of the hedonic project, including the choice of the quality characteristics and their description.

or absence of higher-quality "organic" fabrics, knit or woven fabrics, and other quality characteristics which should raise price and thus have a positive coefficient in the regressions, including the presence of lace, sequins, embroidery, belt, jacket, bow, tie, zipper, and the need for dry cleaning. There is also a dummy variable for imported dresses, when they are identified as such in the catalog, and no presumption whether the coefficient should be positive or negative.

The hedonic regression study for womens' dresses is carried out for 60 of the 79 possible pairs of adjacent years between 1914 and 1993. The exceptions are the years of rapid inflation during World War I and its aftermath (1915-1920 are excluded), the years of World War II price controls (1942-45 are excluded), and the years when the catalog for unknown reasons temporarily suspended publication of weight data for each item (1929-33). For a subset of fifteen of the included years Table 10 displays the number of observations in that particular year, the average weight, and the percentage of dresses having the various quality attributes designated by the zero, one dummy variables.

The sample sizes for the hedonic study of womens' dresses are much larger than the sample on which the matched model indexes for dresses is based (only 0.9 matches during 1914-47 and only 3.3 matches during 1965-93). The number of observations shown in Table 9 are as high as 183 per year for 1936 and as low as 42 per year for 1980. The number of observations diminishes markedly after 1988, and for this reason the

hedonic study terminates in 1988 rather than 1993.

Table 10 exhibits the mean values of price and weight through 1993 and of the other explanatory variables through 1988. The mean price jumps around from year to year but on average in 1993 was 13.3 times the average in 1914 ($63.52 versus $4.75). Recall above that the ratio for the median price was 32.7, indicating that the mean of the 1914 distribution was skewed upward by relatively expensive dresses. The mean value of weight was by coincidence almost exactly the same in 1914 and 1993 at about 1.5 pounds, but there were "long waves" in the behavior of the mean weight. During the entire 1928-48 period, weight was at 3.0 pounds or higher, and weight fell to as low as 0.9 pounds in 1983-84. A ten-year moving average of the mean weight from the hedonic sample is displayed in Figure 6. To the extent that weight is the most important explanatory variable and contributes positively to quality, then there was no net change in quality between 1914 and 1993, and substantial fluctuations in quality in the intervening years.

For the other quality variables as summarized in Table 10, a surprise is the lack of consistent trends. In the early years (1914-30) Sears sold numerous elaborate dresses made of silk and/or velvet, and this shows up in the relatively high value of the "Organic" variable in Table 10. Similarly, through 1940 there were relatively large values for the "LSE" (lace, sequins, embroidery) variable. The mix of dresses then shifts

in the postwar period to a very large fraction of knit and/or woven (KWV). A peculiar aspect of Table 9 is that the "DRY" (dry-cleaning) variable was at a high value between the late 1940s and mid 1970s and then dropped off to almost nothing. This could indicate a change in the catalog policy of explicitly listing the need for dry cleaning.

Hedonic Regression Results

There is always a tradeoff between two extremes in running hedonic price regressions on a long time-series of data. One extreme would be to run separate regressions on every pair of years. This has the advantage of allowing the regression coefficients on characteristics like weight to shift as market and production conditions change, and the disadvantage that it minimizes sample size. The opposite extreme would be to run a single regression on all the data for all the years. This has the advantage of maximizing sample size and the disadvantage that it forces coefficients on characteristics to remain the same over a sample period of 79 years.

In the case of apparel, there is the additional consideration that fabrics changed over time — silk disappeared and synthetics appeared, and so an approach that allowed for changing coefficients seemed essential. There were sufficient data to base the estimated coefficients on each successive pair of years, an abundance of data that allowed us to escape the many compromises required in a previous study of mainframe computers (Gordon, 1989, 1990). Looking at the regression coefficients as displayed in

Table 11, those on weight are almost always highly significant, with an average estimated elasticity of 0.71. The weight , with much higher estimated elasticities in the 1928-48 period (1.0 or above) and lower at the beginning and end. Several of the other quality variables are highly significant with the expected positive coefficient and a plausible magnitude of coefficients, particularly the "organic fabric" variable, as well as the "LSE" (lace-sequins-embroidery) and "DRY" (dry cleaning) variables.

The implied hedonic price index for womens' dresses is compared with the CPI for womens' dresses and the Sears MM index for womens' dresses. These are displayed in Table 12 and in Figures 7 and 8, along with the median price and the implicit hedonic quality index (i.e., median price divided by the hedonic price index). Table 13 summarizes the growth rates of these five indexes for womens' dresses over key intervals. Except for the negligible difference during 1914-47, the huge positive differences between the annual growth rates of the hedonic and MM indexes for womens' dresses from absolutely the same data set are remarkable. The introduction of this paper provided a context for the "Hulten-Bruegel" paradox based on long-term annual rates of bias of 0.5 or 1.5 percent. Here we have a long-term difference in the Sears hedonic vs. MM index of 2.90 percent per year.

An important aspect of these results is that the Sears/MM difference in growth rates is so much larger in the postwar era than between 1914 and 1947. While this is a

puzzle, it may be related to the very different quality of dresses sold by Sears in the early part of the sample period, silk and velvet during 1914-30 compared to pedestrian working-class dresses in the later parts of the sample, e.g., 1975-93. A paradox that is not resolved by this paper is that the hedonic/MM difference increases in annual growth rates in the later years of the postwar just when Sears is becoming more "pedestrian" and "less fashionable."

A Closer Look at Particular Pairs of Years

Are any generalizations possible about the periods when the Sears hedonic price increased so much more than the Sears MM index? To answer this question a closer look was taken at three pairs of adjacent years with the greatest difference in growth rates between the two price indexes; as shown in the first three columns of Table 14, these were 1972-73, 1978-79, and 1982-83. The fourth column looks at the five-year interval (1978-83) that had the greatest discrepancy. For contrast three other pairs of years were chosen with only negligible differences between the growth rates of the two indexes; these pairs (1960-61, 1966-67, and 1977-78) are displayed in the three right-hand columns of Table 14.

The first three lines of Table 14 records the annual growth rates of the two price indexes in each pair of years. The greatest difference was in 1982-83, with a 30 percent increase in the hedonic index versus zero for the MM index. The next greatest

difference was in 1978-79, with respective increases of 27.2 and 4.5 percent. We note from Table 11 that the hedonic regressions for 1978-79 and 1982-83 were based on 116 and 170 observations, respectively, whereas the MM indexes are based on only four observations in each year-pair. Even this small number of comparisons overstates the representativeness of the MM index, since in 1978-79 the "two" models in each year are actually a single dress, with the two models differing only as to whether they are available in half-sizes (with a slightly higher price).

The remaining lines of Table 4 stratify the dresses in the hedonic sample in each year by weight. The top section shows raw price change in each weight quartile in each pair of years; this number was obtained by regressing the price on a constant and a dummy variable for the second year in each pair. The second section shows the coefficient on a time dummy in hedonic regressions run separately for each weight quartile. Because the sample sizes were smaller by a factor of four, degrees of freedom were economized by deleting any quality variable (among those listed in Table 8) which was not significant in a particular regression at the 10 percent level. The third section subtracts the numbers in each cell in the second section (hedonic price change) from the corresponding cell in the first section (raw price change), resulting in the change in the implicit hedonic quality index. For instance, in the second column for 1978-79, the raw price change is 34 percent, the hedonic price change is 29 percent, and the implicit

improvement in quality is 5 percent.

In the first four columns there is a consistent pattern that the lighter dresses (first two weight quartiles) exhibit a substantially faster rate of raw price change and hedonic price change than the two heavier quartiles, especially the heaviest. There was no such difference across the lower two and higher two weight quartiles in the final three columns, showing three pairs of adjacent years when the hedonic and MM price indexes increased by about the same amount. Given the large samples in the hedonic regressions, this result is consistent with the hypothesis that the MM technique, with its sample sizes that of necessity are severely truncated, misses large price increases associated with model changes. Looking at the bottom section of Table 14, there does not appear to be any significant tendency for lighter dresses to decline in quality relative to the heavier dresses. In several columns, the change in quality across weight quartiles has a zig-zag pattern, alternating between positive and negative.

Several other experiments were run on the data for these pairs of years. Each of the subset of significant quality variables was interacted with the year dummy to look for changes in the coefficients of quality characteristics over time. However, none of these interaction terms was significant at the 10 percent level. The absence of time interaction effects, and the stability of the subset of coefficients which are significant in Table 11, attests to the robustness of the hedonic regression results. Another

experiment was to stratify the sample for these years by the DRY variable (0 or 1 depending on the need for dry cleaning), but price changes in this stratification appeared to differ randomly across the DRY=0 and DRY=1 subsets of the sample. The last experiment was to identify subsets of dresses with identical quality characteristics across two adjacent years. This amounts to trying to "mimic" the MM technique within the subset of variables available for the hedonic regression, without requiring (as does the MM technique) that the models are absolutely identical. The result is that within these constant-quality subsets, price increases in adjacent-year pairs were mostly higher rather than lower than the basic hedonic time coefficient in those same year-pairs.

As a last step to understand the phenomenon of rapid price increases in the hedonic regressions for these pairs of years, I visited the pair of microfilm machines displaying the 1978 and 1979 Sears catalogs (after years of relying on research assistants to collect the data). I checked the MM models to make sure they were identical, and they were in both the photo, the available colors, and the specifications:

> "Fabric: polyester-cotton blend. Tuck-stitching at sides, front placket opening, pointed colar, should yoke in front, yoke and shirring in back, one side-seam pocket, short sleeves, self-tie belt."

This standard dress in standard sizes increased in price from $11.44 to $11.99, and in available half sizes increased from $12.44 to $12.99. These price increases calculated in

logs are 4.7 and 4.3 percent, respectively, yielding the 4.5 percent increase in the MM index shown in Table 14, line 2, for 1978-79.

Then I looked for 1979 dresses that were "closely comparable" to their 1978 counterparts, and it immediately became apparent why the sample sizes in the MM indexes are so small. I found a poly-rayon blend "cap-sleeve" one-piece dress in 1978 that in its photo looked just like a cap-sleeve one-piece dress in 1979. But upon closer inspection of the specifications, they weren't identical at all. The 1979 dress was poly-cotton rather than poly-rayon, its weight was 13 oz instead of 9 oz, it had no collar instead of a pointed collar, and it had one pocket instead of two (the price increased from $18 to $25). A two-piece dress comparison was more promising, since both the 1978 and 1979 version had a poly-cotton fabric. Both had a pointed collar, placket opening, and a skirt with a "slightly flared style." However, the 1978 dress had a zipper in back while the 1979 style was "pullover,", the 1979 dress had an elastic waistband that was not mentioned in 1978, and the 1978 dress had "attached tabs with D-ring closure" that was not mentioned in 1979. Despite a decline in weight from 15 to 10 oz, the price went up from $20 to $24. Similarly, a floral print one-piece dress increased in weight from 6 to 7 oz but increased in price from $19 to $27. Again, they looked similar in photos but upon closer inspection one had a square neck, the other a "band neckline," one had 3/4 length sleeves, the other elbow-length sleeves, and the 1979 skirt

was "three-tiered."

Overall, the mind boggles at the difference between price research on womens' dresses and on the many types of durable goods studied in my previous book (Gordon, 1990). In durable goods quality improves steadily, if not from year to year then from decade to decade. Engines become more powerful, quieter, and more fuel efficient. Electric and electronic products become more capable at the same time as they become smaller. The difference with womens' dresses could not be more profound. The many small changes from year to year in womens' dresses that prevent a researcher from "matching a model" do not correspond to our standard notions of "quality." A pocket is moved from the top to the side, a zipper is replaced by buttons or vice-versa, a square neck is replaced by a scooped neck. Immersion in the catalogs for a year-pair like 1978-79 leaves the overwhelming impression that the isolated model that was "matched" was actually a freak, and that the large sample of dresses with as many as ten dimensions of quality controlled, make the hedonic regression results greatly superior to the MM indexes.

Many types of apparel, from mens' suits to work clothes to underwear to childrens' clothes, exhibit far fewer dimensions of style change than womens' dresses. But our overall finding of minimal quality change between 1914-93 should carry over to these apparel products as well, if there is any communality of production techniques

used across different types of apparel. One may speculate that an index of the raw price change for the Sears sample of these more homogeneous types of apparel would be closer to the truth than the corresponding MM indexes displayed in Tables 2 through 7 above.

V. Conclusion

This paper develops new price indexes for apparel based on data from the Sears catalog for the entire period 1914-93, beginning in the first year of the CPI and ending in the last year of the general Sears catalog. The research, which is based on roughly 10,000 exact comparisons for the matched model(MM) index and another 6500 observations on the prices and quality characteristics of womens' dresses, leads to several conclusions and numerous questions for further research.

The Sears matched-model indexes do not exhibit a consistent negative or positive drift relative to the CPI. For womens' apparel the drift is always negative but for mens' apparel there is a turnaround, from negative before 1965 to positive thereafter. Both the matched-model indexes and the CPI rise less rapidly for womens' apparel than for mens' apparel, which would be consistent with the hypothesis that price changes accompanying model changes are more frequent for womens' apparel, since models change more frequently.

The hedonic price index for womens' dresses increases much faster than the matched-model index from the same data over the entire postwar period, although not in the earlier 1914-47 period. Likewise, the hedonic index also increases faster than the CPI over the entire postwar period but also not during 1914-47 (when the CPI-hedonic difference is a relatively minor 0.65 percent per year). To the extent that the Sears hedonic and matched model indexes are based on the same data, so that systematic differences between catalog market shares and pricing policies are not relevant, the results provided here offer a nice complement to past research on computer prices, which also found that price changes were contemporaneous with model changes. Just as hedonic price indexes for computers almost always drop faster than matched-model indexes for computers, we have found the opposite relationship for apparel prices, presumably for the same reason.

Despite the large amount of data examined in this paper, it leaves open the answer to the basic question that motivated the research – what is the overall bias in the CPI for apparel from 1914 to 1993? One answer is a downward bias of 1.28 percent per year, the difference between the CPI and hedonic indexes for womens' dresses over the 1914-88 period for which the hedonic index was compiled. As shown in Table 13, the figure of 1.28 is misleading, since the difference was actually in the opposite direction before 1947, and the 1947-88 difference implies a much higher downward bias of -2.83

percent per year for that period.

In extrapolating this difference from womens' dresses sold by Sears to all apparel sold by all retail outlets, two factors suggest scaling down the -2.83 difference for the postwar period to a smaller number, say -1.5 percent. First, as discussed above the market position changed over the years from the lowest-priced vendor to somewhere in the middle. The fact that the catalog was eventually shut down in 1993 suggests the growing importance of lower-priced merchants like Target and Wal-Mart. Second, the underlying diagnosis of the MM-hedonic price difference as being due to frequent style changes would apply less to mens' and childrens' apparel than to womens' dresses, suggesting the the CPI may have done a better job in these other categories. However, the annual rate of increase in the CPI for mens' apparel over the 1947-93 period was only 0.57 percent per year faster than that for womens' apparel, indicating that the style-fashion source of bias for womens' vs. mens' apparel is only a fraction of the overall difference between the CPI for womens' dresses and Sears hedonic for womens' dresses established in this paper. Our final conclusion that the downward bias in the CPI for the postwar period, at least through 1988, is roughly in the range of -1.5 to -2.0 percent, with no evidence of bias in the 1914-47 period.

The implications of this paper go beyond the limited empirical application of Sears catalog data for womens' dresses. Perhaps the most important conclusion of this

paper is one that economizes enormously on future research resources. Quality change in womens' dresses over the full 1914-93 period was negligible. If this can be extended to other types of apparel, this creates an radical breakthrough for historical research. However sophisticated the modern CPI in measuring price changes for apparel in the 21st century, significant information may be contained in raw price changes of individual apparel products for most of the 20th century.

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TABLE 1A

Sears Products and Corresponding CPI Products - Apparel 1914-47

Sears Product	Years Excluded	CPI Products	Comparisons Per Year
Women's Apparel		Women's and Girl's Apparel	26.0
Coats	---	Wool Apparel	1.7
Skirts	---		1.3
Dresses	---	Rayon and Silk Apparel	1.2
Slips	1926-47		1.6
Panties	---		0.8
Hosiery	---		1.0
Pajamas	1914-29		1.0
Dresses	---	Cotton Apparel	0.9
Housedresses	---		1.5
Nightgowns	---		0.6
Unionsuits	---		1.6
Hosiery	---		1.0
Bloomers	1927-47		0.4
Slips	---		0.6
Hats, wool	---	Other Apparel	1.9
Gloves	---		1.8
Girdles	---		1.6
Brassieres	---		1.8
Rubbers	---	Footwear	1.8
Street Shoes	---		1.9
Men's Apparel		Men's and Boy's Apparel	26.1
Suits	---	Wool Apparel	2.0
Trousers	---		1.8
Sweaters	1914-22		1.4
Overcoats	1931-46		0.5
Socks	---	Rayon Apparel	0.9
Overcoats	---	Cotton Apparel	1.7
Overalls	1946-47		1.6
Shirts, work	---		0.9
Shirts, business	---		1.0
Pajamas	1946-47		1.6
Unionsuits	---		2.1
Socks	---		1.0
Hats, wool	---	Other Apparel	2.1
Neckties	---		1.8
Rubbers	---	Footwear	1.9
Street Shoes	---		1.9
Work Shoes	---		1.9

TABLE 1B

Sears Products and Corresponding CPI Products - Apparel (1947-1964)

Sears Products	Years Excluded	CPI Products	Comparisons per Year
Women's Apparel	…	Women's Apparel	99.4
Bathrobes	1947-48, 1963-64	Underwear, nightwear,	3.9
Brassieres	…	hosiery, and	19.8
Camisoles	1947-49, 50-52, 63-65	accessories	2
Hosiery	…		13.2
Panties	…		29.9
Slips	1947-48		9.5
Jackets	1947-48	Coats and Jackets	4.4
Jeans	1953-54	Separates and Sportswear	5.3
Pants	…		5.9
Skirts	1947-49		2.4
Dresses	1948-49, 60-61, 63-64	Dresses	3.1
Men's Apparel		Men's Apparel	146.8
Bathrobes	1960-61	Furnishings and	2.3
Belts	…	special clothing	5.8
Coveralls	…		3.7
Pajamas	1947-48		3.4
Shorts	1947-55		1.4
Socks	1964-65		16.5
Swimming Trunks	1947-48, 49-50, 53-55		2.4
Undershirt	…		10.6
Underwear	1947-48		20.1
Jeans	1947-48	Dungarees, Jeans, and	10.3
Pants	…	Trousers	12.4
Dress Shirts	…	Shirts	11.1
Shirts	…		13.4
Blazers	1962-63	Suits, sport coats,	1.8
Jackets	…	coats, and jackets	10.7
Rainwear	…		12.6
Suits	1947-48, 62-64		8.1

TABLE 1C

Sears Products and Corresponding CPI Products - Apparel 1965-93

Sears Products	CPI Products	Comparison Per Year
Women's Apparel	Women's Apparel	57.9
Bathrobes	Underwear, nightwear, hosiery, and	3.3
Bras	accessories	9.3
Camisoles		2.4
Hosiery		7.7
Panties		9.3
Slips		6.1
Jackets	Coats and Jackets	4.7
Jeans	Separates and Sportswear	4.4
pants		4.1
Skirts		3.4
Dresses	Dresses	3.3
Men's Apparel	Men's Apparel	93.3
Bathrobes	Furnishings and special clothing	3.1
Belts		4.8
Coveralls		5.2
Pajamas		5
Jumpsuits		3.2
Shorts		3.1
Socks		8.3
Swimming Trunks		2.4
Undershirts		8.1
Underwear		10.8
Jeans	Dungarees, Jeans, and Trousers	7.5
Pants		5.7
Dress Shirts	Shirts	4.4
Shirts		7.8
Blazers	Suits, sport coats, coats, and jackets	3.7
Jackets		6.8
Rainwear		4.5

TABLE 2

Matched-Model Apparel Price Indexes (1958 = 100), 1914-93

	WOMEN'S APPAREL			
YEAR	**SEARS**	**CPI**	**SEARS/CPI**	**OBSERVATIONS**
1914	52.2	22.5	2.32	27
1915	54.4	22.9	2.37	30
1916	80.0	25.2	3.18	28
1917	92.1	30.2	3.04	28
1918	115.3	40.9	2.82	30
1919	148.1	54.2	2.73	31
1920	195.0	64.5	3.02	30
1921	123.6	49.7	2.49	28
1922	104.7	40.4	2.59	27
1923	97.1	40.6	2.39	28
1924	94.8	40.1	2.36	23
1925	92.6	39.4	2.35	31
1926	89.5	38.8	2.31	31
1927	84.0	37.9	2.22	29
1928	80.0	37.4	2.14	31
1929	75.3	37.0	2.04	28
1930	75.2	36.2	2.07	30
1931	69.9	32.9	2.12	27
1932	57.0	29.2	1.95	30
1933	54.6	28.1	1.94	28
1934	64.7	30.8	2.10	28
1935	51.6	31.1	1.66	26
1936	53.4	31.5	1.70	25
1937	53.2	33.0	1.61	26
1938	52.1	32.8	1.59	24
1939	52.2	32.4	1.61	23
1940	55.7	32.6	1.71	26
1941	57.2	34.1	1.68	27
1942	66.0	39.4	1.67	24
1943	67.0	39.1	1.71	26
1944	74.1	44.3	1.67	22
1945	75.0	46.7	1.61	26
1946	81.2	50.2	1.62	23
1947	90.9	58.1	1.56	23
1948	87.3	61.6	1.42	57
1949	86.6	58.2	1.49	85
1950	80.8	56.2	1.44	83
1951	86.8	60.5	1.43	95
1952	84.5	59.8	1.41	90

TABLE 2 (Cont.)

Matched-Model Apparel Price Indexes (1958 = 100), 1914-93

WOMEN'S APPAREL

YEAR	SEARS	CPI	SEARS/CPI	OBSERVATIONS
1953	104.8	100.7	104.27	70
1954	107.5	99.8	107.69	90
1955	103.5	99.0	105.13	83
1956	103.8	99.7	104.27	80
1957	100.0	100.2	100.00	86
1958	100.0	100.0	100.00	100
1959	99.1	100.5	99.15	106
1960	99.9	101.0	99.15	93
1961	98.3	101.4	97.44	112
1962	98.5	101.2	97.44	62
1963	95.5	102.0	94.02	80
1964	93.8	102.6	91.45	65
1965	94.9	103.4	92.31	72
1966	95.2	105.5	90.60	79
1967	100.6	110.2	91.45	70
1968	103.2	116.9	88.89	69
1969	106.1	123.2	86.32	69
1970	106.5	127.8	83.76	72
1971	106.7	132.5	81.20	46
1972	107.3	135.6	79.49	46
1973	110.4	140.2	78.63	36
1974	119.3	148.7	80.34	37
1975	124.4	152.3	82.05	37
1976	116.3	156.6	74.36	38
1977	125.0	161.3	77.78	33
1978	131.2	164.6	80.34	48
1979	139.9	167.5	83.76	34
1980	145.1	170.4	85.47	35
1981	155.7	172.6	90.60	39
1982	169.5	174.4	97.44	31
1983	179.8	177.7	101.71	38
1984	187.5	180.1	104.27	46
1985	195.1	186.9	105.13	57
1986	193.5	185.3	105.13	61
1987	195.8	196.8	100.00	25
1988	199.0	204.6	97.44	25
1990	180.6	218.1	82.91	29
1991	172.3	226.4	76.07	27
1992	185.2	230.8	80.34	35
1993	187.2	235.4	79.49	0

TABLE 3

Matched-Model Apparel Price Indexes (1958 = 100), 1914-93

	MEN'S APPAREL			
YEAR	**SEARS**	**CPI**	**SEARS/CPI**	**OBSERVATIONS**
1914	24.3	16.9	1.44	28
1915	24.3	17.3	1.41	27
1916	29.1	19.0	1.53	26
1917	32.9	22.8	1.44	29
1918	42.7	30.8	1.38	26
1919	53.5	40.9	1.31	25
1920	63.8	48.7	1.31	23
1921	47.3	37.5	1.26	21
1922	45.8	30.5	1.50	26
1923	41.4	30.6	1.35	28
1924	42.6	30.3	1.41	27
1925	41.0	29.7	1.38	28
1926	39.4	29.2	1.35	26
1927	37.4	28.6	1.31	25
1928	40.1	28.2	1.42	22
1929	39.4	27.9	1.41	27
1930	40.4	27.3	1.48	30
1931	37.1	24.8	1.49	27
1932	29.1	22.0	1.32	29
1933	28.0	21.2	1.32	30
1934	32.8	23.3	1.41	30
1935	23.6	23.5	1.00	27
1936	24.5	23.8	1.03	27
1937	25.0	25.1	1.00	28
1938	23.4	25.0	0.94	28
1939	23.6	24.5	0.96	29
1940	27.5	25.0	1.10	29
1941	25.6	26.2	0.98	26
1942	29.4	30.5	0.96	22
1943	31.0	32.0	0.97	25
1944	31.4	33.5	0.94	24
1945	31.4	34.9	0.90	21
1946	32.7	39.6	0.82	22
1947	43.2	47.0	0.92	52
1948	41.8	49.6	0.84	95
1949	41.4	48.2	0.86	95
1950	40.1	48.0	0.84	118
1951	44.5	51.9	0.86	126
1952	43.1	52.2	0.83	121

TABLE 3 (Cont.)

Matched-Model Apparel Price Indexes (1958 = 100), 1914-93

MEN'S APPAREL

YEAR	SEARS	CPI	SEARS/CPI	OBSERVATIONS
1953	102.6	98.9	103.75	96
1954	102.6	98.3	103.75	94
1955	97.6	97.1	100.00	95
1956	98.6	98.9	98.75	102
1957	98.3	100.4	97.50	99
1958	100.0	100.0	100.00	100
1959	103.6	99.8	103.75	96
1960	105.3	101.7	102.50	102
1961	106.0	102.9	102.50	92
1962	108.2	103.4	103.75	88
1963	108.6	104.8	102.50	93
1964	108.9	106.3	101.25	91
1965	107.7	107.4	100.00	98
1966	110.1	110.3	98.75	128
1967	116.8	114.5	101.25	110
1968	123.5	120.8	101.25	86
1969	131.9	128.6	102.50	93
1970	135.0	134.0	100.00	86
1971	139.8	137.8	101.25	74
1972	144.1	139.5	102.50	65
1973	153.5	144.7	105.00	56
1974	168.6	156.1	107.50	53
1975	191.6	162.8	117.50	50
1976	188.0	168.3	111.25	59
1977	208.9	176.1	117.50	64
1978	215.6	180.0	118.75	67
1979	221.3	182.6	120.00	57
1980	239.8	190.8	125.00	62
1981	263.1	201.1	130.00	62
1982	289.4	209.0	137.50	59
1983	302.9	214.1	141.25	45
1984	317.0	218.1	145.00	66
1985	326.1	224.6	145.00	80
1986	322.8	227.3	141.25	77
1987	315.3	235.9	132.50	37
1988	322.3	245.6	130.00	43
1990	341.0	263.0	128.75	51
1991	341.0	271.4	125.00	46
1992	372.7	276.0	133.75	52
1993	367.4	277.5	131.25	0

TABLE 4

Matched-Model Apparel Price Indexes (1980 = 100), 1978-93

GIRL'S APPAREL

YEAR	SEARS	CPI	SEARS/CPI	OBSERVATIONS
1978	88.8	95.3	0.93	21
1979	95.9	96.6	0.99	22
1980	100.0	100.0	1.00	24
1981	107.5	103.6	1.04	18
1982	116.5	103.6	1.12	18
1983	129.4	104.6	1.24	19
1984	134.3	104.6	1.28	21
1985	141.8	107.6	1.32	22
1986	145.2	106.4	1.37	21
1987	141.2	112.2	1.26	12
1988	151.7	117.4	1.29	6
1990	126.7	125.9	1.01	14
1991	139.0	133.3	1.04	16
1992	153.2	138.0	1.11	15
1993	157.9	137.5	1.15	

TABLE 5

Matched-Model Apparel Price Indexes (1980 = 100), 1978-93

BOY'S APPAREL

YEAR	SEARS	CPI	SEARS/CPI	OBS
1978	87.1	90.1	0.97	29
1979	95.2	94.2	1.01	30
1980	100.0	100.0	1.00	27
1981	106.8	105.0	1.02	29
1982	116.8	108.1	1.08	25
1983	120.1	112.0	1.07	19
1984	121.5	113.9	1.07	29
1985	123.3	116.7	1.06	28
1986	125.1	117.1	1.07	27
1987	127.0	115.7	1.10	8
1988	127.8	119.2	1.07	2
1990	128.3	121.4	1.06	20
1991	131.8	125.4	1.05	17
1992	140.9	129.0	1.09	19
1993	138.5	131.0	1.06	

TABLE 6

Matched-Model Apparel Price Indexes (1958 = 100), 1914-93

	ALL APPAREL			
YEAR	**SEARS**	**CPI**	**SEARS/CPI**	**OBSERVATIONS**
1914	66.5	30.6	217.65	55
1915	68.0	31.2	217.65	57
1916	90.9	34.3	264.71	54
1917	103.8	41.2	251.96	57
1918	132.0	55.7	237.25	56
1919	167.6	73.8	227.45	56
1920	212.0	87.9	241.18	53
1921	143.6	67.7	211.76	49
1922	129.5	55.1	235.29	53
1923	118.5	55.3	214.71	56
1924	118.7	54.7	216.67	50
1925	104.5	53.6	195.10	59
1926	110.9	52.9	209.80	57
1927	104.5	51.6	202.94	54
1928	105.6	51.0	206.86	53
1929	101.8	50.5	201.96	55
1930	102.9	49.4	208.82	60
1931	95.1	44.9	211.76	54
1932	76.2	39.9	191.18	59
1933	72.9	38.4	190.20	58
1934	86.0	42.1	204.90	58
1935	65.3	42.5	153.92	53
1936	67.6	42.9	157.84	52
1937	68.0	44.9	151.96	54
1938	65.3	44.7	146.08	52
1939	65.5	44.2	149.02	52
1940	73.1	44.5	164.71	55
1941	71.3	46.6	152.94	53
1942	82.2	54.5	150.98	46
1943	85.1	56.8	150.00	51
1944	90.2	60.9	148.04	46
1945	90.7	64.0	141.18	47
1946	96.4	70.1	137.25	45
1947	116.9	95.0	123.53	75
1948	112.4	100.7	111.76	152
1949	111.6	95.9	116.67	180
1950	106.2	94.2	112.75	201
1951	116.4	101.7	114.71	221
1952	112.7	100.9	111.76	211

TABLE 6 (Cont.)

Matched-Model Apparel Price Indexes (1958 = 100), 1914-93

	ALL APPAREL			
YEAR	**SEARS**	**CPI**	**SEARS/CPI**	**OBSERVATIONS**
1953	104.0	100.0	103.92	221
1954	105.3	99.1	105.88	244
1955	100.5	98.3	101.96	237
1956	100.9	99.3	101.96	242
1957	98.9	100.2	99.02	246
1958	100.0	100.0	100.00	265
1959	101.1	100.2	100.98	268
1960	102.9	101.1	101.96	259
1961	103.5	101.7	101.96	269
1962	104.7	101.9	102.94	200
1963	103.6	103.0	100.98	229
1964	103.1	103.7	99.02	208
1965	103.1	104.5	99.02	226
1966	104.4	106.3	98.04	277
1967	110.5	110.6	100.00	241
1968	115.5	116.9	99.02	205
1969	121.6	123.7	98.04	216
1970	123.5	128.8	96.08	209
1971	126.2	132.7	95.10	160
1972	128.9	135.3	95.10	148
1973	135.1	139.9	97.06	123
1974	147.6	150.1	98.04	120
1975	162.5	155.7	104.90	116
1976	156.7	160.1	98.04	130
1977	156.7	166.6	94.12	130
1978	162.7	170.5	95.10	153
1979	171.8	175.3	98.04	121
1980	181.8	185.5	98.04	130
1981	196.9	192.6	101.96	136
1982	215.3	195.7	109.80	121
1983	227.6	199.8	113.73	110
1984	236.4	202.6	116.67	150
1985	247.6	208.2	118.63	182
1986	246.5	208.9	117.65	183
1987	244.5	218.6	111.76	83
1988	250.7	228.2	109.80	92
1990	237.8	244.9	97.06	107
1991	249.5	254.2	98.04	97
1992	266.7	259.7	102.94	116
1993	268.4	263.1	101.96	

TABLE 7

Comparison of Sears/CPI Ratio (1958 = 1.0)

Year	Women's Apparel	Men's Apparel	All Apparel
1914	2.32	1.44	2.22
1915	2.37	1.41	2.22
1916	3.18	1.53	2.70
1917	3.04	1.44	2.57
1918	2.82	1.38	2.42
1919	2.73	1.31	2.32
1920	3.02	1.31	2.46
1921	2.49	1.26	2.16
1922	2.59	1.50	2.40
1923	2.39	1.35	2.19
1924	2.36	1.41	2.21
1925	2.35	1.38	1.99
1926	2.31	1.35	2.14
1927	2.22	1.31	2.07
1928	2.14	1.42	2.11
1929	2.04	1.41	2.06
1930	2.07	1.48	2.13
1931	2.12	1.49	2.16
1932	1.95	1.32	1.95
1933	1.94	1.32	1.94
1934	2.10	1.41	2.09
1935	1.66	1.00	1.57
1936	1.70	1.03	1.61
1937	1.61	1.00	1.55
1938	1.59	0.94	1.49
1939	1.61	0.96	1.52
1940	1.71	1.10	1.68
1941	1.68	0.98	1.56
1942	1.67	0.96	1.54
1943	1.71	0.97	1.53
1944	1.67	0.94	1.51
1945	1.61	0.90	1.44
1946	1.62	0.82	1.40
1947	1.56	0.92	1.26
1948	1.42	0.84	1.14
1949	1.49	0.86	1.19
1950	1.44	0.84	1.15
1951	1.43	0.86	1.17
1952	1.41	0.83	1.14
1953	1.22	0.83	1.06

TABLE 7 (Cont.)

Comparison of Sear/CPI Ratio (1980 = 1.0)			
Year	**Women's Apparel**	**Men's Apparel**	**All Apparel**
1954	1.08	1.04	1.06
1955	1.05	1.00	1.02
1956	1.04	0.99	1.02
1957	1.00	0.98	0.99
1958	1.00	1.00	1.00
1959	0.99	1.04	1.01
1960	0.99	1.03	1.02
1961	0.97	1.03	1.02
1962	0.97	1.04	1.03
1963	0.94	1.03	1.01
1964	0.91	1.01	0.99
1965	0.92	1.00	0.99
1966	0.91	0.99	0.98
1967	0.91	1.01	1.00
1968	0.89	1.01	0.99
1969	0.86	1.03	0.98
1970	0.84	1.00	0.96
1971	0.81	1.01	0.95
1972	0.79	1.03	0.95
1973	0.79	1.05	0.97
1974	0.80	1.08	0.98
1975	0.82	1.18	1.05
1976	0.74	1.11	0.98
1977	0.78	1.18	0.94
1978	0.80	1.19	0.95
1979	0.84	1.20	0.98
1980	0.85	1.25	0.98
1981	0.91	1.30	1.02
1982	0.97	1.38	1.10
1983	1.02	1.41	1.14
1984	1.04	1.45	1.17
1985	1.05	1.45	1.19
1986	1.05	1.41	1.18
1987	1.00	1.33	1.12
1988	0.97	1.30	1.10
1990	0.83	1.29	0.97
1991	0.76	1.25	0.98
1992	0.80	1.34	1.03
1993	0.79	1.31	1.02

TABLE 8

Growth Rates of Sears Matched Model (MM) Indexes Compared with the CPI, Alternative Intervals, 1914-93

	1914-47	1947-65	1965-78	1978-93	1914-93
Womens' Apparel					
Sears MM	1.68	-1.83	2.49	2.37	1.15
CPI	2.87	0.24	3.57	2.39	2.30
Sears/CPI	-1.19	-2.07	-1.08	-0.02	-1.15
Men's Apparel					
Sears MM	1.74	0.21	5.34	3.55	2.33
CPI	3.10	1.00	3.97	2.89	2.72
Sears/CPI	-1.36	-0.79	1.37	0.67	-0.39
All Apparel					
Sears MM	1.71	-0.70	3.51	3.34	1.77
CPI	3.43	0.53	3.77	2.89	2.72
Sears/CPI	-1.72	-1.22	-0.25	0.44	-0.95

TABLE 9

Characteristics of Hedonic Index Dresses

Variable Name	Coding	Description
LN Weight	LN WT	The weight of a dress (in ounces), indicates the amount of fabric utilized to construct the dress and is a proxy for its overall quality
ORGANIC	ORG	Organic Fabrics include Wool, Silk, Linen, and Cotton Derivatives such as Velvet. These type of fabrics are considered high grade material and contributes to the perceived quality of apparel.
IMPORTED	IMP	Apparel that were imported from a foreign country and advertised as such, could add or subtract from perceived quality.
LACE/ SEQUINS/ EMBROIDERY	LSE	Manufacturing cost for items of apparel with either lace, sequins, or embroideries tend to be priced higher than those without these qualities.
BELT	BLT	Presence of a belt
TWO-PIECE	2PC	Two-piece dresses require more fabric as well as sewing to produce.
DRY-CLEAN	DRY	Indicates whether or not the apparel required dry-cleaning or any other special care for laundering.
JACKET	JCK	Indicates the inclusion of a jacket or blazer, generally of heavier fabric and higher quality than the top of a two-piece dress (see "2PC" above).
BOW/TIE	BOW/TIE	Items of apparel with either a bow or a tie were considered to have extra trimmings and contributed to its cost.
KNIT OR WOVEN	KWV	Indicates that the fabric was knit or woven
ZIPPER	ZIP	Indicates presence of a zipper.

TABLE 10

Percentage of Dresses with Various Quality Attributes

Year	Observations Per Year	Price	Weight	ORG	IMP	LSE	BLT	2-PC	DRY	JCK	BOW/TIE	KWV	ZIP
1914	60	4.0	18.8	15.0	1.7	73.3	23.3	5.0	0.0	1.7	51.7	1.7	0.0
1921	77	8.0	25.7	18.2	0.0	37.7	20.8	2.6	0.0	1.3	61.0	0.0	0.0
1926	71	8.3	26.0	46.5	4.2	33.8	11.3	11.3	0.0	0.0	80.3	1.4	0.0
1936	183	3.0	18.9	0.5	5.5	31.7	28.4	79.8	0.0	23.0	33.3	13.1	0.0
1941	148	3.1	20.0	2.0	0.0	23.0	6.8	16.9	23.0	18.9	14.9	32.4	11.5
1946	96	4.9	21.6	0.0	0.0	18.8	13.5	39.6	67.7	0.0	6.3	57.3	19.8
1950	157	6.1	23.6	0.6	0.0	10.8	21.0	8.9	66.9	10.2	4.5	61.1	31.8
1955	155	7.0	22.1	0.0	0.6	8.4	12.3	6.5	43.9	9.7	18.7	37.4	26.0
1960	150	9.5	17.9	5.3	6.0	21.3	10.7	5.3	60.7	6.7	10.7	43.3	0.0
1965	149	10.2	16.2	2.7	0.0	5.4	0.0	22.8	58.4	8.1	4.7	84.6	0.0
1970	97	13.9	21.7	1.0	1.0	6.2	13.4	9.3	53.6	8.2	12.4	97.9	0.0
1975	78	18.8	19.1	0.0	0.0	14.1	14.1	9.0	2.6	17.9	1.3	94.9	0.0
1980	42	20.8	14.8	2.4	0.0	0.0	21.4	14.3	0.0	19.0	7.1	90.5	0.0
1985	100	42.7	14.6	6.0	3.0	15.0	45.0	16.0	16.0	9.0	10.0	78.0	0.0
1988	80	49.5	30.0	6.3	7.5	28.8	47.5	15.0	16.3	10.0	7.5	15.0	0.0
1993	--	63.5	22.2	--	--	--	--	--	--	--	--	--	--

TABLE 11

Coefficients From Hedonic Regressions of Women's Dresses

Years	YEAR	LN WT	ORG	IMP	LSE	BLT	2-PC	DRY	JCK	BOW/TIE	KWV	ZIP	Adj. R-sq	SEE	OBS
1914-21	0.553**	0.444	1.259**	0.066	0.397**	0.060	-0.168	-	-0.057	0.198*	0.296	-	0.70	0.44	137
1921-22	-0.490**	0.436*	1.182**	0.020	0.312**	-0.205*	0.102	-	-0.315	0.039	-0.361	-	0.69	0.42	168
1922-23	0.178**	0.351	1.119**	0.116	0.227**	-0.021	-0.071	-	0.001	0.127	0.100	-	0.74	0.37	151
1923-24	0.183**	0.651**	0.899**	0.221**	-0.011	0.013	0.103	-	0.231	0.067	-0.082	-	0.68	0.31	133
1924-25	-0.117	1.060**	0.915**	0.286**	0.030	0.058	0.379*	-	-0.032	0.003	-0.032	-	0.57	0.40	163
1925-26	0.071	0.616*	0.957**	0.276*	0.088	0.140	0.447**	-	-0.223	-0.121	0.112	-	0.59	0.44	161
1926-27	-0.177*	0.355*	0.941**	-0.263	0.149	0.068	0.411**	-	-	0.096	0.235	-	0.57	0.38	153
1927-28	-0.168**	0.545**	0.963**	0.145	0.123	0.102	0.357**	-	0.182	-	0.247	0.228**	0.58	0.40	178
1928-34	0.209*	1.116**	0.679**	-0.030	0.172*	0.167**	0.275*	-	-	-0.383*	0.261	0.188**	0.70	0.46	192
1934-35	-0.301**	1.118**	0.490**	0.034	0.188**	0.238**	-0.003	-	-0.075	0.235**	0.026	0.137	0.67	0.40	228
1935-36	0.219**	1.294**	0.489**	-	0.031	0.027	0.092	0.055	0.004	0.206**	0.186**	0.084	0.70	0.34	316
1936-37	-0.022	1.481**	-0.036	-	-0.018	0.096	-0.029	-0.040	0.034	0.142**	0.185**	0.386	0.76	0.30	329
1937-38	0.093**	1.612**	-0.415*	-	-0.077	-0.184*	-0.002	-0.058	0.089	0.105**	0.148**	0.233**	0.79	0.27	299
1938-39	-0.127*	1.570**	0.103	-	-0.057	0.062	-0.065	-0.004	0.060	0.123*	0.100	0.154**	0.65	0.39	336
1939-40	0.059	1.471**	0.230*	-	0.148**	-0.006	0.123*	-	0.084	0.062	0.140**	0.111*	0.69	0.37	335
1940-41	-0.173**	1.635**	0.052	-	0.248**	-0.042	0.100*	0.033	0.089	0.002	0.145**	0.095*	0.83	0.28	300
1941-46	0.354**	1.600**	0.117	-	0.132**	0.029	0.041	0.041	0.088	0.081	0.239**	0.160**	0.82	0.29	244
1946-47	0.337**	1.015**	-	-	0.066	0.174**	0.028	0.134*	-	0.189*	0.261**	0.253**	0.70	0.26	174
1947-48	0.199**	1.104**	0.887**	-	0.161**	0.050	0.154**	0.128*	0.251**	0.009	0.182**	0.137**	0.80	0.22	202
1948-49	-0.081**	0.912**	0.892**	-	0.029	-0.025	0.155**	0.203**	0.179**	-0.061	0.184**	0.062	0.81	0.20	289
1949-50	-0.310**	0.974**	0.731**	-	0.045	0.062	0.077	0.144**	0.108*	-0.060	0.154**	0.000	0.71	0.23	323
1950-51	0.106**	1.094**	0.730**	-	0.119**	0.083*	0.001	0.111	0.090	0.054	0.071*	-0.023	0.67	0.26	292
1951-52	0.098**	0.669**	0.759**	-	0.168**	0.000	0.027	0.334**	0.150**	0.110	0.063	-0.029	0.64	0.28	276
1952-53	-0.036	0.498**	0.638**	-	0.159**	-0.020	0.135	0.372**	0.189**	0.166**	-0.006	-0.135**	0.59	0.30	286
1953-54	0.101**	0.540**	0.421*	-	0.106	-0.027	0.137*	0.337**	0.037	0.150**	-0.062	-0.174**	0.51	0.30	286
1954-55	-0.021	0.625**	0.487*	0.094	0.118*	-0.029	-0.049	0.222**	-0.008	0.096*	-0.025	-0.184**	0.46	0.28	296
1955-56	-0.253**	0.765**	0.787**	0.169	0.221**	0.027	0.017	0.325**	0.086	0.029	0.040	0.028	0.63	0.28	332
1956-57	0.218**	0.786**	0.902**	-	0.321**	-0.144**	0.043	0.365**	0.099*	-0.015	0.039	0.063	0.70	0.29	367
1957-58	0.103**	0.760**	0.792**	-	0.253**	-0.140**	-0.020	0.340**	0.143*	0.070	0.024	0.037	0.68	0.30	342
1958-59	0.186**	0.829**	0.672**	-	0.153**	0.017	0.001	0.305**	0.197**	0.038	-0.050	-	0.67	0.30	345

TABLE 11 (cont'd)

Coefficients From Hedonic Regressions of Women's Dresses

Years	YEAR	LN WT	ORG	IMP	LSE	BLT	2-PC	DRY	JCK	BOW/TIE	KWV	ZIP	Adj. R-sq	SEE	OBS
1959-60	0.096**	0.849**	0.623**	0.074	0.181**	0.039	0.008	0.255**	0.105	0.016	-0.047	-	0.72	0.29	333
1960-61	0.092*	0.846**	0.494**	0.167*	0.156**	0.215**	0.025	0.285**	0.027	0.134*	-0.037	-	0.78	0.27	253
1961-62	0.066	0.840**	0.560**	0.271*	0.056	0.215**	-0.118	0.412**	0.115	0.049	-0.008	-	0.73	0.30	217
1962-63	0.007	0.625**	0.488**	0.312*	0.109*	0.299**	-0.125	0.584**	0.160	0.249*	0.040	-	0.68	0.33	237
1963-64	0.023	0.629**	0.381**	-0.180	0.170**	0.266**	-0.036	0.532**	0.107	0.190	0.082*	-	0.7	0.32	290
1964-65	0.020	0.635**	0.437**	-0.386	0.219**	0.241**	0.062	0.474**	0.043	0.162	0.135**	-	0.74	0.29	316
1965-66	0.043	0.467**	0.416**	-	0.294**	0.345*	0.166**	0.524**	0.148*	0.194*	0.107*	-	0.67	0.30	308
1966-67	0.068	0.430**	-	-	0.268**	0.266*	0.122*	0.380**	0.156*	0.117	0.052	-	0.62	0.30	288
1967-68	-0.024	0.738**	-	-	0.123**	0.142	-0.040	0.170**	0.044	0.116	0.129*	-	0.69	0.27	273
1968-69	0.066*	0.849**	0.623*	-	0.080*	0.070	-0.062	0.130**	0.046	0.137	0.158	-	0.78	0.25	258
1969-70	0.007	0.865**	0.602*	-0.239	0.043	0.007	-0.001	0.083*	0.033	0.050	0.117	-	0.8	0.22	211
1970-71	0.162**	0.703**	0.462	-	-0.112	0.096	0.029	0.131**	0.247**	0.100	0.121	-	0.71	0.23	197
1971-72	-0.019	0.721**	-	-	-0.016	0.171*	0.014	0.194**	0.317**	0.138	0.061	-	0.63	0.26	200
1972-73	0.230**	0.621**	-	-	0.069	0.081	0.056	0.330**	0.139	0.126	0.046	-	0.62	0.26	201
1973-74	0.093**	0.486**	-	-	0.071	0.045	0.180**	0.313**	0.221**	0.206*	0.038	-	0.6	0.23	192
1974-75	0.063	0.443**	-	-	0.074	0.025	0.142*	0.157	0.216**	0.208	-0.107	-	0.56	0.23	169
1975-76	-0.027	0.420**	-	-	0.117*	0.050	0.133*	-0.054	0.071	0.224**	-0.101	-	0.51	0.22	166
1976-77	0.023	0.314**	-	-	0.155**	0.157**	0.128*		0.179**	0.280**	0.139	-	0.53	0.22	155
1977-78	0.093*	0.192*	-	-	0.145	0.149*	0.171*	0.549**	0.305**	0.367**	-0.098	-	0.44	0.25	138
1978-79	0.272**	0.186*	-0.109	-	0.206*	0.099	0.127	0.500**	0.202*	0.121	-0.067	-	0.47	0.24	116
1979-80	-0.187**	0.085	0.027	-	0.260*	0.147**	0.087	0.468*	0.181**	0.125	0.155*	-	0.48	0.19	87
1980-81	0.110**	0.087	-	-	0.068	0.114**	0.079		0.174**	0.231**	0.362**	-	0.57	0.16	83
1981-82	0.095**	0.232**	0.660**	-	0.117*	0.076*	0.150*	0.306	0.177**	0.129*	0.037	-	0.51	0.20	115
1982-83	0.299**	-0.225*	0.262	0.187	-0.024	-0.172**	0.092	-0.673**	0.132	-0.010	0.006	-	0.32	0.35	170
1983-84	-0.006	-0.054	0.611**	0.788**	-0.077	-0.097	0.094	-0.467**	0.090	0.063	0.164	-	0.18	0.40	204
1984-85	0.160**	0.557**	0.006	0.137	0.136*	0.046	0.092*	0.427**	-0.014	0.067	-0.063	-	0.64	0.23	208
1985-86	0.023	0.497**	-0.086	0.266**	0.195**	0.041	0.146**	0.472**	0.056	0.018	-0.047	-	0.67	0.21	169
1986-87	-0.154**	0.387**	0.045	0.176*	0.084	0.000	0.079	0.464**	-0.017	0.054	0.030	-	0.71	0.19	150
1987-88	0.014	0.411**	0.168*	0.049	0.137**	0.009	-0.041	0.354**	0.030	-0.001	0.077	-	0.69	0.18	161

TABLE 12

Comparison of Price Indices for Women's Dresses

Year	Sears Median Price	CPI	Sears Matched Model Index	Sears Hedonic Price Index	Sears Implicit Quality Index
1914	45.34	43.87	84.16	44.71	101.42
1915	--	44.74	87.68	*48.38*	--
1916	--	49.13	129.03	*52.36*	--
1917	--	59.07	148.53	*56.67*	--
1918	--	79.83	186.22	*61.32*	--
1919	--	105.86	239.00	*66.37*	--
1920	--	126.04	314.81	*71.82*	--
1921	90.01	97.09	199.56	77.72	115.81
1922	67.90	78.96	169.06	47.62	142.60
1923	84.85	79.25	156.74	56.89	149.14
1924	86.42	78.37	153.08	68.32	126.50
1925	94.16	76.91	149.41	60.77	154.94
1926	92.82	75.74	144.43	65.25	142.26
1927	37.04	73.99	135.48	54.66	67.76
1928	88.44	73.11	129.03	46.21	191.39
1929	--	72.23	121.55	*47.85*	--
1930	--	70.77	121.26	*49.54*	--
1931	--	64.34	112.76	*51.29*	--
1932	--	57.02	91.94	*53.11*	--
1933	--	54.98	88.12	*54.99*	--
1934	42.42	60.24	104.40	56.95	74.49
1935	33.33	60.53	83.28	42.15	79.09
1936	33.56	60.74	86.07	52.47	63.96
1937	33.11	62.58	85.78	51.32	64.51
1938	38.16	61.35	84.02	56.33	67.75
1939	40.97	61.55	84.16	49.61	82.58
1940	35.02	61.55	89.88	52.62	66.54
1941	34.90	63.60	92.23	44.26	78.86
1942	--	76.48	106.45	*47.51*	--
1943	--	79.75	108.06	*51.00*	--
1944	--	87.32	119.50	*54.74*	--
1945	--	92.02	120.97	*58.75*	--
1946	55.56	93.87	130.94	63.07	88.09
1947	73.51	107.16	150.88	88.34	83.22
1948	87.43	115.95	146.63	107.79	81.11
1949	87.65	99.80	148.24	99.40	88.18
1950	68.91	90.18	128.30	72.91	94.52
1951	79.24	96.93	122.58	81.06	97.75
1952	78.34	97.03	120.82	89.40	87.62
1953	74.64	97.14	117.45	86.24	86.54

Table 12 (Cont.)

Comparison of Price Indices for Women's Dresses					
	Median		Sears		Implicit
Year	Price	CPI	Matched Model	Hedonic Index	Quality Index
1954	83.73	97.34	111.73	95.41	87.76
1955	79.12	97.96	107.48	93.43	84.69
1956	89.67	98.77	119.79	72.54	123.62
1957	103.48	99.39	107.04	90.21	114.71
1958	100.00	100.00	100.00	100.00	100.00
1959	101.46	102.45	94.72	120.44	84.24
1960	106.29	102.86	90.47	132.58	80.17
1961	109.43	103.07	98.68	145.35	75.28
1962	112.68	103.48	78.89	155.27	72.57
1963	116.27	104.29	78.15	156.36	74.36
1964	128.84	106.34	82.70	160.00	80.53
1965	114.48	108.18	87.98	163.23	70.13
1966	123.01	113.50	87.98	170.40	72.19
1967	133.22	123.31	94.87	182.39	73.04
1968	130.86	137.83	95.75	178.07	73.49
1969	143.55	151.33	81.23	190.22	75.46
1970	156.57	159.51	103.81	191.55	81.73
1971	141.86	157.26	103.81	225.24	62.98
1972	145.68	160.33	103.81	221.00	65.92
1973	176.54	167.48	106.45	278.15	63.47
1974	206.06	173.62	111.44	305.26	67.50
1975	211.22	177.71	115.69	325.11	64.97
1976	203.70	184.05	121.70	316.45	64.37
1977	220.99	190.80	127.86	323.81	68.25
1978	210.21	195.30	140.18	355.37	59.15
1979	288.33	202.25	146.63	466.46	61.81
1980	233.33	202.25	146.63	386.90	60.31
1981	252.08	202.45	146.63	431.89	58.37
1982	307.63	196.93	147.95	474.93	64.77
1983	409.99	203.68	147.95	640.45	64.02
1984	410.89	213.09	157.18	636.62	64.54
1985	478.79	217.38	174.19	747.08	64.09
1986	549.61	214.72	174.19	764.46	71.89
1987	498.32	238.45	145.60	655.35	76.04
1988	555.56	252.56	147.07	664.59	83.59
1989	--	252.54	148.53	--	--
1990	--	263.68	148.53	--	--
1991	--	273.75	169.21	--	--
1992	--	273.2	169.21	--	--
1993	--	278.35	150.88	--	--

Note: Italics indicate that the Sears hedonic price index is interpolated for these years

TABLE 13

Growth Rates of Sears Matched Model (MM) and Hedonic Indexes Compared with the CPI, the Median Price, and the Implicit Quality Index, Alternative Intervals, 1914-88

	1914-47	1947-65	1965-78	1978-88	1914-88
Sears Median Price	1.46	2.46	4.67	9.72	3.39
CPI	2.71	0.05	4.54	2.57	2.37
Sears MM Index	1.77	-3.00	3.58	0.48	0.75
Sears Hedonic Index	2.06	3.41	5.98	6.26	3.65
Median Price - CPI	-1.25	2.41	0.13	7.15	1.02
CPI - Sears MM Index	0.94	3.05	0.96	2.09	1.62
CPI - Sears Hedonic Index	0.65	-3.36	-1.44	-3.69	-1.28
Sears MM Index - Sears Hedonic Index	-0.29	-6.41	-2.40	-5.78	-2.90
Implicit Quality Index = Median Price - Sears Hedonic Index	-0.60	-0.95	-1.31	3.46	-0.26

TABLE 14

Comparison of Years When Sears Hedonic Index Grew Much Faster than Sears MM Index with Years when the Two Indexes Grew at the Same Rate, Annual Growth Rates in Percent

	Hedonic >> MM				Hedonic ≈ MM		
	1972-73	1978-79	1982-83	1978-83	1960-61	1966-67	1977-78
Hedonic Price Index	23.0	27.2	29.9	11.8	9.2	6.8	9.3
Matched Model Price Index	2.5	4.5	0.0	-0.6	8.7	7.5	9.2
Hedonic - MM	20.5	22.7	29.9	12.4	0.5	-0.7	0.1
Raw Price Change	22.0	34.0	20.0	11.8	1.0	9.0	-4.0
First Weight Quartile	37.0	38.0	34.0	16.9	-1.0	0.0	8.0
Second Weight Quartile	28.0	40.0	50.0	18.7	9.0	1.0	-12.0
Third Weight Quartile	16.0	34.0	19.0	10.0	9.0	27.0	-5.0
Fourth Weight Quartile	9.0	22.0	-24.0	1.1	-3.0	10.0	-8.0
Hedonic Price Index by Weight Quartile	24.0	29.0	32.0	11.8	9.0	8.0	10.0
First Weight Quartile	32.0	44.0	48.0	14.2	0.0	23.0	10.0
Second Weight Quartile	35.0	40.0	53.0	20.1	17.0	7.0	5.0
Third Weight Quartile	14.0	13.6	26.0	-1.0	-5.0	26.0	26.0
Fourth Weight Quartile	13.0	24.0	-10.0	13.6	14.0	5.0	-1.0
Implicit Quality Change by Wt Quartile	-2.0	5.0	-12.0	0.0	-8.0	1.0	-14.0
First Weight Quartile	5.0	-6.0	-14.0	2.7	-1.0	-23.0	-2.0
Second Weight Quartile	-7.0	0.0	-3.0	-1.4	-8.0	-6.0	-17.0
Third Weight Quartile	2.0	20.4	-7.0	11.0	14.0	1.0	-31.0
Fourth Weight Quartile	-4.0	-2.0	-14.0	-12.5	-17.0	5.0	-7.0