

The Expanding Role of Hedonic Methods in the Official Statistics of the United States

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Abstract: The method of using regressions of prices on characteristics to adjust for quality changes has grown dramatically in the United States statistical agencies in recent years. For example, currently 18 percent of the final expenditures in gross domestic product is deflated using price indexes that use hedonic methods. These indexes are produced by at least four statistical agencies (the Bureau of Labor Statistics, the Bureau of the Census, the Federal Reserve Board, and the Bureau of Economic Analysis). This paper details the adoption of hedonic methods by each of these agencies and discusses some misconceptions about the role of hedonic methods in estimation of price indexes.

*The views expressed in this paper are those of the author and do not represent an official position of the Bureau of Economic Analysis.

1 Introduction

In May 1988, on the occasion of the 50th anniversary of the Conference on Research in Income and Wealth, Jack Triplett presented a paper on hedonic methods in statistical agency environments (see Triplett 1990). His conclusion was rather pessimistic—after more than 25 years of scholarly research on hedonic methods, which largely had resolved the theoretical and practical problems associated with the hedonic method, Triplett was only able to cite three instances in which U.S. statistical agencies had adopted hedonic methods for calculating price statistics.

The present paper revisits the role of hedonic methods in U.S. statistical agencies a decade after Triplett (1990) and reveals that the environment has changed rather dramatically. With relatively little fanfare, the use of hedonic methods has been growing at an accelerating rate. Thus, when Landefeld and Grimm (2000) mentioned that 18 percent of U.S. GDP final expenditures are now deflated using indexes that are calculated with hedonic methods, several readers treated the statistic with incredulity. This paper documents the growth in hedonic methods within the U.S. statistical system, briefly discusses some of the factors that have contributed to their adoption, and then reviews several misconceptions about hedonic methods in the context of adjusting for quality changes in constructing price indexes.

The term “hedonic methods” refers to the use in economic measurement of a “hedonic function,” $h(\cdot)$,

$$(1) \quad p_i = h(c_i),$$

where p is the price of a variety (or model) i of a good and c_i is a vector of characteristics associated with the variety. The hedonic function is then used in one of several ways to adjust for differences in characteristics between varieties of the good in calculating its price index. The hedonic function is usually estimated by regression analysis.

The traditional index method for controlling for quality change is known as the “matched model” method. This method controls for quality change by conditioning on the detailed characteristics of the models in the sample, ensuring that exactly the same models with the same characteristics are priced each period. Although this method conditions on the characteristics (thus requiring that the statistical agency accurately and thoroughly describe the characteristics of the model), it does not require knowing the relationship between characteristics and prices. The problem with the matched model method arises when new models appear or old models disappear; the methods traditionally used to link the samples containing the old and new models may overstate or understate the true quality differences.

Most applications of hedonic methods by U.S. statistical agencies use “composite” methods; that is, a matched model method is used to calculate the index when a full sample of prices is available for both periods, and the hedonic function is used to augment the sample for new or disappearing models when prices are not

available. Exceptions are the Census Bureau's single family house price index and BEA's multifamily house price index, which are calculated directly from the hedonic function using characteristics as weights, the Federal Reserve's indexes for LAN routers and switches and the hedonic portion of the BEA software index, which are calculated from the regression coefficients of indicator (or "dummy") variables for years, and the CPI rent and homeowners' equivalent rent indexes, which use the hedonic coefficients to adjust all units in the sample for the effects of aging.

2 A Brief History of Hedonic Methods in U.S. Statistical Agencies

The origin of hedonic methods in U.S. official price statistics goes back to the famous article by the late Zvi Griliches (1961) that was published in the report of the Price Statistics Review (Stigler) Committee. I purposely use the word "origin" because Griliches's (1990) retrospective paper on the subject begins with a lengthy disclaimer that his work on hedonic price indexes was not particularly original; in particular, Waugh (1928), Court (1939) and Stone (1954, 1956) preceded Griliches in developing and applying hedonic techniques. Stigler (1955), however, has claimed, "Scientific originality in its important role should be measured against the knowledge of a man's contemporaries. If he opens their eyes to new ideas or to new perspective on old ideas, he is an original economist in the scientifically important sense." In this sense, the work of Griliches (1961) was surely original—as Lipsey (1990) observed, he took an unconventional method that was then on periphery of price statistics and demonstrated to the economics and statistics community that it could be used to address critical quality adjustment problems that previously had been considered intractable.

Following Griliches, hedonic methods quickly grew to be a new branch of economic research, which is now far too vast to be easily surveyed.¹ Articles that provide overviews of some of this literature include Griliches (1971, 1990), Triplett (1975, 1987, 2000), Berndt (1983, 1991) and Bartik and Smith (1987). I will leave it to others to comment on this literature, except to note that there have been a number of theoretical and empirical controversies. As Triplett (1990) observed, however, many of these controversies have counterparts in the traditional literature on economic index numbers—issues such as aggregation across individuals in constructing a social cost-of-living index, imperfect competition in constructing an output price index, and problems in separating demand shocks from supply shocks. My own view, which echoes Triplett's, is that all quality adjustment methods are imperfect, but regardless of these imperfections, statistical agencies need to do a better job of quality adjustment, and so these controversies should not prevent agencies from using hedonic methods as one tool in quality adjustment. As already mentioned, many years passed before the economic literature had much impact on the U.S. official price statistics.

¹ For example, when I recently searched for the word "hedonic" in the American Economic Association's Econlit bibliographic CD, it located 795 articles.

2.1 *The U.S. Statistical System*

For those readers who are unfamiliar with the U.S. federal statistical system, the statistical system follows a decentralized organizational structure. There are more than a dozen federal agencies that primarily serve a statistical function, and several dozen others that collect or disseminate statistics in support of other activities.²

The hedonic price work described in this paper has taken place at four agencies. The primary responsibility for price statistics—the consumer, producer, export, and import price indexes—resides with the Bureau of Labor Statistics (BLS). The Bureau of Economic Analysis (BEA) produces the national, international, regional, and industry accounts, so it uses component price indexes constructed by the BLS and other agencies as deflators in calculating quantity indexes for gross domestic product (GDP) and other aggregates, as well as price indexes for these same aggregates. The Bureau of the Census conducts a variety of monthly and annual economic surveys and, at five-year intervals, an economic census; it deflates a few of these statistics, such as construction and foreign trade. Finally the Federal Reserve Board produces the monthly index of industrial production, as well as various monetary and credit statistics and the flow-of-funds accounts. Because the index of industrial production is an indicator of real economic activity, many of its current-price components need to be deflated. I will describe the adoption of hedonic methods at each of these agencies, placing them in chronological order of when the method was first introduced.

2.2 *Bureau of the Census – Single-Family Houses Under Construction*

The Census Bureau was the first federal agency to adopt the hedonic method. In 1968, the Census Bureau began deflating single family houses under construction using a price index based on a regression of the sales price of new single family homes against housing characteristics such as the area of floor space, number of bathrooms, regional location, and central air conditioning (Musgrave 1969; Pieper 1990). Subsequently, the Census Bureau has periodically refined the regression models and index estimation methods, including a recent switch to using the Fisher formula, but the basic character of the estimated hedonic function is largely the same as it was in 1968.

It is interesting that the primary motivation for the single-family house price index was not adjusting for changing technology and quality improvements. Rather, the index was designed to address the severe heterogeneity of new houses. Each new house tends to have unique characteristics, implying that it is difficult to use the conventional price index methods of matched models even to calculate a sales price index. Indeed, prior to 1968, construction prices were deflated in large part by cost indexes based on a weighted average of input prices—materials, wage rates, and in a few cases overhead

² The chief statistician of the Office of Management and Budget is responsible for coordinating statistical activities across agencies, working with the Interagency Council on Statistical Policy.

costs and profit.³ As has often been observed, using input cost indexes as a proxy for output prices is unsatisfactory because they do not allow for the direct measurement of productivity; implicitly, these indexes embody an assumption of zero productivity growth. By using a model to parameterize the differences in characteristics between houses, the hedonic method makes it possible to use sales prices from a very heterogeneous sample of houses to construct an approximately constant-quality price index.

I will also note that the number of characteristics included in the hedonic function underlying the single-family house price index is fairly small. An implication is that while the index appropriately adjusts for changes in major characteristics, such as house size or number of bathrooms, it may not be able to adjust for changes in unobserved characteristics, such as improvements or declines in the quality of materials used in construction or in construction techniques.

The Census Bureau has continued to work on construction prices and provides on-going assistance to BEA in estimating its multi-family price index, but to date the single-family index is the Census Bureau's only hedonic index.

2.3 Bureau of Economic Analysis – National, Regional, and Industry Accounts

After the Census Bureau's price index for single family houses, nearly two decades passed before the next official foray into hedonics by a federal statistical agency. The BEA-IBM price indexes for computer equipment and peripherals were introduced into the national income and product accounts in December 1985 (Cole et al. 1986; Cartwright 1986; Triplett 1986). The original indexes covered five types of computing equipment—computer processors, disk drives, printers, displays (terminals), and tape drives for the period 1972-84. Subsequently, a price index for personal computers was added, and a separate index was created for computer imports. The history and present status of the indexes are documented in U.S. Department of Commerce (2000).

It is interesting to note that the problem BEA addressed in its collaborative effort with IBM was more than just obtaining an improved method of quality adjustment. Prior to 1985, BEA simply had no acceptable price index for computers, so computers had been deflated by an index that was equal to 1 for all periods.

In the early 1990's, BLS began publishing quality-adjusted producer price indexes (PPI's) for computers and peripheral equipment (see discussion below). As these PPI's became available, BEA used them to extrapolate the BEA computer price indexes. Eventually, BLS indexes were used for all of BEA's quality-adjusted computer price indexes.

³ Because of these same difficulties, nonresidential structures continue to be deflated in part using cost indexes. Presently the Bureau of Labor Statistics is conducting research to determine the feasibility of calculating an output-type producer price index for nonresidential structures.

The BEA computer price indexes show rapid declines during all periods; for 1959-2000, the average rate of price change for private fixed investment in computers and peripheral equipment is -17.5 percent per year. Although skeptics have occasionally questioned the rapid price declines, the BEA index has stood the test of time. Scholarly studies have generally found similar rates of price decline (for example, see Berndt, Dulberger, and Rappaport 2000; Aizcorbe, Corrado, and Doms 2000). Several other countries now regularly use the BEA computer price indexes to deflate the computer components of computer imports and capital formation in their own national accounts.

BEA's next hedonic index was the price index for multifamily residential structures (de Leeuw, 1993). The issues for multifamily housing were the same as those for single family housing—severe heterogeneity in the characteristics of housing units leading to the use of an inadequate proxy as a deflator. Considerable research was undertaken before an acceptable hedonic function was identified. The Census Bureau has generously assisted BEA in developing and maintaining this index.

After BEA introduced its quality-adjusted computer price index, a frequently mentioned criticism was that use of the index led to inappropriate measures of value added in the construction of computers because the prices of important inputs, such as semiconductors, were not similarly quality adjusted. In January 1996, BEA introduced new quality-adjusted price indexes for semiconductors, based on indexes for several types of memory chips and microprocessors that were developed by Grimm (1998). In the case of memory chips, Grimm used hedonic methods as a guide to constructing a matched model index. In the case of microprocessors, the hedonic function was used with the matched model to form a composite index, as described earlier.

In 1997, BEA introduced a hedonic price index for digital telephone switching equipment (Grimm 1996; Parker and Seskin 1997). The hedonic regression used data from the filings by regional telephone operating companies with the Federal Communications Commission and incorporated characteristics such as the location, type, and capacity of the switch (number of telephone lines).

In 1999, BEA expanded its concept of capital in the national accounts to recognize expenditures for software as fixed investment (Moulton, Parker and Seskin 1999). Because quality-adjusted price indexes for software did not then exist, BEA developed hedonic indexes for a portion of pre-packaged software—specifically, for spreadsheets and word processing programs (Parker and Grimm 2000). Because these types of software represent only a portion pre-packaged software, the hedonic indexes were averaged with matched model indexes to form the pre-packaged software price index. Because data for estimating the hedonic function were available only for 1985-93, bias adjustments were applied to the matched model index for subsequent years.

In addition to developing several hedonic price indexes, BEA uses the consumer, producer, import and export price indexes produced by BLS, the Census construction price indexes, and prices from several other agencies in deflating the national, regional, and industry accounts. Thus, all of the hedonic indexes described in this paper, with the exception of the Federal Reserve Board's semiconductor index, are or soon will be used

in BEA's economic accounts. In several cases, BEA has also back-cast or made bias adjustments to indexes that have been shown to be biased, thereby maintaining a more consistent time series.

2.4 Bureau of Labor Statistics – Consumer Price Index

BLS has a long history of research on hedonic methods, including many empirical studies (a few examples are Gillingham 1975; Triplett and McDonald 1977; and Archibald and Reece 1979), but its first use of hedonic methods in an official price index did not occur until 1987, with the introduction of hedonic indexes for rent and homeowners' equivalent rent (see Randolph 1988; Lane, Randolph, and Berenson 1988). The problem that these first BLS hedonic indexes addressed was different from the technical change and product heterogeneity that we have so far been discussing.

The services provided by a house or an apartment, like those provided by other capital goods, tends to decline over time as the housing unit ages, because it is prohibitively costly to maintain the unit in perfectly pristine condition. The CPI rent index, which tracks the rents of a fixed sample of housing units over time, was thus subject to a *downward* bias because the quality of the housing services provided by the houses and apartments in the sample is systematically declining over time. (The homeowners' equivalent rent index was also biased because it was imputed from the renter sample.) Randolph's (1988) approach was to assume that in a cross-sectional regression of rents on the age of the housing units and other characteristics, the age coefficients would measure the aging effect—that is, he assumed that any differences in quality across vintages could be controlled for by the conditioning of the regression on the observed characteristics. Since 1987, the age coefficients have been used to adjust these indexes.

Another—perhaps unintended—result of the adoption of the hedonic method for the rent indexes is that the coefficients could also be used to directly quality adjust prices of units in the sample when a change occurred in one of the characteristics contained in the regression—for example, if air conditioning or an additional bedroom were added to a unit. Because these kinds of major alterations of rental units are fairly rare, this use of the hedonic model probably has had little effect on the rent indexes. But the adjustment for aging itself had a notable effect of raising the measured price change for the rent indexes.

The next use of hedonic methods in the CPI was in the apparel indexes, beginning in 1991 (Liegey 1993; 1994). The problem addressed by the hedonic indexes for apparel was again heterogeneity of varieties, in this case because of frequent changes in fashion. This heterogeneity had been exacerbated by BLS's 1978 adoption of probability sampling. Prior to the use of probability sampling, BLS attempted to select varieties that were less likely to be subject to fashion changes, but under probability sampling, the sample felt the full effects of the periodic and seasonal changes in fashions. At first, hedonic models were used to assist the BLS commodity analysts in their traditional methods—specifically, helping them identify which changes in characteristics should be ignored, and in which cases the new and old varieties should be treated as noncomparable

items. The regressions also led to improvements in the checklists (i.e., the forms that the data collectors use to describe the variety) and data collection strategies. Eventually, the models were well enough developed that they were used to make direct quality adjustments. Fixler et al. (1999) provide an excellent overview of BLS's experience with these and other hedonic CPI's.

In 1998 hedonic methods were introduced for the computers index, and in 1999 for the television index. The adjustment of the CPI computers sample is based on the hedonic regression used in the PPI, which will be described more fully below. The index for televisions is based on a regression model developed by Moulton, LaFleur, and Moses (1998). For the computer index, use of hedonics has led to a substantially lower rate of price growth—about 6.5 percentage points per year—but for the television index the use of hedonics had surprisingly little effect—only 0.1 percentage point per year (Stewart and Reed 1999).

Over the last two years, hedonic regressions were developed and methods were applied to a number of additional CPIs—audio equipment, camcorders, college textbooks, clothes washers and dryers, DVD players, microwave ovens, refrigerators, and videocassette recorders. As described by Fixler et al. (1999), BLS has been collecting special samples that have been designed to facilitate hedonic estimation. Full reports on most of these indexes can be found at the BLS's CPI Web site: <http://www.bls.gov/cpihome.htm>.

2.5 Bureau of Labor Statistics – Producer, Export, and Import Price Indexes

In 1991, BLS expanded its coverage of the PPI to include a price index for computers and peripheral equipment that is quality adjusted using hedonic methods (Sinclair and Catron 1990; Holdway, no date). Relative to BEA's earlier work, BLS has been able to devote considerably more resources to ensure that the hedonic regressions were regularly updated and to permit inclusion of a wider variety of models in each sample. For example, Holdway reports that a recent regression for personal computers was estimated using 685 computer models, with prices and detailed specifications drawn from the Internet. In earlier years, the sample had been drawn from magazine advertisements. The regressions are updated on a semi-annual or a quarterly basis as technology changes and old regression estimates become obsolete. Needless to say, maintaining the computer indexes is a labor intensive activity.

The hedonic regressions have also been used to quality adjust the computer components of the BLS export and import price indexes and, since 1998, the consumer price index.

At this time the PPI does not use hedonic methods for quality adjustment of other indexes. The sampling methods used for the PPI for microprocessors, however, were recently revised based on a careful analysis of the relationships between characteristics and prices over the product life cycle, and thus this index might be considered “hedonic” in spirit, if not in implementation (Holdway 2000).

2.6 Federal Reserve Board – Index of Industrial Production

The staff of the Federal Reserve Board have pursued an active interest in price statistics. More recently, the Fed has become a producer of selected price indexes for its index of industrial production. Aizcorbe, Corrado, and Doms (2000) showed that matched model price indexes for computers and semiconductors that were based on superlative index formulas using current quantity weights were able to fully capture the quality change, thus rendering the use of explicit hedonic methods unnecessary for these indexes. This finding was based on the use of very high frequency data (monthly information on quantities and prices), in which the sales weight of models tended to decline prior to a model dropping out of the sample.

In 2000, the Fed introduced a hedonic price index for LAN routers and switches that was developed by Doms and Furman (2001; see also Corrado 2001). These indexes had a substantial effect on the industrial production index for communications equipment, leading to an upward revision of roughly 6 percentage points per year in real growth for the index.

2.7 The Growth in Use of Hedonics

Returning to my introductory comments, we can ask why the last 10 years have seen such substantial growth in hedonic methods after very little activity the preceding 30 years. Several factors have probably played a role.

For good reasons, the statistical agencies have tended to be very conservative about adopting novel methods, subjecting them to several years of analysis and testing before making a decision to adopt. In the case of hedonics, as Triplett (1990) described, the new method also initially encountered vocal criticism from several agency officials in positions of leadership.

As we have discussed, the agencies each found their way to hedonics for a variety of purposes, in some cases quite different from the initial purpose proposed by Griliches (1961) of adjusting indexes for technological progress. Hedonic indexes have been used to strengthen the sample in the case of heterogeneous products, to deal with changing fashions in apparel, and to adjust for quality degradation in the case of aging bias in the CPI rent indexes.

I believe that the expanded use of hedonic methods reflects in part the successful, high profile role of hedonic adjustments of computers and peripheral equipment, first in the national accounts and subsequently in the BLS price programs. Although these indexes have sometimes been criticized, a number of outside studies, such as Berndt, Dulberger, and Rappaport (2000) and Aizcorbe, Corrado, and Doms (2000), have resulted in computer indexes similar to those of BEA and BLS. In my view, the official computer indexes have largely stood the test of time and are now being imitated in other countries and for other goods.

The growing use of hedonics is doubtless due in part to the persistent proselytizing of advocates such as Zvi Griliches, Jack Triplett, and Ernst Berndt. Their work has influenced a new generation of leadership in the statistical agencies.

The *Final Report* of the CPI Advisory (Boskin) Commission also had an impact (U.S. Senate 1996). I was surprised that the report itself contained only a very limited discussion of hedonic methods and did not include hedonics among its formal recommendations. Nevertheless, one of the main messages of the report was that inadequate quality adjustment leads to bias in the CPI. Although I have described elsewhere some disagreements I had with the Commission's specific estimates of quality bias (Moulton 1996; Moulton and Moses 1997; Abraham, Greenlees, and Moulton 1998), the net effect of the *Final Report* and the attendant controversy was to clarify the need for improved methods of quality adjustment and, perhaps equally important, to help develop support for the funding of these improvements.

Finally, there has been a renewal of research on price indexes both in the U.S. and internationally, a renewal that actually preceded the Boskin Commission. For example, in December 1993 BLS published an influential special issue of the *Monthly Labor Review* on price index research, and the International Working Group on Price Indices (Ottawa Group) held its first meeting in 1994. One of the outcomes of this research work has been international discussion and research on quality adjustment and hedonic methods. One new area of research that looks particularly promising is exact hedonic indexes – see Fixler and Zieschang (1992), Feenstra (1995), and Silver and Heravi (2000).

3 Some Misconceptions About Hedonic Methods

The experience of the U.S. statistical agencies may help dispel several misconceptions about the application of hedonic methods. I will list a few misconceptions, in each case following with a brief discussion of the actual experience of applied hedonic methods.

3.1 Quality-adjusted Price Indexes Are Synonymous with Hedonic Indexes

Virtually all methods used to construct price indexes are designed to measure price change holding quality constant (an exception being unit-value indexes, which are not designed to hold quality constant). Hedonic methods hold quality constant by conditioning on characteristics in a regression analysis. Traditional matched model methods hold quality constant by carefully specifying each variety in the sample and ensuring that exactly the same variety is resampled each period. There can be problems with matched model methods—the samples may be unrepresentative or out of date, the methods used to handle new or disappearing items may be sensitive to unusual price changes that sometimes occur when an item first appears or disappears, or the decisions made by the statistical agency analyst about how to treat the replacement of items in the sample may be faulty. These problems may lead to either upward or downward biases, and hedonic methods are important because they can help address some of these problems. Several researchers—for example, Aizcorbe, Corrado and Doms (2000)—have observed that matched model methods using good samples with up-to-date weights may give results similar to, or perhaps better than, hedonic methods.

3.2 Hedonic Methods Are Opposed to Traditional (Matched Model) Methods

In fact, most hedonic research at U.S. statistical agencies has led to the opposite conclusion—hedonic research has often led to improvements in sampling methods that have led to better samples, sample replacement strategies, or other improvements in the matched model indexes. The U.S. statistical agencies have found that hedonic analysis is a useful tool, whether used in the background as a guide to application of the matched model methods, or used directly in making quality adjustments for sample items that are being replaced. The articles by Liegey (1993) and Fixler et al. (1999) on the use of hedonics in the CPI for apparel include a number of examples of how hedonic methods can be used in both ways.

3.3 Hedonic Methods Always Result in a Lower Rate of Price Change

For many people think of the rapid decline of the BEA and BLS computer price indexes as representative of hedonic methods. The recently developed hedonic index for LAN equipment of Doms and Furman is another example of an item for which application of hedonic methods led to a much lower rate of price growth. On the other hand, several of the BLS hedonic CPI's have resulted in higher rates of price change—as described above, the hedonic rent indexes were specifically designed to correct for a downward bias. Also, the apparel indexes and, perhaps more surprisingly, videocassette recorders are examples of items for which hedonic methods led to higher rates of price growth.

3.4 Hedonic Methods “Solve” the Quality Adjustment Problem

Hedonic regressions are only as good as the data and modeling efforts that go into them. If an important new characteristic has appeared on the market, but is not included in the hedonic regression equation, there is no hope of using the hedonic function to adjust for the improvement in quality. Similarly, just as matched model methods may be biased if samples are out of date or unrepresentative, so also hedonic methods may be biased if estimated using unrepresentative samples. For both hedonic methods and more traditional methods, the statistical agencies must depend on knowledgeable staff who proactively keep track of new products and other market developments.

3.5 Hedonic Methods Are Prohibitively Expensive

My own experience has been that hedonic methods do require time and effort. Probably the most significant issue is collecting prices and detailed characteristics for a representative sample of models or varieties. I found that for a number of items—for example, televisions and rental housing—the data already collected by the statistical agency were perfectly adequate for hedonic analysis. For other items, special data collection or purchases of secondary data may be required; as Fixler et al. (1999) describe, the BLS CPI program is now employing both of these approaches specifically for use in the estimation of hedonic regressions. The actual regression analysis itself is often straightforward, and with training should be within the capacity of statistical agency staff in many countries.

4 Concluding Comments

The last ten years have seen an acceleration in the adoption of hedonic methods by U.S. statistical agencies. I expect this trend to continue. In particular, quality adjustment problems exist for several important types of products and services that are still being estimated with traditional methods. Technology has impacted on many types of capital equipment besides the categories of computers, semiconductors, and LAN equipment that are currently adjusted for quality change using hedonic methods. Technology has changed rapidly in recent years on diverse product groups such as medical instruments, printing and publishing equipment, machine tools, etc. A tremendous number of microprocessors are embedded in other equipment or structures. Although hedonic methods have not been widely used for prices of services, Moulton (1991) provides an example of hedonic quality adjustment of a price index for radio services. Doubtless, other areas of services production will also eventually prove amenable to hedonic methods of quality adjustment.

In summary, I believe that the hedonic method has a bright future within the U.S. statistical system and, eventually, throughout the world.

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