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THE EMPLOYMENT SITUATION: APRIL 1997 AND THE CONSUMER PRICE INDEX

HEARING

before the

JOINT ECONOMIC COMMITTEE
CONGRESS OF THE UNITED STATES

ONE HUNDRED FIFTH CONGRESS

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CONTENTS

OPENING STATEMENT OF MEMBERS

WITNESS

SUBMISSIONS FOR THE RECORD

THE EMPLOYMENT SITUATION: APRIL 1997 AND THE CONSUMER PRICE INDEX

Friday, May 2, 1997

CONGRESS OF THE UNITED STATES
JOINT ECONOMIC COMMITTEE,
WASHINGTON, D.C.

The Committee met, pursuant to notice, at 9:32 a.m., in Room 1334, Longworth House Office Building, the Honorable Jim Saxton, Chairman of the Committee presiding.

Present: Representatives Saxton, Thornberry and Maloney.

Staff Present: Christopher Frenze, Mary Hewitt, Amy Pardo, Roni Singleton, Meredith Aber, Victoria Norcross, Nita Morgan, Howard Rosen and John Blair.

OPENING STATEMENT OF REPRESENTATIVE JIM SAXTON, CHAIRMAN

Representative Saxton. Good morning. As always, it is a pleasure to welcome Commissioner Abraham before the Joint Economic Committee. We are glad you are back with us. And once again, Commissioner Abraham brings good news.

According to the household survey, 209,000 jobs were added in April, and the unemployment rate fell to 4.9 percent, the lowest it has been in some time. Employment growth as measured by the payroll survey is somewhat softer than expected, posting an increase of 142,000 jobs. The business cycle expansion continues to provide output and employment gains with no evidence of a significant slowdown in the near future.

Unfortunately, the recent release of data on middle class earnings continue to show stagnation through the first quarter of 1997. As I pointed out last week, another benefit of the sustained expansion has been the marked improvement in the budget situation. The strong

economy has produced strong revenue growth, and this is pushing the projected 1997 deficit down far below official projections.

It now appears that the 1997 deficit - and this is extremely good news - may fall below $70 billion. Obviously, this is occurring because of expansion in the economy; and this is something that I think we should all take note of because, for at least a decade, there have been those of us who have said continually that the way to solve the deficit problem, in large part, is to see expansion in the economy, which in turn produces expansion in Federal revenues; and as a result of that concept, we may be seeing a deficit in 1997 as low as $70 billion, again primarily because of economic expansion.

The sustained business cycle upswing has brought a solid economic situation with strong output and employment growth and a rapidly improving near-term budget outlook. Moreover, the low inflation climate produced by the Federal Reserve's disinflation policy demonstrates that price stability is an important foundation for sustained economic growth.

The experience over the last two decades shows that low inflation leads to job growth and low unemployment. Just as in the late 1970s, it proved that high and accelerating inflation can lead to high unemployment. The strong employment and economic growth over the last two quarters is a very positive development. Moreover, there is no real evidence of accelerating inflation in price indices, measured commodity prices or the value of the dollar.

While the Federal Reserve has done an excellent job in keeping inflation low, I have voiced concerns in recent months that it may be tending to view the current economic strength as potentially inflationary, and it is my belief that that is not necessarily so. Though there is agreement that price stability should be the ultimate objective, our research here at the JEC suggests that price stability should be implemented using inflation targets based on broad price indices. In the absence of inflation, shown in these indices or forward-looking inflation measures, I do not believe that strong economic growth is itself

inflationary or is a justification for increases in interest rates by the Federal Reserve.

The time data on the unemployment cost index and average hourly earnings, released by BLS this week, lend further support to this view.

I will, Dr. Abraham, have some other comments and questions a little bit later on, but perhaps my colleague - does not have an opening statement. And when Mrs. Maloney arrives in a few minutes, she may have an opening statement as well. But in the meantime, Dr. Abraham, we are extremely grateful that you are here with us again this month.

Again, as I said earlier, there is good economic news, and so we shall be interested to hear your comments this morning.

[The prepared statement of Representative Jim Saxton together with press releases and Joint Economic Committee studies appear in the Submissions for the Record.]

STATEMENT OF THE HONORABLE KATHARINE G. ABRAHAM, COMMISSIONER, BUREAU OF LABOR STATISTICS

ACCOMPANIED BY KENNETH V. DALTON, ASSOCIATE COMMISSIONER FOR PRICES AND LIVING CONDITIONS; AND PHIL RONES, ASSISTANT COMMISSIONER OF CURRENT EMPLOYMENT ANALYSIS

Ms. Abraham. Thank you, Mr. Chairman. As always, I appreciate the opportunity to be here to talk about the economic data we have to report.

As you have noted, unemployment declined in April, and nonfarm payroll employment rose. The unemployment rate dropped by three-tenths of a percentage point to 4.9 percent. Over the prior 10 months, the rate had remained in a narrow range from 5.2 to 5.4 percent.

Payroll employment increased by 142,000 in April, which is about the same as the gain in March, as revised, but well below the growth realized in January and February. Unfavorable weather during the survey reference periods dampened construction hiring in both March and April.

In April, employment in the services industry increased by 93,000. There were relatively large over-the-month gains in health services,

social services and engineering and management services. Job growth in computer and data processing services continued at its steady pace. In all these industries, employment has been on an upward trend for many years.

Partly offsetting these increases in April was a decline in amusement and recreation services. Help-supply services showed virtually no change in employment in April. Although this industry has been a major contributor to job growth during the six years of the current economic expansion, gains since last August have been both more modest and more sporadic.

In April, each of the major components of finance, insurance, and real estate added jobs, and employment also continued to rise in transportation and communications. In retail trade, a gain in eating and drinking places was partly offset by a decline in general merchandise stores.

In manufacturing, employment declined by 14,000 over the month, reflecting in part a strike in auto manufacturing and some temporary shutdowns for inventory control in that industry. From September to March, factories had added 75,000 jobs.

In April, growth continued in industrial machinery, fabricated metals and aircraft. Also, I might note, overall manufacturing hours, however, rose to match its post-World War II high level at 42.2 hours, and overtime edged up to five hours, its highest level since that series began in 1956.

In April, construction employment declined for the second month in a row. Following a large gain in February, employment in construction has decreased by 69,000 over the past two months on a seasonally adjusted basis. Bad weather across much of the country during the March and April survey reference periods probably delayed some of the normal hiring that we otherwise would have expected to see during those months.

Average hourly earnings edged down by a penny in April. This followed increases totalling 11 cents over the first quarter of the year. Although the month-to-month movements in this data series remain

quite volatile, the over-the-year gains for recent months clearly have been running higher than during the early part of 1996.

The 4.9 percent unemployment rate in April was the lowest since 1973. The number of unemployed persons declined to 6.7 million. All the major demographic groups contributed to the decline in the overall jobless rate and the unemployment rates for both whites and blacks and for adult women were down significantly.

Unemployment decreased among those who had been looking for work for less than 14 weeks and among those who had lost jobs to which they did not expect to be recalled. Although a great deal of attention undoubtedly will be paid to the drop in the jobless rate, I would caution, as always, against reading too much into any one month's data.

Total employment, as measured by our household survey, was essentially unchanged in April. The proportion of the population with jobs, the employment-to-population ratio, however, remained at a record level of 63.8 percent.

In summary, unemployment fell in April and payroll employment rose modestly. The employment-to-population ratio, manufacturing hours, and manufacturing overtime all remained at historically high levels.

My colleagues and I, of course, would be more than happy to answer any questions you might want to address to us.

[The prepared statement of Commissioner Abraham and accompanying press release appear in the Submissions for the Record.]

Representative Saxton. Well, thank you very much, Dr. Abraham.

Congressman Thornberry has joined us from the State of Texas, and I just wanted to point that out. And we look forward to hearing his comments here shortly.

But let me just ask a couple of questions. There seems to be some mixed news here. And let me concentrate on the good news first and then ask some questions about, perhaps, more questionable aspects of the data that you bring us.

A 4.9 percent rate of unemployment, no matter how anybody looks at it, has got to be good news. As a matter of fact, you just mentioned it was 1973, 24 years ago, that we had the opportunity to look at an unemployment rate that low. I am wondering if you believe that this is a figure that will hold, based on what you have seen in the past several months, whether this is a trend or perhaps we have seen something happen here in terms of statistical data and analysis that would produce a one-month aberration. And I am hopeful, as you are, I guess, that this is a trend, but what are your thoughts on this?

Ms. Abraham. Well, with respect to this 4.9 percent unemployment rate figure, there isn't anything in the data that I would say is peculiar or that is in any way an anomaly that we think would have contributed to this. So it is not a quirky number in that sense; on the other hand, it is just 1 month's data, and before drawing any sort of conclusion that there is a trend here, I would want to wait and see some data for additional months.

Representative Saxton. As you know, Dr. Abraham, Dr. Norwood was the BLS Commissioner; and when she was, she consistently warned against reading too much into one month's data, and you have just –

Ms. Abraham. I would concur in that recommendation, certainly.

Representative Saxton. You concur that we ought not to be as elated as one might be if we thought this was more significant than that.

Ms. Abraham. Well, I think, clearly, 4.9 percent unemployment is low by recent historical standards.

Representative Saxton. Absolutely.

Ms. Abraham. Whether we are going to see the same number next month, I obviously just don't know.

Representative Saxton. Obviously. Okay.

Also, the number of unemployed fell, according to our data, by 430,000 in April, which would seem to be a very, very large drop for one month. How would you interpret this monthly decline?

Ms. Abraham. Well, again, more so with the estimates of levels in the household survey – levels of employment, levels of unemployment.

I would not read too much into one month's change. Those level estimates do jump around considerably from month to month.

The 430,000 decline in unemployment is a larger jump than we have seen recently, but if you look back through the changes in unemployment, month to month, you do see them bouncing around quite a lot.

Representative Saxton. Now, is this –

Ms. Abraham. So again I guess I am saying that I wouldn't attach undue significance to that particular figure.

Representative Saxton. Sure.

Is this 430,000 number from the household payroll?

Ms. Abraham. Yes. When we talk about unemployment, we are always talking about data that we have derived from the household survey.

Representative Saxton. So this is a survey where experts or surveyors actually go out and ask questions about employment tendencies in individual households.

Ms. Abraham. The survey is done for us by the Census Bureau. Each month, people in roughly 50,000 households are interviewed.

There is a series of specific questions that we ask about people's labor force activity from which we derive these estimates of employment and unemployment. So we are not just asking them general questions; these are very specific questions. But it is based on the answers to those.

Representative Saxton. Now, there is another survey, or set of data, that we use, known as the payroll employment figures.

Ms. Abraham. Yes.

Representative Saxton. How do these figures differ in the way they are collected and the sources of these figures? And what is that figure and how does it compare with the 430,000 drop?

Ms. Abraham. The payroll employment figures are derived from a survey of employers. So we get those numbers by collecting responses from a large number of employers, about 400,000 employers, each

month, asking them about what has happened to the employment on their payrolls.

Those figures don't always track one another precisely on a month-to-month basis or even on a longer-term basis.

Over the past year, for example, our payroll employment figures show that employment has grown by about 2.7 million, whereas our household figures, adjusted to be more comparable in terms of the concepts to the payroll employment figures, show employment was up over the year by 3 million. So it is not uncommon for them to diverge, certainly month to month or even over longer periods of time.

Representative Saxton. Thank you.

You indicated in your statement that manufacturing employment fell in April. How would you interpret such a decline?

Ms. Abraham. The only information that I would have to contribute on that would be sort of a breakout of where we were – seeing increases in manufacturing and where we were seeing decreases. If we look at the manufacturing employment figures, we saw a decline last month; manufacturing employment overall was down 14,000. Motor vehicles and equipment employment was down by 13,000.

As I noted, the largest share of the decline in motor vehicles and equipment was due to strikes and also to some temporary shutdowns for inventory control, although that was not the whole story in motor vehicles and equipment. And if you look at the other parts of manufacturing, there are some industries where we saw small increases, some industries where we saw decreases, but those were, on net, offsetting, more or less.

Representative Saxton. So what was the total falloff in manufacturing employment in 1996? Do you recall?

Ms. Abraham. Well, the figure I have in my head covers a slightly different period than that. Manufacturing employment had fallen between mid-1995 and the fall of 1996 by some 300,000-plus. Looking over 1996, it was down. It was down between December 1995 and December 1996. That was down by almost 100,000.

Representative Saxton. Almost 100,000. That corresponds with some numbers that we have, at least in a general range.

In the service-producing sector, we have seen quite the opposite tendency. Does that fit with what you believe is true?

Ms. Abraham. Yes. Certainly over the long haul, service-producing industries have been the big job generators.

Representative Saxton. So what we have talked about this morning is good news in that we have seen a significant drop in unemployment. That is one thing that we can all agree on.

We can also all agree that we have seen a significant decline, or a tendency of decline, over the past year or so, and probably more than that with regard to manufacturing jobs. And, conversely, once again, good news in the service sector where we have seen a significant increase in jobs; is that all correct?

Ms. Abraham. Well, looking at manufacturing, we had seen between September of last year and last month some cumulative increases, though those were smaller than the declines that had occurred over the previous year and a half.

Representative Saxton. Obviously we all agree, without question, that the unemployment rate is lower now than it has been for almost a quarter of a century.

Ms. Abraham. That is correct.

Representative Saxton. The tendency seems to be, however, that manufacturing jobs are decreasing while service sector job are increasing.

Ms. Abraham. Taking a long-haul perspective, that is okay.

Representative Saxton. Okay. Thank you very much.

Let me yield at this point to the gentleman from Texas, Mr. Thornberry, for whatever questions he may have.

OPENING STATEMENT OF REPRESENTATIVE MAC THORNBERRY

Representative Thornberry. Thank you, Mr. Chairman.

Commissioner, as you are aware, one of the struggles that we have in Congress, as well as in the Administration, is to take the information

that you provide and try to evaluate its accuracy, what level of confidence we have in it, and then what it tells us, what we can determine from there. And that is, that is not an easy think. And, as you know, there is a lot of debate in that area right now.

Let me ask you for example, on the unemployment rate, lowest in 25 years, is obviously a very significant change, a significant milestone. What level of confidence can we put in the accuracy of that number?

For some time, we have heard, for example, that the unemployment measure does not count, people have given up looking for jobs. And what sorts of questions should we ask? What sorts of doubts, problems, are there in the way that we measure unemployment? And the second part of that is, do we measure it differently now than we did 25 years ago? Are you changing, updating, modernizing the way that you arrive at the unemployment rate?

Ms. Abraham. Let me try to answer those questions. I could maybe start out by giving you just a statistical answer.

A statistical answer is that the size of the survey that we have is big enough that if we see month-to-month change in the unemployment rate of 0.2 percentage points or greater, that that is a statistically significant change at about a 90 percent confident level. So we have a fair degree if confidence, if you see movements in the unemployment rate of that magnitude, that that is meaningful. But I think that is not really the main thrust of what you are asking.

There is a set of concepts embedded in the unemployment rate. We are drawing a line in terms of who we count and who we don't count. We are saying that if you actively searched for work within the last four weeks and are currently available for work that you are counted as unemployed.

If the last time you , did something to look for work was six weeks ago, we don't count you. So we are drawing a line there. Exactly where we draw that line is unavoidably somewhat arbitrary.

I think the important thing is the consistency of the measure over time. Because these data are used so much for assessing trends in the labor market, we are very careful about changing the survey. The only

big change in our survey that is used for measuring unemployment that we have made in the last 25 years was a change that was made in January of 1994 that involved a thoroughgoing revamping of the questionnaire. We have learned things about how to ask better questions. So there was a major change in the survey then.

Based on our analysis of the data that we have available, our sense is that that change had a very modest effect on the unemployment rate, that the change in the survey questionnaire and the survey instrument may have bumped the unemployment rate up by – what did we say – 0.1, a tenth of a percentage point, but we think it had a fairly modest effect. So the data are really quite comparable over time.

In addition to publishing the unemployment rate, because we have drawn a line and some people are in, but others are out, we actually publish a whole range of measures that are less inclusive, more inclusive. Our most inclusive measure is a measure that includes the unemployed plus everyone who is what we have – have called "marginally attached" to the labor force, that is, everyone who says that they have done anything to look for work within the last year and would be available to work now if a job were offered to them, plus everyone who says that they are currently working part-time, but would prefer full-time work. So that is obviously a much more inclusive measure.

That group, as a share of the civilian labor force, plus the marginally attached, totaled 9 percent. That is down from a year earlier when it was 9.7 percent. So we have seen declines in that measure as well.

Representative Thornberry. But essentially you have questionnaires that you send out to a sampling of employers, and that is where the basic raw data comes back to you from?

Ms. Abraham. The basic data for unemployment comes from a survey of households, in-person interviews in households, asking them things like are you employed? If you are not, have you been looking for work? When did you look for work? What did you do to look for work?

Representative Thornberry. And what is your sample size?

Ms. Abraham. It is about 50,000 households.

Representative Thornberry. As I understood, at some point, before January 1994 you all decided there is a better way to ask these questions in the questionnaire, and so that has been the only substantial change.

Ms. Abraham. Right. Right.

Representative Thornberry. Was that a change that the Bureau initiated on its own, saying that we just don't have the confidence that we could have if we ask questions a little bit better? And how long did it take you to get to the new questionnaire?

Ms. Abraham. The initial impetus for reviewing what we were doing, I guess, I would say was the 1979 Levitan Commission report that was a review of all of the country's labor force statistics. The process of reviewing the current questionnaire, devising improved questions, testing those questions went on over many years, at least 8 years.

I don't know, do you remember when the -

Mr. Rones. About eight years.

Ms. Abraham. About eight years. So it was quite a long-term, exhaustive process.

Representative Thornberry. And then of course the other area that we hear so much about is the Consumer Price Index. It was my understanding that you all have a requirement or an internal policy - I am not sure which - to review and revise the method by which you come up with the CPI.

Can you refresh my memory on when and how and why that revision process occurs?

Ms. Abraham. I think what you must be referring to is our every-10-year revisions of the Consumer Price Index.

The Consumer Price Index, I suspect you know, is based on tracking the prices of a fixed market basket of goods and services. It is also based on data, collected in a set of geographic areas.

It makes sense to update what items you are collecting data for and also where you are collecting data on a periodic basis to ensure that it is more representative of what people are buying and where the population

actually lives. Every 10 years we get data from the census on how the distribution of the population across the country has shifted. And historically it has been the practice of the BLS to - when that information becomes available, - fold it into the sample used for the Consumer Price Index; and also, in the context of updating the geographic sample, the set of cities where data are being collected, to take the opportunity to introduce other improvements in the index.

The rationale for doing this roughly every 10 years has been that that is when census data become available. But as I said, we also take advantage of doing that updating to introduce other improvements.

The Bureau has, in addition, from time to time, as our ongoing review of the index, the procedures used to construct the index suggest, made other improvements in the index; and I have a list which I would be happy to get to you, although I don't have a copy here, of those improvements that we have made. There is a whole set of improvements that we have made in the index over just the last two years.

[Information provided by Commissioner Abraham appears in the Submissions for the Record]

Representative Thornberry. When are we scheduled for the next 10-year revision?

Ms. Abraham. We are in the process of a roughly-every-10-year revision as we speak. We are planning to introduce an updated market basket, which will affect the weighting in the index of different items, in January of 1998. So less than a year from now.

Representative Thornberry. And the revision in January of 1998 is to update the items that are included in what you sample every month; is that - is that right?

Ms. Abraham. That is correct.

Representative Thornberry. Okay. In and of itself, that does not address some of the other concerns that people have raised, substitution and other things.

Ms. Abraham. No. Putting more recent market basket weights in place partially addresses the substitution bias problem. Getting more

recent weights in place will help with that, but it does not correct the problem. And it does not, in and of itself, correct the quality, new goods, and other problems that people have suggested exist.

Representative Thornberry. Well, my understanding is that Chairman Saxton had written you earlier asking about a request from the Bureau in - I believe it was back in 1993 to have additional money to update or revise the Consumer Price Index at that time. Have you requested money through the budget process to update this index, which was then denied?

Ms. Abraham. I should say that this was before my time at the Bureau. The Bureau did have a proposal that had been developed to get started with the revision of the Consumer Price Index beginning in fiscal year 1994 that did not in the end find its way into the President's budget request. I think that was laid out in the documents that we have supplied to the Chairman.

We again requested funding to get started with that revision in fiscal year 1995 and received full funding for our work at that time and at each point since.

I might note that we did, between preparing the initial request for funds and the subsequent request for funds, rework our plans so that, in fact, the date at which the new market basket weights are being introduced, that is, January of 1998, is the same as had been originally planned, though some other activities were rescheduled to make that possible.

Representative Thornberry. Okay. When was the last time the market basket was updated?

Ms. Abraham. The last time the market basket was updated was 1987. At that time, weights were based on consumer expenditures for the 1982 to 1984 period.

Representative Thornberry. So we are going to be roughly a year behind if you count 10-year -

Ms. Abraham. Well, if you go back, it was 1978, the time before that; but the revision before that was 1964. So I say -

Representative Thornberry. We don't always make 10 years?

Ms. Abraham. I say roughly every 10 years, but it is very roughly.

Representative Thornberry. Okay.

Now, in addition to updating the items that you count, as we mentioned, there are other criticisms that are made of the CPI. And it is my impression that you have announced that there would be some additional consideration given for some of the substitution effect or at least an alternative index where you all would look at it.

Could you refresh my memory on what you have decided, what you have announced so far?

Ms. Abraham. Certainly. By way of a little bit of perhaps necessary background, the Consumer Price Index is put together based on about 90,000 prices we collect each month that are then used to produce subindexes that, in turn, get aggregated to produce the overall index. And there are substitution bias issues that arise both with respect to the construction of the subindexes and with respect to the way those get aggregated.

We recently released an experimental index that differs from the official CPI in the way that the subindexes are constructed. The experimental indexes use a geometric mean aggregation formula which may, in practical terms, under certain assumptions about consumer behavior, address the substitution bias at that level of constructing the -

Representative Saxton. Would the gentleman yield to me for just a minute?

Representative Thornberry. Certainly.

Representative Saxton. I would like to explore this. This is a very important point. Let me just state what I believe substitution means and you tell me if I am correct or not.

As consumers purchase goods, we all know that from time to time certain prices of goods increase, while others perhaps do not. And so a consumer who goes to the market, for example, and decides that they want to buy their normal favorite kind of apples - say they like to buy McIntosh apples as opposed to Granny apples - and all of a sudden the price for some reason, climatic conditions or whatever, McIntosh apples

have a significant increase in price. Therefore, might be encouraged to purchase Granny apples.

Ms. Abraham. Right.

Representative Saxton. And that is what you are referring to as substitution; is that correct?

Ms. Abraham. Not precisely. I think it is not quite the right thought experiment for what we are talking about. Could I try to explain why, briefly?

Representative Saxton. Please.

Ms. Abraham. Clearly, if you go into the store and the price of everything is the same as it was last month, except the price of these McIntosh apples that you like has gone up, you are worse off than you were the month before.

Representative Saxton. Right.

Ms. Abraham. Prices unambiguously have risen, and we want to pick a price increase up in the measure we produce. The question though is, are you as much worse off? Do you need as much more money to achieve the same level of well-being as you had last month as it would take for you to buy exactly the same amount of McIntosh apples this month that you were buying last month? Then if you think that there is any willingness on the part of consumers to make trade-offs between different things, you probably don't. You could probably achieve the same level of well-being maybe only a little bit less money than it would take you to keep buying exactly what you were buying last month.

Maybe a better thought experiment is, what happens if you come into the store and the price of McIntosh apples has gone up and the price of Gala apples, which happens to be my personal favorite, has gone down? Well, you might see some substitution there. That is more the flavor of what we are talking about with this substitution effect. What happens when relative prices change?

I am sensing from your expression that that wasn't particularly clarifying.

Representative Saxton. It is a complicated issue. But the fact of the matter is that this substitution is very difficult to measure and creates some inaccuracies in the CPI. There is some thought being given on Capitol Hill and at BLS that we should try to find ways to offset these seeming inaccuracies; is that correct?

Ms. Abraham. Yes. I think, clearly, if you assume that none of that sort of substitution is going on, which is the assumption embedded in the Consumer Price Index as currently constructed, you have a measure that is giving you an upper bound on what is happening to the cost of living, which is how historically the Bureau has always characterized the CPI.

Representative Saxton. So the CPI looks at the cost of the apples?

Ms. Abraham. Yes.

Representative Saxton. And does not necessarily take into consideration -

Ms. Abraham. Right.

Representative Saxton. - whether or not consumption of the more expensive apples is taking place as it did when they were at the lower price?

Ms. Abraham. The implicit assumption is -

Representative Saxton. And there -

Ms. Abraham. - people buy what they buy last month.

Representative Saxton. Therefore, the resulting CPI, taking account only of the cost of the product and not whether or not the product is consumed, creates the less-than-accurate number?

Ms. Abraham. It is a number. I mean, the number is what it is. What it is is an index that conceptually, theoretically gives you an upper bound on the cost of living.

Representative Saxton. Now, if the gentleman will permit me to just ask one additional question - do you believe this substitution, affects all segments of society equally? In other words, do younger people and older people find the same effects of substitution, let's say, for one segment of society that is less mobile than others? Is it more

difficult for that less mobile section of society to shop around, to find lower-priced products?

Ms. Abraham. That is not something we know much about. The information that we have on the magnitude of the substitution effect has been information derived from the whole urban population. So it is very much an average sort of measure.

Representative Saxton. Dr. Abraham, do you have any hard evidence at all on differences between age groups?

Ms. Abraham. There has been some research done by a researcher named Mary Kakoski in our office that I believe may shed some light on this. I am not familiar enough to describe -

Representative Saxton. What I would really like, what I am really trying -

Ms. Abraham. If you would be interested in having those results described, I believe John Greenlees -

Representative Saxton. That would be wonderful. What I am really interested in trying to determine is whether or not substitution effect is the same on people, let's say over 65 years of age, as it is on people under 65 years of age.

Ms. Abraham. I don't think we know.

Mr. Dalton. We don't know.

Ms. Abraham. There is - I think we just don't know at this point. Is the, is the -

Mr. Dalton. We know the spending patterns, but we don't know.

Representative Saxton. Does that mean, you don't have the evidence?

Ms. Abraham. Yes, I don't. Other than this study which I have heard alluded to and which I have not had a chance to review myself, I don't think we have any evidence.

Oh, I am sorry. That was just - I am being told that that was just on the poor; it did not look at things by age group. So we have no evidence.

Representative Saxton. Thank you. I will yield back to the gentleman.

Representative Thornberry. And Commissioner, as I understand, this experimental index that we were talking about tries to have some recognition that some substitution takes place. Is that kind of the bottom line to it?

Ms. Abraham. That is the bottom line.

Representative Thornberry. Okay. And are you making a specific numerical compensation for substitution in this experimental index, or is it something that varies? Or is it a hard and fast number we are going to take "X" amount off of every -

Ms. Abraham. No, it is a different way of computing the index we are considering for potential adoption; and it would, in principal, yield, it could well yield, probably would yield different results in terms of the impact from month to month.

I should say we have produced this experimental index that uses this alternative formula across the board. I think it is very unlikely that we would end up adopting that alternative formula across the board, because I don't think it makes sense in all cases.

Representative Thornberry. You may across the board, for all products.

Ms. Abraham. For all the components of the index.

Representative Thornberry. Did you look at certain - so you would have to pick out which of the 900 products you analyzed substitution is likely and -

Ms. Abraham. Yes.

Representative Thornberry. - and make adjustments based on that?

Ms. Abraham. It is not quite that bad.

Representative Thornberry. It sounds pretty bad.

Ms. Abraham. We have 200 item categories and we shall have to make some judgment about which of those item categories this alternative formula makes sense for and which of them it does not.

Representative Thornberry. Let me ask you about another area that I have heard discussed and that is the inability of the Consumer Price Index to take changes of quality into account. And to switch a

little bit from apples to computers, because it is something that hits close to me.

Buy a home computer in November 1995, you spend $2,000, you get this capability; spend the same amount today, and you get dramatically more capability. As I understand it, the current Consumer Price Index cannot take that into account. In other words, you can't take - the more you are getting for your money with certain products cannot be reflected in, in the index; is that right?

Ms. Abraham. I think that is not quite accurate. We do have procedures in place that are designed to take change in the quality of the items we are producing into account. In some cases, we do make direct adjustments for changes in items' characteristics.

We do that in automobiles, for example. If a new model of car comes out and it has features that the old model didn't have, we value those and adjust that out of the price increase. We make explicit adjustments for item quality in apparel. We also do some adjustments in the housing area.

But even in the components of the index where we don't explicitly adjust for changes in item characteristics and try to value those, we do make efforts to take change in quality out of the price numbers we are reporting. And the basic way that that works is that we are pricing an item and it stops being available, and we start pricing another item. In your example, it is the old computer; and it goes off the market, and we start pricing a new computer.

It is slightly more complicated. But, in essence, what we do is say, well, if there is a difference at that point in time between the price of the new item and the price of the old item, we assume that that is reflecting the difference in their characteristics, their value to consumers. And we subtract that out. There is quite a lot that gets subtracted out of the raw price change that we pick up in that way.

Representative Thornberry. But if there is no price change -

Ms. Abraham. If it really were the case that at the point in time when the old model were going off the market, that there was no price

difference between the old model and the new model, we wouldn't make an adjustment.

My point isn't that what we do is perfect; it is that we do make substantial effort and actually remove quite a lot of price change that we would otherwise be measuring in the application of our quality adjustment techniques.

I think it is clear that it would be better to expand the set of items for which we are directly taking item characteristics into account. And part of the budget proposal that we currently have pending before the Congress for our fiscal year 1988 budget would be the resources to let us expand what we are doing in that regard.

Representative Thornberry. So your plans now are to in January 1988 have an updated market basket -

Ms. Abraham. January 1998, yes.

Representative Thornberry. I am sorry, 1998.

Do you have specific plans to have other changes to the CPI other than this experimental index that you are looking at, but probably won't adopt across the board?

Ms. Abraham. We are looking at that; we shall make a decision about that by the end of this year and make whatever changes we decide upon - most likely, at this point, I would say, in January of 1999.

In addition to that, we are planning to make changes in the way that we bring new items into the sample. Historically, we have always brought new items into the sample on a city-by-city basis. So 20 percent of the cities get updated samples each year. We are shifting to a different way of doing that, that will allow us, among other things, to focus on components of the index where we think there is a lot of change, either in what people are buying or where they are buying it. And we shall be able to bring in new items on those cases on a more frequent schedule, and that may have some impact on the index.

As part of the budget proposal we have pending before the Congress, we also have requested resources to, as I said, do more of this, explicitly taking into account changes in the quality, the characteristics of items and the value of those characteristics to consumers. And also to make

more targeted efforts to ensure that new goods that show up in the market get into the index more quickly.

So that is the set of things that we have planned, unless I have inadvertently left something out.

Mr. Dalton. Superlative index.

Ms. Abraham. The one thing I might add, we also are working on producing, as an alternative to the CPI, a set of measures that would be on a strengthened statistical footing that would come out once a year with a lag and that would take the substitution bias at the upper level into account in a way we can't in the monthly index.

Representative Saxton. Dr. Abraham, as you know, this subject of the CPI has been hotly debated and may continue to be hotly debated for quite some time. There is a fair amount of concern that we have accurate data, there is also a fair amount of concern that the government programs that accurate - or inaccurate data affects, has not only an effect on our budgetary situation and our fiscal situation, but also on people that Members of Congress represent.

Let me just ask, have the Office of Management and Budget or the White House offices been in contact with BLS personnel in connection with the CPI issue and the budget?

Ms. Abraham. Yes. We have been in contact with a great many people both in the executive branch and on the Hill.

Representative Saxton. Can you tell us which White House offices have been involved and what issues have been discussed?

Ms. Abraham. I have had conversations with various people, most particularly people on the Council of Economic Advisers. I, together with Ken Dalton, John Greenlees and others have gone over and given a number of briefings for the CEA, but including a whole lot of other people on the whole range of issues regarding the Consumer Price Index -

Representative Saxton. Commissioner -

Ms. Abraham. - substitution bias, quality, new goods bias.

Representative Saxton. Obviously, some of this material may have been given in written form?

Ms. Abraham. Sir, I have briefing materials.

Representative Saxton. I wonder if we could request that whatever briefing materials were used, or written materials used, be provided to the Committee for Members of both sides of the aisle.

[Information in response to Chairman Saxton's request appears in the Submissions for the Record]

Ms. Abraham. Certainly.

Representative Saxton. We would appreciate that. And if you could -

Ms. Abraham. Many of these materials, I suspect you have seen before, since, in terms of the briefings that we went and gave, the materials that we used were essentially the same materials as were used in our -

Representative Saxton. Sure.

Ms. Abraham. - press briefing and so on.

Representative Saxton. Well, there are many differences of opinion on Capitol Hill and at the White House about this issue. I think it is important for us to avail ourselves to whatever statistical or other information you may have. So if you would provide that to us, I would be most appreciative.

Before we wrap up, if I may just change the subject one more time, one of the functions that this Committee does is to try to evaluate statistical information and government policy from one quarter of the government or another to determine what, if any, effect they have on economic growth, or the lack thereof, or on the performance generally of our economy. Those of us who have studied these issues over time note that we had a sustained period of economic growth in the 1980s, and that one of the major policy changes in the 1980s had to do with tax rates making it possible for businesses to expand for economic growth to take place, for wages to go up - and a fairly successful period of economic growth. So there are a whole group of folks around Capitol Hill who believe the tax policy has a lot to do with economic performance.

Now, I know it is not your job to evaluate in a less than objective way these kinds of policy notions that we deal with, but there is another

policy notion that I would like to discuss this morning from a statistical point of view with you. In the 1990s, we have had another, thankfully, sustained period of economic growth and quite the opposite tax policy that we had in the 1980s. And, therefore, we have been searching for answers or reasons as to why we might have experienced this economic growth. And, lo and behold, we have hit upon yet another theory which is closely related perhaps to tax policy - but certainly not tax policy; it has to do with Federal Reserve policy.

We began this period of economic growth in 1991; in fact it was the last quarter of 1991 when we came out of the recession. And statistics show that inflation, or the CPI, was during the late 1980s increasing at rates above 4 percent.

And, strangely, in 1991 when the period of economic expansion started, the rate of inflation dropped to 3.1 percent. In 1992, the average for the year was 2.9 percent. In 1993, 2.7 percent. In 1994, 2.7 percent, and in 1995, 2.5 percent.

Lo and behold, in 1996 we had an annual average of 3.3 percent which says to us that somebody, some agency or some government function, must have had some effect on inflation in the 1990s. I expect it had something to do with Federal Reserve policy.

Now, first of all, would you confirm that the figures that I recited are in fact accurate figures with regard to changes in consumer prices during those years?

Ms. Abraham. Ken, were you tracking those against the printout?

Mr. Dalton. Yes, I was. Those were accurate. Just to be sure, I will read them real quickly: 3.1, 2.9, 2.7, 2.7, 2.5, 3.3.

Representative Saxton. We got it right.

Mr. Dalton. Okay. Good.

Representative Saxton. Now, if that is in fact true, then the Fed, seemingly through their efforts to provide a period of price stability, have created an opportunity or a series of events that have encouraged certain types of economic activity to take place. And that has provided for economic growth through all these years.

Now, I know that you don't like, or it is not your job to comment on whether or not Fed policy in fact, as we have begun to interpret it, has caused this type of economic growth to take place. But I would be interested in any comments that you have in this regard, whether they are related to the statistics that I recited or whether you want to venture into the area of commenting on Fed policy or inflation or anything that might shed light on these issues for the benefit of policymakers here on Capitol Hill and specifically, of course, on the Committee.

Ms. Abraham. Thank you for the offer. I think I will decline.

Representative Saxton. Well, I appreciate that. And I suspected that you might. But I just think that it is extremely important that when we talk about price stability and the CPI, that all of the Members, and I know they do – and incidentally I have been joined by Mrs. Maloney.

Thank you for being here. We welcome you, and we will get to you in just a moment. But this is an extremely important set of circumstances for us to evaluate and understand, because government has the responsibility of understanding what it does, or doesn't do, that has an effect on the economy.

And you know, I told Alan Greenspan a month or so ago, how pleased we were that they had taken the necessary steps, and since, during the decade of the 1990s literally have squeezed inflation out of our economy. And that is certainly something that is, I believe, quite notable that has happened. And it is at least a good coincidence that we have seen economic growth during this period of time when inflation has been relatively absent from the scene. And, I suspect, we will find that as history marches forward and we look back, we shall in fact find that the Fed policy did have a lot to do with the fact that we have finally gotten to a 25-year low in unemployment figures this month.

And so even if we do have some differences over the current Fed policy, we can certainly agree that these circumstances have, at the very minimum, happened together.

Mrs. Maloney, welcome aboard, we were about to finish up, but please take whatever few minutes you need to ask your questions or make your comments.

OPENING STATEMENT OF REPRESENTATIVE CAROLYN B. MALONEY

Representative Maloney. Okay. Thank you very much, Mr. Chairman.

And welcome, Madam Commissioner. I was delayed this morning; I just testified at a hearing on campaign finance reform. It is indeed a pleasure to be with you now.

In contrast with the skeptics, I am pleased to say that the 4.9 percent unemployment rate was the lowest since 1973 and with virtually no inflation. It looks like Mr. Greenspan's so called preemptive strike was unnecessary. We should not be afraid to celebrate good news in the economy. And I certainly would hope that Mr. Greenspan would join us.

The so-called euphoria over the budget deal should not preempt a serious discussion on the issues of the CPI. Right here in this Committee, Members from both sides of the aisle have begun this process. Versions of the CPI are used to measure inflation that affects America. The CPI is used to adjust the benefits of over 40 million Social Security recipients as well as the benefits of millions of other pensioners in government and private plans. It is also used to determine the cost-of-living adjustments and worker wage agreements.

Finally, the Internal Revenue Code requires that the personal exemption, the standard deduction, the minimum and maximum dollar amounts of each tax bracket, among other provisions, all be indexed to the CPI.

During fiscal year 1994, 31 cents of every Federal dollar spent, or 460 billion; and 44 cents of every dollar in tax revenue collected, or 550 billion, were indexed to the CPI.

The recent flurry of interest in the CPI started on January 10th, 1995, when Federal Reserve Chairman Alan Greenspan told a joint meeting of the House and Senate Budget Committees that he thought that CPI exaggerates annual inflation anywhere from 0.5 to 1.5 percentage points.

At first, many people saw an opportunity to raise revenue for the Federal Government by lowering the cost-of-living adjustment to the millions of Americans on government pension plans.

In December of 1996, the Senate Finance Committee issued the final report of an advisory committee it had directed to study the Consumer Price Index. The commission became known as the Boskin Commission after its distinguished chairman Michael Boskin.

Let me say something about the views of the four of the highly qualified and distinguished members of the commission. Their 1995 estimates of the government, of the CPI, were reported to be 1 percent or more, with Professor Robert Gordon being the highest at 1.7 percent. That high estimate would turn the March 1997 reported 0.1 percent inflation rate into a report of falling prices. A lot of consumers shopping in the real world would find that very hard to believe.

But many experts did not share these views. For example, Professor Charles Holton at the University of Maryland informed my staff yesterday that the errors in the CPI have not been estimated with enough accuracy to justify an arbitrary adjustment in the CPI. Professor Holton says that there are a number of elements in the CPI that might understate inflation as well as elements that might overstate inflation.

He suggested that we should leave this adjustment totally to the Bureau of Labor Statistics. I couldn't agree more. I have a resolution before Congress, a bipartisan one with John Fox and Phil English and my Democratic colleague, Joe Kennedy, which calls upon the Bureau of Labor Statistics alone to make any adjustments in the CPI, if any are needed, and to use the methodology used to determine the Consumer Price Index. And we argue that the Consumer Price Index is useful only if it is technical and not a political measurement.

There has been a lot of agreement. I would say now – at one point it looked like there was a lot of support for the Boskin Commission and for the idea of a commission. I would say that certainly Congressman Gephardt and leaders on both the Republican and Democratic sides support the Bureau of Labor Statistics making any adjustment, if an adjustment is needed.

I understand that there has been an allocation for you to hire more staff and to take steps to move forward in a more expansive way. I would like you to comment on that. And I would like to ask you, will there be a need for any legislative authority for you to make any adjustments in the CPI, if any you declare are needed?

[The prepared statement of Representative Carolyn Maloney appears in the Submissions for the Record]

Ms. Abraham. Okay. We have currently pending before the Congress a request for funds beginning in fiscal year 1998 to take a number of steps to improve the Consumer Price Index; in addition to things we already had in the works, that would give us funding to do more to explicitly take account of changes in the quality of items and also to more aggressively ensure that new goods that come on the market find their way into the index more quickly.

At the time that we were putting together this budget proposal, we sat down and thought through all of the things that we felt we knew how to do at that point in time to improve the index; and we requested funds to do all of those things. This is in addition to things that we had previously had in the works.

We are looking at changes in the formula for constructing the subindexes to address the substitution bias problem. We are planning to update the market basket weights in January of 1998. We are making changes in the way we bring new items into the index, again to ensure representativeness of our sample. Those things already planned, plus the things that we asked for funding for, represent, I would say, everything we know how to do to improve the index.

Having said that, there are a variety of issues that have been raised concerning the index that I don't think we or anyone else at this point knows how to address and that are going to constitute a long-term research agenda for us and, I hope, for the economics profession.

Representative Maloney. The Chairman informs me that while I was testifying on campaign finance, he asked a series of questions on the CPI, and I don't want to repeat in that area. I would like to submit a

series of questions on the CPI for the record and ask another question very briefly on wage differential.

[Letter from Representative Maloney to Commissioner Abraham and Commissioner Abraham's response appear in the Submissions for the Record.]

Representative Maloney. Roughly 2 weeks ago we celebrated Pay Inequity Day where it was reported that women are being paid 71 cents to the dollar, and that it takes a woman in the same job to work 3 months and 11 days to be paid the same as a man in a comparable position. I have a series of questions on the wage gap between men and women. Again, I will submit them to you in writing so that - the Chairman informs me that he would like to conclude this hearing.

But specifically I, I want to know that, if you have changed the way that you figure out the wage differential? At one point there was a huge change, specifically women were at one point at 50 cents to the dollar. Then, over a long period of time, it moved to 60 cents. And then there was a huge jump into the 70 cents to the dollar. And I would like to know historically if you changed any way that you figure out the differential.

Was there a change in the way that you figured out the differential that forced this huge change in the gap differences? And I really would like more questions focused on that area; I am interested in how you come up with those numbers, and I would like to understand it in greater detail.

But the Chairman has informed me that he needs to conclude this hearing. I will present my questions to you in writing.

Ms. Abraham. Okay.

Representative Maloney. And it was good to hear your good news today.

Representative Saxton. Thank you, Mrs. Maloney.

Ms. Abraham. Thank you.

Representative Saxton. Thank you for also indicating that, as others here believe, including yours truly, that perhaps the Fed

preemptive strike against inflation was unwarranted; and I know that we have chatted about that at some length.

So, Dr. Abraham, I want to again express our appreciation for your being here. I believe it was two months ago that we requested, and you agreed to provide, a BLS report on the Consumer Price Index. We're looking forward to receiving that, and thank you again for being here. The hearing is adjourned.

Thank you.

Ms. Abraham. Thank you.

[Whereupon, at 10:40 a.m., the committee was adjourned.]

SUBMISSIONS FOR THE RECORD

PREPARED STATEMENT OF REPRESENTATIVE JIM SAXTON, CHAIRMAN

As always, it is a pleasure to welcome Commissioner Abraham before the Joint Economic Committee.

Once again, Commissioner Abraham brings good news. According to the household survey, 209,000 jobs were added in April, and the unemployment rate fell to 4.9 percent. Employment growth as measured by the payroll survey was softer than expected, posting an increase of 142,000 jobs. This business cycle expansion continues to produce output and employment gains with no evidence of a significant slowdown in the near future. Unfortunately, the recent release of data on middle class earnings continue to show stagnation through the first quarter of 1997.

As I pointed out last week, another benefit of this sustained expansion has been the marked improvement in the budget situation. The strong economy has produced strong revenue growth, and this is pushing the projected 1997 deficit down far below official projections. It now appears possible that the 1997 deficit may even fall below $70 billion.

The sustained business cycle upswing has brought a solid economic situation with strong output and employment growth, and a rapidly improving near term budget outlook. Moreover, the low inflation climate produced by the Federal Reserve's disinflation policy demonstrates that price stability is an important foundation for sustained economic growth. The experience over the last two decades shows that low inflation leads to job growth and low unemployment, just as the late 1970s proved that high and accelerating inflation can lead to high employment.

The strong employment and economic growth in the last two quarters is a very positive development. Moreover, there is no real evidence of accelerating inflation in price index measures, commodity

prices, or the value of the dollar. While the Federal Reserve has done a very good job keeping inflation low, I have voiced concerns in recent months that it may be tending to view the current economic strength as potentially inflationary.

Though there is agreement that price stability should be the ultimate objective, our research here at the JEC suggests that price stability should be implemented using inflation targets based on broad price indexes. In the absence of inflation shown in these indexes or forward looking inflation measures, I do not believe that strong economic growth is itself inflationary, or is a justification for increases in interest rates by the Federal Reserve. The tame data on the employment cost index and average hourly earnings released by BLS this week, lend further support to this view.

JOINT ECONOMIC COMMITTEE

CONGRESS OF THE UNITED STATES
Jim Saxton, Chairman

PRESS RELEASE

For Immediate Release
April 1, 1997

Press Release #105-34
Contact:.Mary Hewitt
(202) 224-5171

ADMINISTRATION DELAYED PROGRESS ON CPI IMPROVEMENTS

WASHINGTON, D.C. -- Joint Economic Committee (JEC) Chairman Jim Saxton (R-NJ) released a letter today indicating that the Administration blocked a Bureau of Labor Statistics (BLS) budget request for the Consumer Price Index (CPI) revision in 1993.

In recent months the CPI and the BLS have been at the center of intense political controversy because of the seemingly slow progress in updating several components of the CPI. The delays have added support for the view that BLS had been dilatory in making any CPI improvements, though several have been underway for some time.

This letter submitted by the BLS Commissioner provides the missing clue as to why CPI improvements have been delayed. "It wasn't because of BLS fumbling, but rather because the White House had dropped the ball and blocked the agency's budget request for a CPI revision," Saxton stated. "It's unfortunate that the Administration permitted the BLS to be criticized for delays that were not its fault. Now the Administration wants the Congress to correct its delay," he concluded.

The letter to Saxton from the BLS Commissioner Katharine Abraham comes as a response to his questions at a JEC hearing last month about whether funding issues had played any role in delaying CPI improvements. The Commissioner's letter shows that the Clinton Administration delayed the 1993 BLS budget requests for improvements in the CPI, although it relented a year later.

Though dropped from the President's budget proposal submitted in 1993, as luck would have it the BLS request was mistakenly printed on page 802 of the Appendix to the budget. Apparently the BLS request had been carried over from the previous budget proposal of the outgoing Bush Administration.

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JOINT ECONOMIC COMMITTEE

CONGRESS OF THE UNITED STATES
Jim Saxton, Chairman

PRESS RELEASE

For Immediate Release

April 15, 1997

Press Release #105-39
Contact: Mary Hewitt
(202) 224-5171

TAME CPI SHOULD DETER FEDERAL RESERVE INCREASE IN INTEREST RATES

WASHINGTON, D.C.--Today's release of the Consumer Price Index (CPI) showed only a 0.1 percent increase in March, while the core rate, which excludes food and energy, advanced only 0.2 percent. **Joint Economic Committee (JEC) Chairman Jim Saxton (R-NJ)** cited the CPI release as further evidence that inflation remains in check, and another reason that Federal Reserve policy should not lead to significantly higher interest rates.

"As I pointed out to Chairman Greenspan at the March 20th JEC hearing, there is no significant evidence of inflation to justify a change in monetary policy. The goal of price stability should remain the centerpiece of Fed policy," Saxton stated. "In the absence of inflation signals reflected in the CPI, commodity markets, the value of the dollar, or bond market, Federal Reserve hikes in interest rates are not warranted," he continued.

As Chairman of the JEC, Saxton has released a series of studies on the Federal Reserve and monetary policy authored by a JEC economist formerly with the Federal Reserve for 14 years. These studies suggest that Federal Reserve policy should be guided by targeting inflation as defined by projected changes in the consumer price or similar index.

Saxton also chaired the March 20th JEC hearing in which Chairman Greenspan was widely viewed as telegraphing changes in policy at an imminent Federal Open Market Committee (FOMC) meeting. The studies and the hearing both underscored the importance of openness at the Federal Reserve, and the danger of unnecessary uncertainties about the direction of monetary policy.

"The recent interest rate increase by the Federal Reserve has introduced much uncertainty about the basis and future conduct of monetary policy," Saxton noted. "Chairman Greenspan should act quickly to publicly dispel this uncertainty by clearly stating the objective of monetary policy and how it will be implemented," Saxton concluded.

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JOINT ECONOMIC COMMITTEE BRIEF
JIM SAXTON, VICE-CHAIRMAN
INSIDE MAIL

1537 Longworth House Office Building, Washington, DC 20515 Phone: 202-226-3234 Fax: 202-226-3950 Internet Home Page: www.house.gov/jec/

December 1996

The Consumer Price Index and Public Policy

On December 4, 1996 a commission of five economists headed by former Bush Administration Council of Economic Advisers (CEA) chairman Michael Boskin issued its report on the Consumer Price Index (CPI) to the Senate Finance Committee. The report, *Toward a More Accurate Measure of the Cost of Living,* suggests that the current CPI may overstate inflation by between 0.8 to 1.6 percentage points annually. The commission concluded that the most reasonable point estimate of this overstatement is 1.1 percentage points per year.

This conclusion will spark a controversy because the CPI is used to inflation index social security, military retirement, and several other entitlement programs. Less often noted is its use to index parts of the income tax including tax brackets, personal exemptions, and the standard deduction. Over time, the cumulative budget effects of a significant reduction in CPI increases would amount to hundreds of billions of dollars in spending restraint, higher tax revenues from primarily middle class taxpayers, and lower deficits, relative to baseline projections. For example, according to the commission's report, over a ten year period (1997-2006), well over $600 billion would be shaved from deficits by reducing CPI increases by 1.1 percentage points annually.

The commission's report suggests implementing legislation to adjust the CPI in order to realize the associated savings and revenues increases. The available analysis indicates that tax increases would comprise about 40 percent of the direct budget effects, while entitlement savings would comprise about 60 percent of these direct effects. For example, for every $100 billion of legislated budget changes, roughly $40 billion would be tax increases, and about $60 billion would be entitlement savings. Further outlay reductions would result from debt service savings. Policy makers will have to evaluate whether this ratio of tax increases to entitlement savings is optimal. This paper will take no position on this policy question, but only is intended to provide some background on some of the key issues.

The CPI and Measurement Issues

Although there is some agreement among economists that the CPI probably overstates inflation to some degree, there is great disagreement over the extent of this overstatement. Attempts to produce precise estimates of this overstatement involve resolution of many thorny issues inherent in any price index of this type. The difficulties are large enough that the Boskin commission's interim report estimated an upward statistical bias of 0.7-2.0 percentage points, a very large range in which the upper bound is nearly three times as large as the lower bound.

Most of the problems related to the CPI were identified by the Stigler committee several decades ago, and by the Bureau of Labor Statistics (BLS) since. The Stigler committee, headed by George Stigler (later named a Nobel Laureate), reported its findings in hearings held by the Joint Economic Committee (JEC) in 1961. Though BLS has addressed some of these issues, others remain.

The Stigler committee identified several sources of problems common to price indexes including "frequency of revision of the Weight Bases" --referring to updating the market basket of goods and services -- quality changes, treatment of new products, treatment of consumer durables, and other issues. BLS has examined these and other issues over the years, and the Boskin commission also addressed them.

The technical issues related to the CPI are extremely complicated. The CPI is produced by classifying 207 strata of consumption items in 44 geographical areas, resulting in 9,108 components in the CPI. Aside from the sheer size of the CPI, the methodology also can be a source of problems. The CPI is an index composed of a fixed weight market basket of goods and services. Thus the substitution of lower priced goods for higher priced goods produces a *substitution effect.* When the price of one product rises, consumers tend to substitute like products to avoid the price increases. Even when sharply higher prices force substitution to avoid price increases, the CPI methodology assumes that consumer spending on each item is an unchanged proportion of the index over time, and thus price increases tend to be overstated. Likewise, when the price of one good drops, more of it may be purchased, but this increase is not reflected in changing weights in the CPI. Every ten years or so the CPI is reweighted with a more current reflection of relative consumption patterns. The problematic effects of substitution effects in a fixed weight index have been well recognized for many years.

Another issue results from the fact that the same product can be purchased from discount outlets. The proliferation of retail outlets such as the "Price Club" over the last ten years means that a larger proportion of some products are purchased on a discount basis, though often associated with a loss of service. This is called the *outlet substitution effect.*

One of the most difficult issues, the extent to which *quality* improvements account for price increases, appears impossible to resolve with precision. Exactly how much more productive is an item of computer software or hardware now relative to price changes occurring over several years? What is the increased value supplied by medical technology such as the latest MRIs and noninvasive surgical procedures relative to their prices and those of more primitive technology and procedures? Another problem area regards the introduction of entirely new products. How should a product's output and price be evaluated that may not have even existed several years before? Various statistical techniques can be used to try to resolve such

questions, but precise answers often cannot be obtained.

Conclusion

The Boskin commission has produced a serious report that merits serious examination. Careful consideration of CPI revision is needed because if it is excessive, it would have an important impact on social security and other retirement programs. It could also result in sizable tax increases on middle class taxpayers. Because the implications of the report are so significant, the report should be closely examined by other experts in the field. If a consensus develops that the CPI is not useful as an inflation adjustment index, perhaps some other index should be considered, as recommended by the Boskin commission. Some of the ideas contained in the recommendations of the Boskin commission have been under consideration or development by BLS for some time.

Christopher Frenze
Chief Economist to the Vice Chairman

JOINT ECONOMIC COMMITTEE BRIEF
JIM SAXTON, CHAIRMAN

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March 1997

THE CONSUMER PRICE INDEX AND TAX POLICY

Last December, a panel of five economists, headed by Michael Boskin, Chairman of the Council of Economic Advisers (CEA) during the Bush Administration, released its report on the Consumer Price Index (CPI). The Boskin Commission report, *Toward a More Accurate Measure of the Cost of Living*, analyzes technical issues regarding the CPI and makes recommendations intended to lead to a more accurate measure of changes in the cost of living. This report also calls for legislative action to adjust indexing provisions.

The Commission found that the current CPI may overstate annual change in the cost of living from 0.8 to 1.6 percentage points. The Commission also concluded that the most plausible point estimate of this overstatement is 1.1 percentage points per year. Although there is considerable agreement among economists that the CPI probably overstates price inflation to some degree, there is great uncertainty over the extent of this overstatement.

The Commission's report has proved controversial because a variety of Federal entitlement programs, including Social Security and military retirement, are indexed using the CPI. This paper will focus on how a reduction in annual CPI adjustments would affect the Federal income tax. A previous Joint Economic Committee (JEC) report[1] found that income tax increases, falling primarily on middle class taxpayers, would comprise about 40 percent of the direct budget effects of a CPI revision. This paper takes no position on the policy issues related to adjusting the CPI.

THE CPI AND THE FEDERAL INCOME TAX

Under the provisions of the Economic Recovery Tax Act (ERTA) of 1981, certain features of the individual income tax were indexed to the CPI starting in 1985. These features include the personal exemption, standard deduction, and tax bracket boundaries. The effect of indexing is to expose a smaller proportion of income to taxation and to tax a portion of income at lower as opposed to higher tax rates. Conversely, a legislated cutback in annual tax indexing means that a higher proportion of personal income would be taxable, and some of it would be taxable at higher tax rates. Over time, the cumulative effects of curtailing tax indexing are very significant.

[1]See JEC report, *The Consumer Price Index and Public Policy*, December 1996.

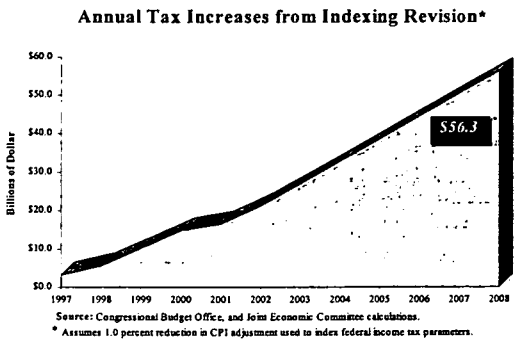


Figure 2

According to the available estimates, a 1.1 percentage point reduction in tax indexing would lead to a tax increase of about $322 billion over the next 12 years. Though the tax increases in the early years are not very large, the cumulative effects of de-indexing mount rapidly after the turn of the century. By 2008, the final year projected in the Boskin Commission report, the annual tax increase grows to about $56 billion. Thus, a reduction in tax indexing would lead to a maj or structural change in revenues in relation to other components of the budget. Figure 1 displays the amount of annual tax increases over the next 12 fiscal years.

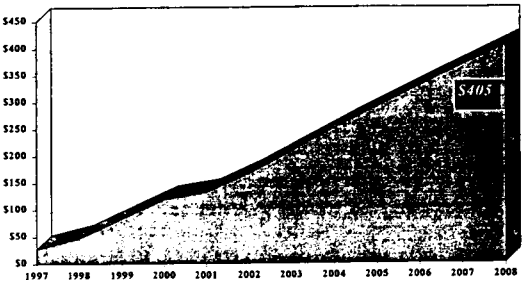
Any attempt to calculate the effects of this proposal on individual taxpayers is very difficult because of the different tax situations of taxpayers. The number of personal exemptions, use or non-use of the standard deduction, and the proximity of taxable income to tax bracket thresholds are some of the variables involved. Nonetheless, the aggregate revenue numbers can be used conservatively to estimate the average tax increase per taxpayer resulting from reducing the CPI adjustment. By dividing the annual aggregate tax increase by the number of tax returns, the average impact per taxpayer can be approximated.

The projected number of individual tax returns for the next decade by tax year is available from the Internal Revenue Service. Use of tax filer data for this purpose is a conservative approach to determining the average tax increase per taxpayer because more than 15 percent of tax filers do not actually incur income tax liability. However, the erosion of tax indexing would force many low income filers currently without tax liability to become subject to the income tax.

The data show the significant effects caused by the erosion of tax indexing. By the year 2003, the average tax increase per taxpayer would total $208 annually. By the last year of the Boskin Commission projection, 2008, the average tax increase per taxpayer would amount to $405 annually. Over the entire 12-year period, the average tax increase would amount to about $2,424. Figure 2 displays the cumulative effects of this proposal.

WILL A CPI REVISION FUEL MORE SPENDING?

Average Tax Increase per Taxpayer



Source: Joint Economic Committee calculations.

Figure 3

Up until now, the conventional assumption has been that the tax increases and benefit savings from a CPI revision would be devoted to deficit reduction. However, this assumption is open to question as there is no assurance these resources could not be rededicated to spending increases in discretionary programs or certain entitlement programs. If history is any guide, the revenue from this tax increase will likely stimulate more spending, not deficit reduction. According to a 1991 JEC study, the Federal government has spent $1.59 for every dollar of tax increases during most of the post-World War period[2]. If this pattern were repeated with the tax increases resulting from a CPI revision, not only would the entire tax increase be expended, but the additional increase in Federal spending would erase much of the entitlement savings as well.

CONCLUSION

A legislated reduction in the CPI adjustment to the Federal income tax would result in large and growing annual tax increases within several years. By the end of the period reviewed by the Boskin Commission, these tax increases would average more than $400 per family each year. These tax increases would fall primarily on middle class taxpayers. Moreover, the conventional assumption that these tax increases would necessarily result in deficit reduction rather than additional spending cannot be substantiated.

Christopher Frenze
Executive Director
Joint Economic Committee

[2]Richard Vedder, Lowell Gallaway, and Chris Frenze, *Taxes and Deficits: New Evidence ("The $1.59 Study")*, Joint Economic Committee, 1991.

PREPARED STATEMENT OF COMMISSIONER ABRAHAM

Mr. Chairman and Members of the Committee:

I appreciate this opportunity to comment on the labor market data released this morning.

Unemployment declined in April, and nonfarm payroll employment rose. The unemployment rate dropped by three-tenths of a percentage point to 4.9 percent; over the prior 10 months, the rate had remained in a narrow range from 5.2 to 5.4 percent. Payroll employment increased by 142,000 in April, about the same as in March (as revised), but well below the growth realized in January and February. Unfavorable weather during the survey reference periods dampened construction hiring in both March and April.

In April, employment in the services industry increased by 93,000. There were relatively large over-the-month gains in health services, Social services, and engineering and management services. Job growth in computer and data processing services continued at its steady pace. In all these industries, employment has been on an upward trend for many years. Partly offsetting these increases in April was a decline in amusement and recreation services. Help supply services showed virtually no change in employment in April. Although this industry has been a major contributor to job growth during the six years of the current economic expansion, gains since last August have been both more modest and more sporadic.

In April, each of the major components of finance, insurance, and real estate added jobs, and employment also continued to rise in transportation and communications. In retail trade, a gain in eating and drinking places was partly offset by a decline in general merchandise stores.

In manufacturing, employment declined by 14,000 over the month, reflecting, in part, a strike in auto manufacturing and some temporary shutdowns for inventory control in that industry. From September to March, factories had added 75,000 jobs. In April, growth continued in industrial machinery, fabricated metals, and aircraft. Also, overall manufacturing hours rose to match its post-World-War-II high level, at

42.2 hours, and overtime edged up to 5.0 hours, its highest level since the series began in 1956.

In April, construction employment declined for the second month in a row. Following a large gain in February, employment in the industry has decreased by 69,000 over the past two months, on a seasonally adjusted basis. Bad weather across much of the country during the March and April survey reference periods probably delayed some of the normal hiring that we would have otherwise expected to see during those months.

Average hourly earnings edged down by a penny in April. This followed increases totaling 11 cents over the first quarter of the year. Although the month-to month movements in this data series remain quite volatile, the over-the-year gains for recent months clearly have been running higher than during the early part of 1996.

The 4.9 percent unemployment rate in April was the lowest since 1973. The number of unemployed persons declined to 6.7 million. All the major demographic groups contributed to the decline in the overall jobless rate, and the unemployment rates for both whites and blacks and for adult women were down significantly. Unemployment decreased among those who had been looking for work for less than 14 weeks and among those who had lost jobs to which they did expect to be recalled. Although a great deal of attention will undoubtedly will be paid to the drop in the jobless rate, I would caution, as always, against reading too much into any one month's data.

Total employment, as measured by our household survey, was essentially unchanged in April. The proportion of the population with jobs (the employment-population ratio), however, remained at a record level of 63.8 percent.

In summary, unemployment fell in April, and payroll employment rose modestly. The employment-to-population ratio, manufacturing hours and manufacturing overtime all remained at historically high levels.

My colleagues and I now world be glad to respond to your questions.

News United States Department of Labor

Bureau of Labor Statistics Washington, D.C. 20212

Internet address: http://stats.bls.gov:80/newsrels.htm
Technical information: USDL 97-148
Household data: (202) 606-6378

Establishment data: 606-6555
Media contact: 606-5902

Transmission of material in this release is embargoed until 8:30 A.M. (EDT), Friday, May 2, 1997.

THE EMPLOYMENT SITUATION: APRIL 1997

Unemployment declined in April, and nonfarm payroll employment rose modestly, the Bureau of Labor Statistics of the U.S. Department of Labor reported today. The nation's jobless rate fell from 5.2 to 4.9 percent. The number of payroll jobs rose by 142,000 in April, and average hourly earnings edged down by 1 cent.

Chart 1. Unemployment rate, seasonally adjusted, May 1994 - April 1997

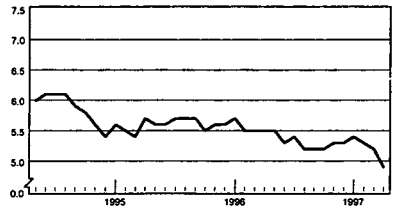
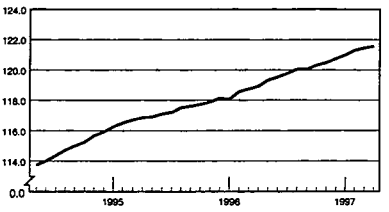


Chart 2. Nonfarm payroll employment, seasonally adjusted, May 1994 - April 1997



Unemployment (Household Survey Data)

The number of unemployed persons declined by 430,000 to 6.7 million, and the unemployment rate fell by 0.3 percentage point to 4.9 percent in April, after seasonal adjustment. All of the major demographic groups contributed to the improvement. The jobless rate for adult women decreased by 0.3 point to 4.4 percent, the rate for blacks fell by 0.9 point to 9.8 percent, and the rate for whites dropped by 0.3 point to 4.2 percent. (See tables A-1 and A-2.)

Among the unemployed, the number of persons in the newly jobless category—those who had been looking for work fewer than 5 weeks—declined in April, as did the number who had been looking for work for 5 to 14 weeks. The number of unemployed persons who had lost their job and did not expect to be recalled also decreased over the month. (See tables A-5 and A-6.)

Table A. Major indicators of labor market activity, seasonally adjusted
(Numbers in thousands)

Category	Quarterly averages		Monthly data			Mar.-Apr. change
	1996	1997[1]	1997[1]			
	IV	I	Feb.	Mar.	Apr.	
HOUSEHOLD DATA	Labor force status					
Civilian labor force	134,830	135,934	135,634	136,319	136,098	-221
Employment	127,705	128,728	128,430	129,175	129,384	209
Unemployment	7,124	7,206	7,205	7,144	6,714	-430
Not in labor force	66,627	66,462	66,754	66,194	66,577	383
	Unemployment rates					
All workers	5.3	5.3	5.3	5.2	4.9	-0.3
Adult men	4.4	4.5	4.4	4.4	4.2	-.2
Adult women	4.8	4.7	4.7	4.7	4.4	-.3
Teenagers	16.6	17.0	17.5	16.4	15.4	-1.0
White	4.6	4.5	4.5	4.5	4.2	-.3
Black	10.6	10.9	11.3	10.7	9.8	-.9
Hispanic origin	8.0	8.3	8.1	8.6	8.1	-.5
ESTABLISHMENT DATA	Employment					
Nonfarm employment	120,509	p121,238	121,296	p121,435	p121,577	p142
Goods-producing[2]	24,320	p24,469	24,508	p24,499	p24,442	p-57
Construction	5,492	p5,596	5,639	p5,614	p5,570	p-44
Manufacturing	18,262	p18,304	18,299	p18,316	p18,302	p-14
Service-producing[2]	96,189	p96,769	96,788	p96,936	p97,135	p199
Retail trade	21,864	p21,952	21,940	p21,993	p22,025	p32
Services	34,785	p35,096	35,101	p35,173	p35,266	p93
Government	19,510	p19,557	19,577	p19,550	p19,582	p32
	Hours of work[3]					
Total private	34.6	p34.7	34.9	p34.9	p34.6	p-0.3
Manufacturing	41.8	p41.9	41.9	p42.1	p42.2	p.1
Overtime	4.5	p4.8	4.7	p4.9	p5.0	p.1
	Earnings[3]					
Average hourly earnings, total private	$11.98	p$12.10	$12.10	p$12.15	p$12.14	p-$0.01
Average weekly earnings, total private	414.00	p419.48	422.29	p424.04	p420.04	p-4.00

[1] Beginning in January 1997, household data reflect revised population controls used in the survey.
[2] Includes other industries, not shown separately.
[3] Data relate to private production or nonsupervisory workers.
p=preliminary.

Total Employment and the Labor Force (Household Survey Data)

Total employment was about unchanged in April, following a substantial gain in March. The proportion of the population with jobs (the employment-population ratio) remained at 63.8 percent, the highest level since the series began. (See table A-1.)

Approximately 7.9 million persons (not seasonally adjusted) held more than one job in April, comprising 6.1 percent of all employed persons. (See table A-9.)

Both the civilian labor force, 136.1 million persons (seasonally adjusted), and the labor force participation rate, 67.2 percent, were essentially unchanged in April. The labor force has shown substantial growth since the beginning of last year. (See table A-1.)

Persons Not in the Labor Force (Household Survey Data)

About 1.5 million persons (not seasonally adjusted) were marginally attached to the labor force in April—that is, they wanted and were available for work, and had looked for jobs sometime in the prior 12 months. The number of discouraged workers—a subset of the marginally attached who were not currently looking for jobs specifically because they believed no jobs were available for them or there were none for which they would qualify—was 379,000 in April. (See table A-9.)

Industry Payroll Employment (Establishment Survey Data)

Total nonfarm payroll employment rose by 142,000 in April to 121.6 million, after seasonal adjustment. Job gains in many of the service-producing industries were offset somewhat by declines in construction and manufacturing. (See table B-1.)

The services industry added 93,000 jobs in April, in line with the average monthly change for the past year. Health services and engineering and management services recorded strong increases of 34,000 and 29,000, respectively. Social services had a relatively large job gain for the second month in a row. In contrast, business services added only 19,000 jobs, as continued expansion in computer and data processing employment was partly offset by a small decline in help supply services. Job growth in help supply services has been both slow and sporadic since August. Employment in amusement and recreation services declined in April, reflecting, in part, slow seasonal hiring due to unusually cold weather during the survey reference period.

In April, job growth continued in finance and real estate; insurance also posted a gain. Strong job growth continued in transportation and communications for the fourth consecutive month. Retail trade added 32,000 jobs in April, somewhat below the average monthly gain of the past year. An employment increase of 46,000 in eating and drinking places offset a loss of similar magnitude in March. Employment in general merchandise stores declined in April, following a large increase in the prior month. Employment in wholesale trade was unchanged in April after 2 months of growth.

Government employment rose by 32,000 in April. The noneducation component of local government increased by 19,000, following 2 months without growth. Federal employment, which was unchanged over the month, has declined by 275,000 since the most recent peak in May 1992.

Construction employment fell by 44,000 in April (after seasonal adjustment); it had declined by 25,000 in March. Unfavorable weather in both months contributed to this weakness. In contrast, the industry had a substantial employment gain in February, when the weather was much warmer than normal.

Manufacturing employment declined by 14,000 in April, following a gain of 75,000 over the prior 6 months. Motor vehicles and equipment lost 13,000 jobs in April, mostly due to temporary shutdowns for inventory control and a strike of 3,500 workers. Employment growth continued in industrial machinery, fabricated metals, and aircraft; gains in these three industries totaled 14,000 over the month and 102,000 over the past year.

Weekly Hours (Establishment Survey Data)

The average workweek for production or nonsupervisory workers on private nonfarm payrolls fell by 0.3 hour in April, to 34.6 hours, seasonally adjusted. The manufacturing workweek edged up by 0.1 hour to 42.2 hours, matching its post-World War II high reached in January 1995. Factory overtime edged up to 5.0 hours, the highest level since the series began in 1956. (See table B-2.)

Reflecting the decline in the average workweek, the index of aggregate weekly hours of private production or nonsupervisory workers on nonfarm payrolls dropped by 0.8 percent to 139.6 (1982=100) in April, on a seasonally adjusted basis. The manufacturing index, in contrast, edged up by 0.2 percent to 107.6. (See table B-5.)

Hourly and Weekly Earnings (Establishment Survey Data)

Average hourly earnings of private production or nonsupervisory workers edged down 1 cent in April to $12.14, seasonally adjusted, following gains totaling 11 cents in the first quarter. Average weekly earnings were down 0.9 percent to $420.04 in April. Over the past year, average hourly earnings have increased by 3.6 percent and average weekly earnings by 4.5 percent. (See table B-3.)

The Employment Situation for May 1997 is scheduled to be released on Friday, June 6, at 8:30 A.M. (EDT).

Revisions in the Establishment Survey Data

The Employment Situation news release of May data in June will introduce revisions in the establishment-based series on nonfarm payroll employment, hours, and earnings to reflect the regular annual benchmark adjustments for March 1996 and updated seasonal adjustment factors.

This year's benchmark process affects all unadjusted series from April 1995 forward. In addition, the unadjusted data from January 1988 forward for selected series in the transportation and public utilities division will be revised to reflect industry coding changes for a group of employers within the airline and trucking industries. These recomputations will have a slight effect on higher level aggregate series, including total nonfarm employment.

All seasonally adjusted series will be revised from January 1988 forward to incorporate an updated version of the X-12 ARIMA seasonal adjustment software. Seasonal adjustment factors for March through October 1997 will be available on May 30, 1 week prior to the release of the May estimates, on the Internet (http://stats.bls.gov:80/ceshome.htm) or by calling (202) 606-6555.

Explanatory Note

This news release presents statistics from two major surveys, the Current Population Survey (household survey) and the Current Employment Statistics survey (establishment survey). The household survey provides the information on the labor force, employment, and unemployment that appears in the A tables, marked HOUSEHOLD DATA. It is a sample survey of about 50,000 households conducted by the Bureau of the Census for the Bureau of Labor Statistics (BLS).

The establishment survey provides the information on the employment, hours, and earnings of workers on nonfarm payrolls that appears in the B tables, marked ESTABLISHMENT DATA. This information is collected from payroll records by BLS in cooperation with State agencies. In June 1996, the sample included about 390,000 establishments employing over 47 million people.

For both surveys, the data for a given month relate to a particular week or pay period. In the household survey, the reference week is generally the calendar week that contains the 12th day of the month. In the establishment survey, the reference period is the pay period including the 12th, which may or may not correspond directly to the calendar week.

Coverage, definitions, and differences between surveys

Household survey. The sample is selected to reflect the entire civilian noninstitutional population. Based on responses to a series of questions on work and job search activities, each person 16 years and over in a sample household is classified as employed, unemployed, or not in the labor force.

People are classified as *employed* if they did any work at all as paid employees during the reference week; worked in their own business, profession, or on their own farm; or worked without pay at least 15 hours in a family business or farm. People are also counted as employed if they were temporarily absent from their jobs because of illness, bad weather, vacation, labor-management disputes, or personal reasons.

People are classified as *unemployed* if they meet all of the following criteria: They had no employment during the reference week; they were available for work at that time; and they made specific efforts to find employment sometime during the 4-week period ending with the reference week. Persons laid off from a job and expecting recall need not be looking for work to be counted as unemployed. The unemployment data derived from the household survey in no way depend upon the eligibility for or receipt of unemployment insurance benefits.

The *civilian labor force* is the sum of employed and unemployed persons. Those not classified as employed or unemployed are *not in the labor force*. The *unemployment rate* is the number unemployed as a percent of the labor force. The *labor force participation rate* is the labor force as a percent of the population, and the *employment-population ratio* is the employed as a percent of the population.

Establishment survey. The sample establishments are drawn from private nonfarm businesses such as factories, offices, and stores, as well as Federal, State, and local government entities. *Employees on nonfarm payrolls* are those who received pay for any part of the reference pay period, including persons on paid leave. Persons are counted in each job they hold. *Hours and earnings* data are for private businesses and relate only to production workers in the goods-producing sector and nonsupervisory workers in the service-producing sector.

Differences in employment estimates. The numerous conceptual and methodological differences between the household and establishment surveys result in important distinctions in the employment estimates derived from the surveys. Among these are:

- The household survey includes agricultural workers, the self-employed, unpaid family workers, and private household workers among the employed. These groups are excluded from the establishment survey.
- The household survey includes people on unpaid leave among the employed. The establishment survey does not.
- The household survey is limited to workers 16 years of age and older. The establishment survey is not limited by age.
- The household survey has no duplication of individuals, because individuals are counted only once, even if they hold more than one job. In the establishment survey, employees working at more than one job and thus appearing on more than one payroll would be counted separately for each appearance.

Other differences between the two surveys are described in "Comparing Employment Estimates from Household and Payroll Surveys," which may be obtained from BLS upon request.

Seasonal adjustment

Over the course of a year, the size of the nation's labor force and the levels of employment and unemployment undergo sharp fluctuations due to such seasonal events as changes in weather, reduced or expanded production, harvests, major holidays, and the opening and closing of schools. The effect of such seasonal variation can be very large; seasonal fluctuations may account for as much as 95 percent of the month-to-month changes in unemployment.

Because these seasonal events follow a more or less regular pattern each year, their influence on statistical trends can be eliminated by adjusting the statistics from month to month. These adjustments make nonseasonal developments, such as declines in economic activity or increases in the participation of women in the labor force, easier to spot. For example, the large number of youth entering the labor force each June is likely to obscure any other changes that have taken place relative to May, making it difficult to determine if the level of economic activity has risen or declined. However, because the effect of students finishing school in previous years is known, the statistics for the current year can be adjusted to allow for a comparable change. Insofar as the seasonal adjustment is made correctly, the adjusted figure provides a more useful tool with which to analyze changes in economic activity.

In both the household and establishment surveys, most seasonally adjusted series are independently adjusted. However, the adjusted series for many major estimates, such as total payroll employment, employment in most major industry divisions, total employment, and unemployment are computed by aggregating independently adjusted component series. For example, total unemployment is derived by summing the adjusted series for four major age-sex components; this

differs from the unemployment estimate that would be obtained by directly adjusting the total or by combining the duration, reasons, or more detailed age categories.

The numerical factors used to make the seasonal adjustments are recalculated twice a year. For the household survey, the factors are calculated for the January-June period and again for the July-December period. For the establishment survey, updated factors for seasonal adjustment are calculated for the May-October period and introduced along with new benchmarks, and again for the November-April period. In both surveys, revisions to historical data are made once a year.

Reliability of the estimates

Statistics based on the household and establishment surveys are subject to both sampling and nonsampling error. When a sample rather than the entire population is surveyed, there is a chance that the sample estimates may differ from the "true" population values they represent. The exact difference, or *sampling error*, varies depending on the particular sample selected, and this variability is measured by the standard error of the estimate. There is about a 90-percent chance, or level of confidence, that an estimate based on a sample will differ by no more than 1.6 standard errors from the "true" population value because of sampling error. BLS analyses are generally conducted at the 90-percent level of confidence.

For example, the confidence interval for the monthly change in total employment from the household survey is on the order of plus or minus 376,000. Suppose the estimate of total employment increases by 100,000 from one month to the next. The 90-percent confidence interval on the monthly change would range from -276,000 to 476,000 (100,000 +/- 376,000). These figures do not mean that the sample results are off by these magnitudes, but rather that there is about a 90-percent chance that the "true" over-the-month change lies within this interval. Since this range includes values of less than zero, we could not say with confidence that employment had, in fact, increased. If, however, the reported employment rise was half a million, then all of the values within the 90-percent confidence interval would be greater than zero. In this case, it is likely (at least a 90-percent chance) that an employment rise had, in fact, occurred. The 90-percent confidence interval for the monthly change in unemployment is +/- 258,000, and for the monthly change in the unemployment rate it is +/- .21 percentage point.

In general, estimates involving many individuals or establishments have lower standard errors (relative to the size of the estimate) than estimates which are based on a small number of observations. The precision of estimates is also improved when the data are cumulated over time such as for quarterly and annual averages. The seasonal adjustment process can also improve the stability of the monthly estimates.

The household and establishment surveys are also affected by *nonsampling error*. Nonsampling errors can occur for many reasons, including the failure to sample a segment of the population, inability to obtain information for all respondents in the sample, inability or unwillingness of respondents to provide correct information on a timely basis, mistakes made by respondents, and errors made in the collection or processing of the data.

For example, in the establishment survey, estimates for the most recent 2 months are based on substantially incomplete returns; for this reason, these estimates are labeled preliminary in the tables. It is only after two successive revisions to a monthly estimate, when nearly all sample reports have been received, that the estimate is considered final.

Another major source of nonsampling error in the establishment survey is the inability to capture, on a timely basis, employment generated by new firms. To correct for this systematic underestimation of employment growth (and other sources of error), a process known as bias adjustment is included in the survey's estimating procedures, whereby a specified number of jobs is added to the monthly sample-based change. The size of the monthly bias adjustment is based largely on past relationships between the sample-based estimates of employment and the total counts of employment described below.

The sample-based estimates from the establishment survey are adjusted once a year (on a lagged basis) to universe counts of payroll employment obtained from administrative records of the unemployment insurance program. The difference between the March sample-based employment estimates and the March universe counts is known as a benchmark revision, and serves as a rough proxy for total survey error. The new benchmarks also incorporate changes in the classification of industries. Over the past decade, the benchmark revision for total nonfarm employment has averaged 0.2 percent, ranging from zero to 0.6 percent.

Additional statistics and other information

More comprehensive statistics are contained in *Employment and Earnings*, published each month by BLS. It is available for $13.00 per issue or $35.00 per year from the U.S. Government Printing Office, Washington, DC 20402. All orders must be prepaid by sending a check or money order payable to the Superintendent of Documents, or by charging to Mastercard or Visa.

Employment and Earnings also provides measures of sampling error for the household survey data published in this release. For unemployment and other labor force categories, these measures appear in tables 1-B through 1-H of its "Explanatory Notes." Measures of the reliability of the data drawn from the establishment survey and the actual amounts of revision due to benchmark adjustments are provided in tables 2-B through 2-G of that publication.

Information in this release will be made available to sensory impaired individuals upon request. Voice phone: 202-606-STAT; TDD phone: 202-606-5897; TDD message referral phone: 1-800-326-2577.

Table A-1. Employment status of the civilian population by sex and age

(Numbers in thousands)

Employment status, sex, and age	Not seasonally adjusted			Seasonally adjusted[1]					
	Apr. 1996	Mar. 1997	Apr. 1997	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997	Apr. 1997
TOTAL									
Civilian noninstitutional population	200,101	202,513	202,674	200,101	201,636	202,285	202,388	202,513	202,674
Civilian labor force	132,512	135,524	135,180	133,427	135,022	135,848	135,634	136,319	136,098
Participation rate	66.2	66.9	66.7	66.7	67.0	67.2	67.0	67.3	67.2
Employed	125,388	128,125	128,629	126,125	127,855	128,580	128,430	129,175	129,384
Employment-population ratio	62.7	63.3	63.5	63.0	63.4	63.6	63.5	63.8	63.8
Agriculture	3,344	3,168	3,425	3,412	3,426	3,468	3,292	3,388	3,497
Nonagricultural industries	122,044	124,959	125,205	122,713	124,429	125,112	125,138	125,789	125,887
Unemployed	7,124	7,399	6,551	7,302	7,167	7,268	7,205	7,144	6,714
Unemployment rate	5.4	5.5	4.8	5.5	5.3	5.4	5.3	5.2	4.9
Not in labor force	67,589	66,989	67,494	66,674	66,614	66,437	66,754	66,194	66,577
Men, 16 years and over									
Civilian noninstitutional population	95,955	97,386	97,474	95,955	96,742	97,264	97,320	97,386	97,474
Civilian labor force	71,450	72,731	72,755	71,922	72,414	73,106	72,987	73,268	73,232
Participation rate	74.5	74.7	74.6	75.0	74.9	75.2	75.0	75.2	75.1
Employed	67,415	68,573	69,105	67,932	68,707	69,184	69,232	69,478	69,627
Employment-population ratio	70.3	70.4	70.9	70.8	71.0	71.1	71.1	71.3	71.4
Unemployed	4,036	4,158	3,650	3,990	3,707	3,942	3,755	3,790	3,604
Unemployment rate	5.6	5.7	5.0	5.5	5.1	5.4	5.1	5.2	4.9
Men, 20 years and over									
Civilian noninstitutional population	88,440	89,604	89,680	88,440	89,040	89,448	89,556	89,604	89,680
Civilian labor force	67,624	68,937	68,933	67,829	68,369	68,998	68,827	69,111	69,147
Participation rate	76.5	76.9	76.9	76.7	76.8	77.1	76.9	77.1	77.1
Employed	64,296	65,502	65,956	64,573	65,367	65,813	65,818	66,066	66,243
Employment-population ratio	72.7	73.1	73.5	73.0	73.4	73.6	73.5	73.7	73.9
Agriculture	2,283	2,244	2,396	2,310	2,356	2,364	2,276	2,362	2,428
Nonagricultural industries	62,014	63,257	63,560	62,263	63,011	63,449	63,542	63,703	63,815
Unemployed	3,328	3,435	2,976	3,256	3,002	3,185	3,009	3,045	2,904
Unemployment rate	4.9	5.0	4.3	4.8	4.4	4.6	4.4	4.4	4.2
Women, 16 years and over									
Civilian noninstitutional population	104,146	105,127	105,200	104,146	104,894	105,022	105,068	105,127	105,200
Civilian labor force	61,062	62,794	62,425	61,505	62,608	62,742	62,647	63,051	62,866
Participation rate	58.6	59.7	59.3	59.1	59.7	59.7	59.6	60.0	59.8
Employed	57,973	59,552	59,525	58,193	59,148	59,416	59,197	59,697	59,756
Employment-population ratio	55.7	56.6	56.6	55.9	56.4	56.6	56.3	56.8	56.8
Unemployed	3,089	3,241	2,901	3,312	3,460	3,327	3,450	3,354	3,109
Unemployment rate	5.1	5.2	4.6	5.4	5.5	5.3	5.5	5.3	4.9
Women, 20 years and over									
Civilian noninstitutional population	96,856	97,638	97,685	96,856	97,457	97,520	97,571	97,638	97,685
Civilian labor force	57,636	59,160	58,794	57,817	58,728	58,894	58,743	59,130	58,974
Participation rate	59.5	60.6	60.2	59.7	60.3	60.4	60.2	60.6	60.4
Employed	55,081	56,442	56,388	55,075	55,871	56,165	55,954	56,359	56,392
Employment-population ratio	56.9	57.8	57.7	56.9	57.3	57.6	57.3	57.7	57.7
Agriculture	834	710	775	842	772	797	775	739	779
Nonagricultural industries	54,247	55,732	55,613	54,233	55,099	55,369	55,179	55,620	55,613
Unemployed	2,555	2,718	2,406	2,742	2,857	2,729	2,788	2,771	2,581
Unemployment rate	4.4	4.6	4.1	4.7	4.9	4.6	4.7	4.7	4.4
Both sexes, 16 to 19 years									
Civilian noninstitutional population	14,805	15,271	15,309	14,805	15,139	15,318	15,261	15,271	15,309
Civilian labor force	7,252	7,428	7,453	7,781	7,925	7,956	8,065	8,078	7,977
Participation rate	49.0	48.6	48.7	52.6	52.3	51.9	52.8	52.9	52.1
Employed	6,011	6,182	6,285	6,477	6,617	6,601	6,657	6,750	6,748
Employment-population ratio	40.6	40.5	41.1	43.7	43.7	43.1	43.6	44.2	44.1
Agriculture	227	212	253	280	298	307	240	285	290
Nonagricultural industries	5,784	5,970	6,031	6,217	6,319	6,294	6,417	6,465	6,458
Unemployed	1,241	1,246	1,169	1,304	1,308	1,354	1,408	1,328	1,229
Unemployment rate	17.1	16.8	15.7	16.8	16.5	17.0	17.5	16.4	15.4

[1] The population figures are not adjusted for seasonal variation; therefore, identical numbers appear in the unadjusted and seasonally adjusted columns.

NOTE: Beginning in January 1997, data reflect revised population controls used in the household survey.

HOUSEHOLD DATA

Table A-2. Employment status of the civilian population by race, sex, age, and Hispanic origin

(Numbers in thousands)

Employment status, race, sex, age, and Hispanic origin	Not seasonally adjusted			Seasonally adjusted[1]					
	Apr. 1996	Mar. 1997	Apr. 1997	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997	Apr. 1997
WHITE									
Civilian noninstitutional population	167,973	169,569	169,675	167,973	169,044	169,436	169,492	169,569	169,675
Civilian labor force	111,965	114,135	113,867	112,720	113,991	114,377	114,333	114,736	114,618
Participation rate	66.7	67.3	67.1	67.1	67.4	67.5	67.5	67.7	67.6
Employed	106,724	108,745	109,177	107,364	108,734	109,151	109,197	109,630	109,831
Employment-population ratio	63.5	64.1	64.3	63.9	64.3	64.4	64.4	64.7	64.7
Unemployed	5,241	5,389	4,690	5,356	5,257	5,226	5,136	5,106	4,786
Unemployment rate	4.7	4.7	4.1	4.8	4.6	4.6	4.5	4.5	4.2
Men, 20 years and over									
Civilian labor force	58,003	59,000	58,983	58,193	58,623	59,042	58,968	59,161	59,196
Participation rate	77.0	77.5	77.4	77.3	77.4	77.7	77.5	77.7	77.7
Employed	55,499	56,411	56,772	55,755	56,356	56,653	56,632	56,923	57,057
Employment-population ratio	73.7	74.1	74.5	74.0	74.4	74.5	74.5	74.8	74.9
Unemployed	2,504	2,589	2,212	2,428	2,267	2,388	2,275	2,238	2,139
Unemployment rate	4.3	4.4	3.7	4.2	3.9	4.0	3.9	3.8	3.6
Women, 20 years and over									
Civilian labor force	47,821	48,852	48,526	47,977	48,686	48,631	48,619	48,832	48,662
Participation rate	59.1	60.1	59.6	59.3	59.9	59.8	59.8	60.0	59.8
Employed	45,983	46,962	46,902	45,984	48,614	46,750	46,747	46,915	46,902
Employment-population ratio	56.8	57.7	57.6	56.8	57.3	57.5	57.5	57.7	57.6
Unemployed	1,838	1,891	1,624	1,993	2,072	1,881	1,872	1,917	1,759
Unemployment rate	3.8	3.9	3.3	4.2	4.3	3.9	3.9	3.9	3.6
Both sexes, 16 to 19 years									
Civilian labor force	6,141	6,282	6,357	6,550	6,682	6,704	6,746	6,742	6,750
Participation rate	52.4	51.8	52.4	55.9	55.6	55.3	55.6	55.6	55.7
Employed	5,242	5,373	5,503	5,815	5,764	5,747	5,758	5,792	5,872
Employment-population ratio	44.7	44.3	45.4	47.9	48.0	47.4	47.5	47.7	48.4
Unemployed	899	910	854	935	918	957	988	951	888
Unemployment rate	14.6	14.5	13.4	14.3	13.7	14.3	14.6	14.1	13.1
Men	15.8	16.0	14.7	15.3	14.8	14.9	14.6	15.0	14.3
Women	13.4	12.8	12.1	13.1	12.6	13.6	14.7	13.1	11.9
BLACK									
Civilian noninstitutional population	23,519	23,895	23,923	23,519	23,794	23,847	23,872	23,895	23,923
Civilian labor force	14,900	15,325	15,265	15,004	15,305	15,372	15,408	15,439	15,365
Participation rate	63.4	64.1	63.8	63.8	64.3	64.5	64.5	64.6	64.2
Employed	13,368	13,677	13,801	13,432	13,693	13,709	13,672	13,784	13,863
Employment-population ratio	56.8	57.2	57.7	57.1	57.5	57.5	57.3	57.7	57.9
Unemployed	1,532	1,649	1,463	1,572	1,613	1,663	1,736	1,655	1,503
Unemployment rate	10.3	10.8	9.6	10.5	10.5	10.8	11.3	10.7	9.8
Men, 20 years and over									
Civilian labor force	6,716	6,812	6,796	6,724	6,833	6,829	6,765	6,803	6,805
Participation rate	71.5	71.7	71.3	71.6	72.0	71.8	71.0	71.6	71.4
Employed	6,067	6,149	6,221	6,081	6,235	6,198	6,159	6,173	6,234
Employment-population ratio	64.6	64.7	65.3	64.8	65.7	65.2	64.7	65.0	65.4
Unemployed	648	663	575	643	598	632	605	629	571
Unemployment rate	9.7	9.7	8.5	9.6	8.8	9.2	9.0	9.3	8.4
Women, 20 years and over									
Civilian labor force	7,308	7,628	7,631	7,319	7,544	7,574	7,636	7,641	7,641
Participation rate	61.9	63.7	63.7	62.0	63.3	63.4	63.9	63.9	63.8
Employed	6,707	6,928	6,997	6,708	6,851	6,880	6,851	6,934	6,997
Employment-population ratio	56.8	57.9	58.4	56.8	57.5	57.6	57.3	57.9	58.4
Unemployed	601	700	635	613	693	694	785	706	644
Unemployment rate	8.2	9.2	8.3	8.4	9.2	9.2	10.3	9.2	8.4
Both sexes, 16 to 19 years									
Civilian labor force	877	886	838	961	929	969	1,007	996	920
Participation rate	37.6	36.5	34.7	41.3	38.9	40.4	42.0	41.1	38.1
Employed	594	600	583	645	607	631	662	676	632
Employment-population ratio	25.5	24.8	24.2	27.7	25.4	26.3	27.6	27.9	26.2
Unemployed	283	285	254	316	322	337	346	319	287
Unemployment rate	32.3	32.2	30.4	32.9	34.7	34.8	34.3	32.1	31.2
Men	35.0	43.7	37.4	34.9	38.6	42.7	37.4	41.4	37.3
Women	29.5	22.0	23.4	30.8	31.2	27.5	31.3	23.7	25.3

See footnotes at end of table.

Table A-2. Employment status of the civilian population by race, sex, age, and Hispanic origin — Continued

(Numbers in thousands)

Employment status, race, sex, age, and Hispanic origin	Not seasonally adjusted			Seasonally adjusted[1]					
	Apr. 1996	Mar. 1997	Apr. 1997	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997	Apr. 1997
HISPANIC ORIGIN									
Civilian noninstitutional population	19,080	20,119	20,180	19,080	19,505	20,013	20,067	20,119	20,180
Civilian labor force	12,417	13,620	13,427	12,552	13,150	13,795	13,640	13,662	13,572
Participation rate	65.1	67.7	66.5	65.8	67.4	68.9	68.0	67.9	67.3
Employed	11,260	12,381	12,358	11,357	12,141	12,653	12,538	12,493	12,470
Employment-population ratio	59.0	61.5	61.2	59.5	62.2	63.2	62.5	62.1	61.8
Unemployed	1,158	1,239	1,069	1,195	1,009	1,142	1,102	1,169	1,102
Unemployment rate	9.3	9.1	8.0	9.5	7.7	8.3	8.1	8.6	8.1

[1] The population figures are not adjusted for seasonal variation; therefore, identical numbers appear in the unadjusted and seasonally adjusted columns.

NOTE: Data for the above race and Hispanic-origin groups will not sum to totals because data for the "other races" group are not presented and Hispanics are included in both the white and black population groups. Beginning in January 1997, data reflect revised population controls used in the household survey.

Table A-3. Selected employment indicators

(In thousands)

Category	Not seasonally adjusted			Seasonally adjusted					
	Apr. 1996	Mar. 1997	Apr. 1997	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997	Apr. 1997
CHARACTERISTIC									
Total employed, 16 years and over	125,388	128,125	128,629	126,125	127,855	128,580	128,430	129,175	129,384
Married men, spouse present	42,152	42,339	42,371	42,127	42,607	42,909	42,513	42,509	42,329
Married women, spouse present	32,123	32,830	32,603	31,983	32,631	32,826	32,578	32,699	32,473
Women who maintain families	7,426	7,812	7,908	7,366	7,500	7,501	7,556	7,720	7,838
OCCUPATION									
Managerial and professional specialty	36,094	37,811	37,565	36,116	37,234	37,478	37,525	37,723	37,599
Technical, sales, and administrative support	37,450	38,044	37,998	37,584	37,902	38,163	38,073	38,158	38,150
Service occupations	17,074	17,275	17,319	17,033	17,271	17,171	17,170	17,292	17,267
Precision production, craft, and repair	13,364	13,887	14,087	13,572	13,574	13,902	14,140	14,200	14,301
Operators, fabricators, and laborers	17,975	17,931	18,183	18,206	18,310	18,317	18,144	18,234	18,415
Farming, forestry, and fishing	3,431	3,177	3,478	3,561	3,496	3,528	3,388	3,507	3,605
CLASS OF WORKER									
Agriculture:									
Wage and salary workers	1,830	1,764	1,965	1,852	1,878	1,988	1,932	1,905	1,989
Self-employed workers	1,466	1,348	1,393	1,502	1,475	1,448	1,353	1,414	1,424
Unpaid family workers	48	55	67	51	66	62	15	59	70
Nonagricultural industries:									
Wage and salary workers	112,936	115,601	115,947	113,577	115,212	115,560	115,987	116,533	116,608
Government	18,564	18,282	18,307	18,307	18,256	18,365	18,144	17,994	18,036
Private industries	94,372	97,319	97,640	95,270	96,946	97,176	97,843	98,539	98,572
Private households	827	875	871	873	934	1,002	882	869	922
Other industries	93,545	96,444	96,769	94,397	96,012	96,174	96,962	97,671	97,650
Self-employed workers	9,008	9,245	9,132	9,045	9,109	9,445	9,124	9,292	9,159
Unpaid family workers	101	113	126	104	149	162	136	108	130
PERSONS AT WORK PART TIME									
All industries:									
Part time for economic reasons	4,299	4,277	4,244	4,466	4,338	4,426	4,262	4,153	4,402
Slack work or business conditions	2,501	2,459	2,419	2,581	2,353	2,423	2,378	2,344	2,491
Could only find part-time work	1,522	1,542	1,571	1,577	1,653	1,552	1,550	1,518	1,629
Part time for noneconomic reasons	18,291	18,918	19,139	17,712	17,868	18,340	18,070	18,120	18,176
Nonagricultural industries:									
Part time for economic reasons	4,081	4,075	4,066	4,251	4,162	4,163	4,093	3,937	4,235
Slack work or business conditions	2,362	2,329	2,279	2,462	2,214	2,310	2,277	2,210	2,374
Could only find part-time work	1,491	1,516	1,547	1,543	1,622	1,512	1,523	1,475	1,603
Part time for noneconomic reasons	17,690	18,338	18,562	17,068	17,237	17,737	17,452	17,565	17,661

NOTE: Persons at work excludes employed persons who were absent from their jobs during the entire reference week for reasons such as vacation, illness, or industrial dispute. Part time for noneconomic reasons excludes persons who usually work full time but worked only 1 to 34 hours during the reference week for reasons such as holidays, illness, and bad weather. Beginning in January 1997, data reflect revised population controls used in the household survey.

Table A-4. Selected unemployment indicators, seasonally adjusted

Category	Number of unemployed persons (in thousands)			Unemployment rates[1]					
	Apr. 1996	Mar. 1997	Apr. 1997	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997	Apr. 1997
CHARACTERISTIC									
Total, 16 years and over	7,302	7,144	6,714	5.5	5.3	5.4	5.3	5.2	4.9
Men, 20 years and over	3,256	3,045	2,904	4.8	4.4	4.6	4.4	4.4	4.2
Women, 20 years and over	2,742	2,771	2,581	4.7	4.9	4.6	4.7	4.7	4.4
Both sexes, 16 to 19 years	1,304	1,328	1,229	16.8	16.5	17.0	17.5	16.4	15.4
Married men, spouse present	1,307	1,218	1,161	3.0	3.0	2.8	2.8	2.8	2.7
Married women, spouse present	1,223	1,096	1,026	3.7	3.7	3.3	3.4	3.2	3.1
Women who maintain families	582	769	637	7.3	8.4	9.1	9.0	9.1	7.5
Full-time workers	5,878	5,736	5,329	5.4	5.2	5.2	5.1	5.1	4.8
Part-time workers	1,448	1,428	1,415	5.9	5.8	5.7	6.0	5.7	5.7
OCCUPATION[2]									
Managerial and professional specialty	859	787	755	2.3	2.4	2.1	2.1	2.0	2.0
Technical, sales, and administrative support	1,750	1,702	1,683	4.4	4.6	4.4	4.3	4.3	4.2
Precision production, craft, and repair	799	732	714	5.6	5.4	5.3	4.7	4.9	4.8
Operators, fabricators, and laborers	1,565	1,616	1,453	7.9	7.6	7.9	8.1	8.1	7.3
Farming, forestry, and fishing	303	279	256	7.8	7.7	7.5	7.5	7.4	6.6
INDUSTRY									
Nonagricultural private wage and salary workers	5,705	5,447	5,221	5.6	5.4	5.4	5.3	5.2	5.0
Goods-producing industries	1,714	1,615	1,578	6.1	5.9	6.0	5.6	5.5	5.4
Mining	26	26	13	4.6	7.6	6.0	4.2	4.0	2.0
Construction	685	674	618	10.3	9.4	10.1	9.0	9.6	8.7
Manufacturing	1,003	915	947	4.8	4.8	4.6	4.5	4.3	4.4
Durable goods	576	467	457	4.7	4.7	4.4	4.0	3.6	3.6
Nondurable goods	427	448	490	5.0	5.0	4.8	5.3	5.2	5.8
Service-producing industries	3,991	3,832	3,643	5.5	5.2	5.2	5.2	5.1	4.9
Transportation and public utilities	299	296	208	4.2	4.0	4.1	4.3	4.1	2.8
Wholesale and retail trade	1,712	1,675	1,658	6.5	6.2	6.4	6.5	6.3	6.2
Finance, insurance, and real estate	181	247	255	2.4	3.1	3.5	3.0	3.2	3.4
Services	1,799	1,614	1,522	5.6	5.2	4.9	5.0	4.8	4.6
Government workers	545	523	438	2.9	3.0	2.9	2.9	2.8	2.4
Agricultural wage and salary workers	228	200	212	11.0	10.3	8.6	8.8	9.5	9.6

[1] Unemployment as a percent of the civilian labor force.
[2] Seasonally adjusted unemployment data for service occupations are not available because the seasonal component, which is small relative to the trend-cycle and irregular components, cannot be separated with sufficient precision.
NOTE: Beginning in January 1997, data reflect revised population controls used in the household survey.

Table A-5. Duration of unemployment

(Numbers in thousands)

Duration	Not seasonally adjusted			Seasonally adjusted					
	Apr. 1996	Mar. 1997	Apr. 1997	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997	Apr. 1997
NUMBER OF UNEMPLOYED									
Less than 5 weeks	2,221	2,313	2,131	2,450	2,671	2,801	2,591	2,650	2,354
5 to 14 weeks	2,133	2,663	1,981	2,330	2,357	2,223	2,382	2,380	2,156
15 weeks and over	2,770	2,423	2,439	2,387	2,179	2,155	2,163	2,064	2,092
15 to 26 weeks	1,343	1,259	1,293	1,098	976	943	1,025	1,001	1,058
27 weeks and over	1,427	1,164	1,147	1,289	1,203	1,212	1,138	1,063	1,034
Average (mean) duration, in weeks	18.9	16.3	16.7	17.3	15.8	16.0	16.0	15.3	15.2
Median duration, in weeks	10.6	9.3	10.2	8.6	7.8	7.7	8.4	7.9	8.3
PERCENT DISTRIBUTION									
Total unemployed	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Less than 5 weeks	31.2	31.3	32.5	34.2	37.1	39.0	36.3	37.4	35.7
5 to 14 weeks	29.9	36.0	30.2	32.5	32.7	31.0	33.4	33.6	32.7
15 weeks and over	38.9	32.7	37.2	33.3	30.2	30.0	30.3	29.1	31.7
15 to 26 weeks	18.8	17.0	19.7	15.3	13.5	13.1	14.4	14.1	16.0
27 weeks and over	20.0	15.7	17.5	18.0	16.7	16.9	15.9	15.0	15.7

NOTE: Beginning in January 1997, data reflect revised population controls used in the household survey.

Table A-6. Reason for unemployment

(Numbers in thousands)

Reason	Not seasonally adjusted			Seasonally adjusted					
	Apr. 1996	Mar. 1997	Apr. 1997	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997	Apr. 1997
NUMBER OF UNEMPLOYED									
Job losers and persons who completed temporary jobs	3,610	3,493	3,050	3,535	3,221	3,245	3,163	3,187	2,979
On temporary layoff	1,094	1,250	988	1,092	987	953	944	1,021	976
Not on temporary layoff	2,517	2,243	2,062	2,443	2,234	2,293	2,218	2,167	2,003
Permanent job losers	1,828	1,560	1,453	(1)	(1)	(1)	(1)	(1)	(1)
Persons who completed temporary jobs	689	683	609	(1)	(1)	(1)	(1)	(1)	(1)
Job leavers	694	808	723	723	845	890	787	784	754
Reentrants	2,291	2,530	2,239	2,487	2,556	2,505	2,648	2,535	2,420
New entrants	530	568	540	567	626	600	647	647	577
PERCENT DISTRIBUTION									
Total unemployed	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Job losers and persons who completed temporary jobs	50.7	47.2	46.6	48.3	44.4	44.8	43.7	44.6	44.3
On temporary layoff	15.4	16.9	15.1	14.9	13.6	13.2	13.0	14.3	14.5
Not on temporary layoff	35.3	30.3	31.5	33.4	30.8	31.7	30.6	30.3	29.8
Job leavers	9.7	10.9	11.0	9.9	11.7	12.3	10.9	11.0	11.2
Reentrants	32.2	34.2	34.2	34.0	35.3	34.6	36.6	35.4	36.0
New entrants	7.4	7.7	8.2	7.8	8.6	8.3	8.9	9.0	8.6
UNEMPLOYED AS A PERCENT OF THE CIVILIAN LABOR FORCE									
Job losers and persons who completed temporary jobs	2.7	2.6	2.3	2.6	2.4	2.4	2.3	2.3	2.2
Job leavers	.5	.6	.5	.5	.6	.7	.6	.6	.6
Reentrants	1.7	1.9	1.7	1.9	1.9	1.8	2.0	1.9	1.8
New entrants	.4	.4	.4	.4	.5	.4	.5	.5	.4

[1] Not available.

NOTE: Beginning in January 1997, data reflect revised population controls used in the household survey.

Table A-7. Range of alternative measures of labor underutilization

(Percent)

Measure	Not seasonally adjusted			Seasonally adjusted					
	Apr. 1996	Mar. 1997	Apr. 1997	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997	Apr. 1997
U-1 Persons unemployed 15 weeks or longer, as a percent of the civilian labor force	2.1	1.8	1.8	1.8	1.8	1.6	1.8	1.5	1.5
U-2 Job losers and persons who completed temporary jobs, as a percent of the civilian labor force	2.7	2.6	2.3	2.6	2.4	2.4	2.3	2.3	2.2
U-3 Total unemployed, as a percent of the civilian labor force (official unemployment rate)	5.4	5.5	4.8	5.5	5.3	5.4	5.3	5.2	4.9
U-4 Total unemployed plus discouraged workers, as a percent of the civilian labor force plus discouraged workers	5.7	5.7	5.1	(1)	(1)	(1)	(1)	(1)	(1)
U-5 Total unemployed, plus discouraged workers, plus all other marginally attached workers, as a percent of the civilian labor force plus all marginally attached workers	6.4	6.5	5.9	(1)	(1)	(1)	(1)	(1)	(1)
U-6 Total unemployed, plus all marginally attached workers, plus total employed part time for economic reasons, as a percent of the civilian labor force plus all marginally attached workers	9.7	9.6	9.0	(1)	(1)	(1)	(1)	(1)	(1)

[1] Not available.

NOTE: This range of alternative measures of labor underutilization replaces the U1-U7 range published in table A-7 of this release prior to 1994. Marginally attached workers are persons who currently are neither working nor looking for work but indicate that they want and are available for a job and have looked for work sometime in the recent past. Discouraged workers, a subset of the marginally attached, have given a job-market related reason for not currently looking for a job. Persons employed part time for economic reasons are those who want and are available for full-time work but have had to settle for a part-time schedule. For further information, see "BLS introduces new range of alternative unemployment measures," in the October 1995 issue of the *Monthly Labor Review*. Beginning in January 1997, data reflect revised population controls used in the household survey.

Table A-8. Unemployed persons by sex and age, seasonally adjusted

Age and sex	Number of unemployed persons (in thousands)			Unemployment rates[1]					
	Apr. 1996	Mar. 1997	Apr. 1997	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997	Apr. 1997
Total, 16 years and over	7,302	7,144	6,714	5.5	5.3	5.4	5.3	5.2	4.9
16 to 24 years	2,533	2,554	2,449	11.9	11.9	12.2	12.0	11.8	11.4
16 to 19 years	1,304	1,328	1,229	16.8	16.5	17.0	17.5	16.4	15.4
16 to 17 years	621	637	618	19.0	19.3	17.7	19.7	19.4	18.5
18 to 19 years	692	697	617	15.3	14.7	16.6	15.2	14.6	13.3
20 to 24 years	1,229	1,226	1,220	9.1	9.1	9.4	8.7	9.0	9.0
25 years and over	4,748	4,591	4,253	4.2	4.1	4.0	4.1	4.0	3.7
25 to 54 years	4,203	4,018	3,750	4.4	4.2	4.2	4.2	4.1	3.8
55 years and over	525	550	487	3.3	3.3	3.1	3.0	3.3	3.0
Men, 16 years and over	3,990	3,790	3,604	5.5	5.1	5.4	5.1	5.2	4.9
16 to 24 years	1,430	1,384	1,331	12.8	12.3	12.9	12.0	12.2	11.8
16 to 19 years	734	745	701	17.9	17.4	18.4	17.9	17.9	17.2
16 to 17 years	357	368	350	21.2	20.6	20.4	19.8	21.4	20.5
18 to 19 years	391	388	362	16.2	15.4	17.1	15.4	15.7	15.2
20 to 24 years	696	640	631	9.8	9.3	9.8	8.6	8.9	8.7
25 years and over	2,551	2,390	2,267	4.2	3.8	4.0	3.9	3.9	3.7
25 to 54 years	2,288	2,058	2,003	4.4	3.9	4.1	4.0	3.9	3.8
55 years and over	273	323	272	3.1	3.4	3.2	3.3	3.5	3.0
Women, 16 years and over	3,312	3,354	3,109	5.4	5.5	5.3	5.5	5.3	4.9
16 to 24 years	1,103	1,170	1,118	11.0	11.4	11.4	11.9	11.3	10.9
16 to 19 years	570	583	528	15.5	15.5	15.5	16.9	14.9	13.6
16 to 17 years	264	269	268	16.7	18.1	14.9	19.7	17.1	16.5
18 to 19 years	301	311	255	14.3	14.0	16.2	15.0	13.3	11.3
20 to 24 years	533	587	589	8.4	8.9	8.9	8.8	9.1	9.3
25 years and over	2,197	2,202	1,986	4.3	4.5	4.1	4.2	4.2	3.8
25 to 54 years	1,915	1,960	1,747	4.3	4.7	4.3	4.5	4.3	3.9
55 years and over	252	227	214	3.6	3.3	2.9	2.6	3.1	3.0

[1] Unemployment as a percent of the civilian labor force.

NOTE: Beginning in January 1997, data reflect revised population controls used in the household survey.

Table A-9. Persons not in the labor force and multiple jobholders by sex, not seasonally adjusted

(Numbers in thousands)

Category	Total		Men		Women	
	Apr. 1996	Apr. 1997	Apr. 1996	Apr. 1997	Apr. 1996	Apr. 1997
NOT IN THE LABOR FORCE						
Total not in the labor force	67,589	67,494	24,504	24,719	43,084	42,775
Persons who currently want a job	5,378	4,836	2,265	2,070	3,113	2,766
Searched for work and available to work now[1]	1,516	1,480	749	700	767	780
Reason not currently looking:						
Discouragement over job prospects[2]	403	379	270	206	133	173
Reasons other than discouragement[3]	1,113	1,101	479	494	634	606
MULTIPLE JOBHOLDERS						
Total multiple jobholders[4]	7,500	7,874	4,117	4,123	3,383	3,751
Percent of total employed	6.0	6.1	6.1	6.0	5.8	6.3
Primary job full time, secondary job part time	4,250	4,445	2,594	2,631	1,655	1,814
Primary and secondary jobs both part time	1,690	1,828	544	559	1,146	1,267
Primary and secondary jobs both full time	241	221	169	162	72	59
Hours vary on primary or secondary job	1,301	1,351	796	762	506	590

[1] Data refer to persons who have searched for work during the prior 12 months and were available to take a job during the reference week.

[2] Includes thinks no work available, could not find work, lacks schooling or training, employer thinks too young or old, and other types of discrimination.

[3] Includes those who did not actively look for work in the prior 4 weeks for such reasons as child-care and transportation problems, as well as a small number for which reason for nonparticipation was not determined.

[4] Includes persons who work part time on their primary job and full time on their secondary job(s), not shown separately.

NOTE: Beginning in January 1997, data reflect revised population controls used in the household survey.

Table B-1. Employees on nonfarm payrolls by industry

(In thousands)

Industry	Not seasonally adjusted				Seasonally adjusted					
	Apr. 1996	Feb. 1997	Mar. 1997P	Apr. 1997P	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997P	Apr. 1997P
Total	118,765	119,717	120,534	121,369	118,922	120,723	120,982	121,296	121,435	121,577
Total private	98,980	99,865	100,566	101,405	99,527	101,199	101,438	101,719	101,885	101,995
Goods-producing	23,968	23,824	23,971	24,192	24,209	24,356	24,399	24,508	24,499	24,442
Mining	567	556	558	564	573	566	568	570	569	570
Metal mining	50.5	51.1	51.3	51.6	51	52	52	52	52	52
Coal mining	100.3	95.9	95.8	96.0	101	97	97	96	96	97
Oil and gas extraction	308.5	307.5	306.4	307.9	314	308	309	312	311	313
Nonmetallic minerals, except fuels	107.2	101.4	104.5	108.2	107	109	110	110	110	108
Construction	5,199	5,087	5,197	5,411	5,353	5,520	5,535	5,639	5,614	5,570
General building contractors	1,188.0	1,185.8	1,195.6	1,220.9	1,227	1,250	1,260	1,271	1,267	1,259
Heavy construction, except building	742.2	650.5	678.9	739.3	765	766	765	784	773	761
Special trade contractors	3,268.4	3,250.6	3,322.2	3,450.7	3,361	3,504	3,510	3,584	3,574	3,550
Manufacturing	18,202	18,181	18,216	18,217	18,283	18,270	18,296	18,299	18,316	18,302
Production workers	12,566	12,546	12,577	12,574	12,624	12,616	12,636	12,642	12,651	12,638
Durable goods	10,639	10,694	10,726	10,740	10,654	10,710	10,734	10,746	10,764	10,761
Production workers	7,288	7,329	7,360	7,369	7,289	7,333	7,355	7,368	7,382	7,379
Lumber and wood products	748.8	760.2	764.3	769.4	761	771	771	775	781	781
Furniture and fixtures	497.3	503.6	504.3	501.6	498	503	503	505	506	502
Stone, clay, and glass products	533.0	518.9	525.5	535.1	534	539	539	540	538	537
Primary metal industries	703.7	702.9	703.0	702.3	704	702	703	703	704	703
Blast furnaces and basic steel products	237.4	233.1	233.0	231.3	238	233	234	234	234	232
Fabricated metal products	1,437.8	1,462.1	1,465.0	1,466.8	1,440	1,462	1,466	1,466	1,467	1,471
Industrial machinery and equipment	2,088.5	2,107.2	2,115.8	2,119.0	2,086	2,092	2,101	2,106	2,111	2,117
Computer and office equipment	356.7	363.8	367.3	368.4	358	361	362	365	369	370
Electronic and other electrical equipment	1,646.4	1,640.7	1,640.1	1,640.0	1,650	1,645	1,642	1,643	1,644	1,645
Electronic components and accessories	613.0	613.9	617.2	620.1	615	611	612	614	618	622
Transportation equipment	1,768.1	1,784.3	1,794.6	1,788.9	1,763	1,776	1,788	1,788	1,796	1,786
Motor vehicles and equipment	961.0	953.2	960.3	950.9	955	953	959	954	961	948
Aircraft and parts	447.9	480.0	482.7	486.3	447	472	476	481	483	487
Instruments and related products	831.2	830.0	829.6	831.2	832	834	832	831	830	832
Miscellaneous manufacturing	384.6	383.6	386.1	385.2	386	386	389	389	387	387
Nondurable goods	7,563	7,487	7,488	7,477	7,629	7,560	7,562	7,553	7,552	7,541
Production workers	5,278	5,217	5,217	5,205	5,335	5,283	5,281	5,274	5,269	5,259
Food and kindred products	1,613.2	1,612.3	1,612.8	1,605.9	1,667	1,649	1,659	1,654	1,658	1,656
Tobacco products	38.9	41.8	40.1	39.4	41	41	40	41	42	42
Textile mill products	636.9	622.8	623.8	622.0	636	628	630	625	626	620
Apparel and other textile products	857.5	809.2	805.3	804.3	858	824	818	814	808	806
Paper and allied products	672.9	669.8	668.7	667.7	677	674	673	674	673	672
Printing and publishing	1,525.1	1,521.9	1,524.1	1,523.8	1,527	1,523	1,523	1,524	1,524	1,527
Chemicals and allied products	1,021.0	1,012.2	1,013.9	1,014.3	1,024	1,016	1,017	1,016	1,017	1,017
Petroleum and coal products	137.8	132.5	132.6	134.2	139	138	136	137	136	135
Rubber and misc. plastics products	962.4	972.1	973.7	973.5	962	973	972	975	975	974
Leather and leather products	97.3	92.3	92.7	92.1	98	94	94	93	93	92
Service-producing	94,797	95,893	96,563	97,177	94,713	96,367	96,583	96,788	96,938	97,135
Transportation and public utilities	6,257	6,332	6,360	6,395	6,294	6,340	6,378	6,403	6,416	6,434
Transportation	3,987	4,050	4,070	4,104	4,015	4,057	4,091	4,108	4,115	4,132
Railroad transportation	232.6	223.8	223.1	224.8	233	229	229	227	225	225
Local and interurban passenger transit	455.1	476.8	480.5	483.1	442	462	465	465	467	471
Trucking and warehousing	1,847.3	1,837.7	1,844.4	1,861.9	1,882	1,852	1,861	1,890	1,892	1,897
Water transportation	170.2	168.2	169.9	174.4	173	172	176	175	176	178
Transportation by air	833.2	877.9	882.9	886.6	837	878	876	883	887	890
Pipelines, except natural gas	13.9	13.7	13.6	13.6	14	14	14	14	14	14
Transportation services	434.2	452.1	455.1	459.2	434	450	450	454	454	459
Communications and public utilities	2,270	2,282	2,290	2,291	2,279	2,283	2,287	2,295	2,301	2,302
Communications	1,373.4	1,404.4	1,411.7	1,416.3	1,378	1,397	1,404	1,412	1,417	1,423
Electric, gas, and sanitary services	896.2	877.7	878.0	874.7	901	886	883	883	884	879
Wholesale trade	6,530	6,631	6,665	6,689	6,550	6,655	6,662	6,690	6,709	6,710
Durable goods	3,838	3,891	3,909	3,921	3,844	3,894	3,897	3,914	3,924	3,926
Nondurable goods	2,692	2,740	2,756	2,768	2,706	2,761	2,765	2,776	2,785	2,784

See footnotes at end of table.

Table B-1. Employees on nonfarm payrolls by industry – Continued

(In thousands)

Industry	Not seasonally adjusted				Seasonally adjusted					
	Apr. 1996	Feb. 1997	Mar. 1997P	Apr. 1997P	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997P	Apr. 1997P
Retail trade	21,170	21,401	21,526	21,753	21,415	21,931	21,922	21,940	21,993	22,025
Building materials and garden supplies	901.9	892.9	918.6	968.6	896	948	942	945	956	964
General merchandise stores	2,573.8	2,657.8	2,681.9	2,657.5	2,675	2,781	2,736	2,747	2,794	2,780
Department stores	2,264.3	2,349.3	2,377.0	2,349.4	2,360	2,454	2,416	2,432	2,483	2,446
Food stores	3,365.2	3,432.9	3,430.8	3,440.1	3,401	3,461	3,469	3,472	3,479	3,480
Automotive dealers and service stations	2,244.3	2,292.5	2,304.5	2,319.4	2,253	2,313	2,315	2,322	2,328	2,328
New and used car dealers	1,022.0	1,044.5	1,047.3	1,049.8	1,024	1,044	1,047	1,050	1,050	1,051
Apparel and accessory stores	1,070.4	1,069.9	1,073.7	1,075.5	1,098	1,102	1,108	1,103	1,106	1,103
Furniture and home furnishings stores	949.2	1,014.4	1,011.3	1,008.9	957	1,016	1,017	1,020	1,021	1,019
Eating and drinking places	7,449.3	7,301.3	7,392.3	7,572.6	7,468	7,558	7,571	7,574	7,539	7,585
Miscellaneous retail establishments	2,616.2	2,739.3	2,712.8	2,710.6	2,667	2,752	2,764	2,757	2,770	2,766
Finance, insurance, and real estate	6,912	7,023	7,056	7,086	6,942	7,052	7,062	7,077	7,095	7,118
Finance	3,294	3,376	3,390	3,400	3,303	3,369	3,379	3,384	3,397	3,410
Depository institutions	2,014.7	2,030.0	2,033.8	2,035.2	2,023	2,035	2,035	2,037	2,041	2,043
Commercial banks	1,459.1	1,478.2	1,481.7	1,483.3	1,467	1,480	1,484	1,484	1,488	1,491
Savings institutions	265.4	253.1	252.4	251.6	265	257	255	255	253	252
Nondepository institutions	505.4	535.9	542.6	546.5	505	533	536	534	541	546
Mortgage bankers and brokers	228.4	243.1	247.3	249.2	(1)	(1)	(1)	(1)	(1)	(1)
Security and commodity brokers	532.4	561.3	563.6	567.2	534	555	560	564	566	570
Holding and other investment offices	241.5	248.3	249.6	251.2	241	246	248	249	249	251
Insurance	2,253	2,260	2,264	2,265	2,256	2,265	2,260	2,264	2,263	2,268
Insurance carriers	1,546.9	1,545.4	1,544.9	1,543.7	1,549	1,551	1,549	1,549	1,544	1,546
Insurance agents, brokers, and service	706.2	714.2	719.3	720.8	707	714	711	715	719	722
Real estate	1,365	1,387	1,402	1,421	1,383	1,418	1,423	1,429	1,435	1,440
Services[2]	34,143	34,654	34,988	35,290	34,117	34,865	35,015	35,101	35,173	35,266
Agricultural services	612.3	633.1	564.8	639.3	606	623	634	638	631	632
Hotels and other lodging places	1,625.1	1,622.7	1,639.9	1,659.7	1,673	1,700	1,711	1,714	1,709	1,708
Personal services	1,237.7	1,264.3	1,256.3	1,256.5	1,179	1,183	1,189	1,195	1,191	1,194
Business services	6,998.9	7,229.9	7,338.6	7,376.3	7,085	7,326	7,389	7,414	7,467	7,486
Services to buildings	895.8	873.9	877.7	883.3	899	885	878	885	883	886
Personnel supply services	2,510.8	2,575.3	2,653.9	2,668.1	2,569	2,690	2,762	2,732	2,755	2,753
Help supply services	2,216.9	2,262.3	2,331.7	2,341.2	2,272	2,379	2,448	2,408	2,427	2,422
Computer and data processing services	1,170.1	1,291.7	1,307.9	1,319.1	1,169	1,262	1,277	1,291	1,307	1,320
Auto repair, services, and parking	1,072.2	1,139.8	1,143.3	1,148.2	1,072	1,128	1,133	1,143	1,144	1,149
Miscellaneous repair services	361.7	363.7	367.2	371.4	363	370	369	369	370	372
Motion pictures	522.0	533.9	537.3	529.6	517	532	536	537	530	526
Amusement and recreation services	1,497.6	1,381.3	1,442.4	1,529.8	1,516	1,559	1,565	1,557	1,556	1,541
Health services	9,500.4	9,694.8	9,726.9	9,754.2	9,520	9,679	9,709	9,721	9,737	9,771
Offices and clinics of medical doctors	1,654.3	1,708.3	1,710.4	1,718.4	1,659	1,697	1,711	1,716	1,716	1,723
Nursing and personal care facilities	1,726.8	1,758.0	1,762.9	1,766.1	1,733	1,760	1,763	1,765	1,767	1,772
Hospitals	3,837.4	3,883.2	3,893.5	3,897.2	3,844	3,880	3,880	3,887	3,895	3,901
Home health care services	654.1	661.9	666.1	671.0	658	665	670	665	667	673
Legal services	922.0	943.3	949.2	952.0	926	943	944	946	953	958
Educational services	2,118.8	2,148.3	2,160.1	2,158.6	1,994	2,021	2,016	2,029	2,031	2,031
Social services	2,397.3	2,431.7	2,452.4	2,465.7	2,389	2,416	2,425	2,431	2,441	2,453
Child day care services	585.1	592.1	598.6	600.9	569	575	580	581	582	584
Residential care	658.2	676.7	682.0	685.4	661	676	678	679	684	688
Museums and botanical and zoological gardens	82.3	79.1	81.2	85.8	84	87	86	87	87	88
Membership organizations	2,125.1	2,130.7	2,141.3	2,143.6	2,137	2,153	2,154	2,153	2,156	2,157
Engineering and management services	2,876.6	2,970.2	2,992.7	3,024.1	2,863	2,952	2,961	2,973	2,976	3,005
Engineering and architectural services	827.7	854.6	861.4	869.9	834	859	861	867	873	877
Management and public relations	891.7	942.4	950.7	964.4	893	942	941	949	952	965
Services, nec	45.4	46.0	46.9	47.7	(3)	(3)	(3)	(3)	(3)	(3)
Government	19,785	19,852	19,968	19,964	19,395	19,524	19,544	19,577	19,550	19,582
Federal	2,767	2,700	2,702	2,702	2,776	2,729	2,725	2,714	2,709	2,709
Federal, except Postal Service	1,914.2	1,848.6	1,851.2	1,852.8	1,919	1,870	1,860	1,860	1,858	1,857
State	4,772	4,748	4,773	4,781	4,643	4,642	4,638	4,648	4,642	4,653
Education	2,095.4	2,088.3	2,108.3	2,111.2	1,956	1,963	1,960	1,970	1,962	1,972
Other State government	2,677.0	2,659.9	2,664.2	2,669.7	2,687	2,679	2,678	2,678	2,680	2,681
Local	12,246	12,404	12,493	12,481	11,976	12,153	12,181	12,215	12,199	12,220
Education	7,034.2	7,165.6	7,228.0	7,195.1	6,682	6,801	6,823	6,857	6,841	6,843
Other local government	5,211.4	5,238.4	5,265.0	5,286.2	5,294	5,352	5,358	5,358	5,358	5,377

[1] This series is not suitable for seasonal adjustment because it has very little seasonal and irregular movement. Thus, the not seasonally adjusted series can be used for analysis of cyclical and long-term trends.

[2] Includes other industries, not shown separately.

[3] This series is not published seasonally adjusted because the seasonal component, which is small relative to the trend-cycle and irregular components, cannot be separated with sufficient precision.

P = preliminary.

Table B-2. Average weekly hours of production or nonsupervisory workers[1] on private nonfarm payrolls by industry

Industry	Not seasonally adjusted				Seasonally adjusted					
	Apr. 1996	Feb. 1997	Mar. 1997p	Apr. 1997p	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997p	Apr. 1997p
Total private	34.1	34.5	34.6	34.4	34.3	34.8	34.2	34.9	34.9	34.6
Goods-producing	40.7	40.7	41.2	41.2	41.0	41.3	40.8	41.3	41.4	41.5
Mining	44.9	45.6	45.5	45.0	45.0	45.7	44.3	46.2	46.1	45.2
Construction	38.6	37.4	38.3	38.7	38.9	38.8	37.8	39.0	38.9	38.9
Manufacturing	41.2	41.6	42.0	41.8	41.5	42.0	41.7	41.9	42.1	42.2
Overtime hours	4.2	4.5	4.7	4.6	4.6	4.6	4.7	4.7	4.9	5.0
Durable goods	42.0	42.5	42.9	42.7	42.4	42.7	42.4	42.8	42.9	43.1
Overtime hours	4.5	4.8	5.1	5.0	4.9	4.9	5.0	5.0	5.3	5.4
Lumber and wood products	40.7	40.2	40.7	41.3	40.8	41.0	40.4	40.8	41.0	41.3
Furniture and fixtures	38.7	38.9	39.9	39.5	39.2	40.2	39.7	39.8	40.3	40.2
Stone, clay, and glass products	43.2	42.0	42.6	42.9	43.4	43.4	42.3	43.5	43.2	43.0
Primary metal industries	43.6	44.6	44.8	44.6	43.9	44.6	44.4	44.7	44.8	45.0
Blast furnaces and basic steel products	44.0	44.5	44.6	44.2	44.1	44.6	44.8	44.6	44.7	44.5
Fabricated metal products	41.8	42.2	42.5	42.5	42.3	42.5	42.1	42.5	42.6	43.1
Industrial machinery and equipment	42.7	43.5	43.8	43.6	43.2	43.2	43.1	43.5	43.5	43.9
Electronic and other electrical equipment	40.7	41.7	42.1	41.9	40.9	41.8	41.1	42.1	42.1	42.4
Transportation equipment	44.1	44.3	44.9	44.6	44.6	44.5	45.0	44.4	45.1	44.7
Motor vehicles and equipment	45.4	45.0	45.8	45.3	46.0	45.1	45.9	45.1	45.9	45.4
Instruments and related products	41.3	42.0	42.2	41.8	41.4	42.1	41.6	42.3	42.0	42.1
Miscellaneous manufacturing	39.4	40.1	40.4	40.2	39.6	40.6	40.0	40.7	40.3	40.5
Nondurable goods	40.0	40.4	40.7	40.6	40.4	41.0	40.6	40.8	41.0	41.0
Overtime hours	3.8	4.0	4.2	4.1	4.2	4.3	4.2	4.3	4.4	4.4
Food and kindred products	40.2	40.7	40.7	40.6	41.1	41.4	41.0	41.3	41.3	41.4
Tobacco products	39.4	39.1	39.1	38.7	40.4	41.6	39.4	41.4	39.7	39.3
Textile mill products	40.1	40.3	41.2	41.3	40.3	41.6	41.1	40.6	41.2	41.5
Apparel and other textile products	36.4	36.8	37.5	37.2	36.5	37.4	37.1	37.1	37.5	37.5
Paper and allied products	42.9	43.3	43.6	43.5	43.4	43.8	43.7	43.7	44.0	43.9
Printing and publishing	37.9	38.1	38.8	38.4	38.1	38.4	38.1	38.5	38.8	38.6
Chemicals and allied products	42.8	43.2	43.2	43.1	42.9	43.6	43.2	43.4	43.2	43.2
Petroleum and coal products	43.4	43.4	42.8	42.9	(2)	(2)	(2)	(2)	(2)	(2)
Rubber and misc. plastics products	41.1	41.5	41.8	41.7	41.4	41.8	41.2	41.6	41.9	42.0
Leather and leather products	37.5	37.8	38.6	38.5	37.6	38.8	38.0	38.8	38.8	38.9
Service-producing	32.4	32.9	32.9	32.7	32.5	33.0	32.4	33.2	33.1	32.8
Transportation and public utilities	39.2	39.8	39.8	39.6	39.4	40.0	39.4	40.1	40.2	39.7
Wholesale trade	38.1	38.5	38.5	38.3	38.1	38.6	38.0	38.8	38.7	38.3
Retail trade	28.4	28.7	28.8	28.6	28.6	28.9	28.7	29.4	29.2	28.9
Finance, insurance, and real estate	35.6	36.7	36.5	35.8	(2)	(2)	(2)	(2)	(2)	(2)
Services	32.2	32.7	32.6	32.4	(2)	(2)	(2)	(2)	(2)	(2)

[1] Data relate to production workers in mining and manufacturing; construction workers in construction; and nonsupervisory workers in transportation and public utilities; wholesale and retail trade; finance, insurance, and real estate; and services. These groups account for approximately four-fifths of the total employees on private nonfarm payrolls.

[2] These series are not published seasonally adjusted because the seasonal component, which is small relative to the trend-cycle and irregular components, cannot be separated with sufficient precision.

p = preliminary.

ESTABLISHMENT DATA

Table B-3. Average hourly and weekly earnings of production or nonsupervisory workers[1] on private nonfarm payrolls by industry

Industry	Average hourly earnings				Average weekly earnings			
	Apr. 1996	Feb. 1997	Mar. 1997p	Apr. 1997p	Apr. 1996	Feb. 1997	Mar. 1997p	Apr. 1997p
Total private	$11.75	$12.14	$12.17	$12.18	$400.68	$418.83	$421.08	$418.99
Seasonally adjusted	11.72	12.10	12.15	12.14	402.00	422.29	424.04	420.04
Goods-producing	13.35	13.66	13.72	13.78	543.35	555.96	565.26	567.74
Mining	15.55	16.05	16.03	16.18	698.20	731.88	729.37	728.10
Construction	15.19	15.65	15.64	15.72	586.33	585.31	599.01	608.36
Manufacturing	12.73	13.02	13.08	13.10	524.48	541.63	549.36	547.58
Durable goods	13.29	13.58	13.64	13.65	558.18	577.15	585.16	582.86
Lumber and wood products	10.33	10.60	10.61	10.64	420.43	426.12	431.83	439.43
Furniture and fixtures	10.06	10.34	10.43	10.42	389.32	402.23	416.16	411.59
Stone, clay, and glass products	12.76	13.04	13.00	13.04	551.23	547.68	553.80	559.42
Primary metal industries	15.00	15.10	15.16	15.17	654.00	673.46	679.17	676.58
Blast furnaces and basic steel products	17.92	17.78	17.87	18.02	788.48	791.21	797.00	796.48
Fabricated metal products	12.43	12.72	12.75	12.80	519.57	536.78	541.88	544.00
Industrial machinery and equipment	13.44	13.89	13.94	13.96	573.89	604.22	610.57	608.66
Electronic and other electrical equipment	12.00	12.41	12.50	12.57	488.40	517.50	526.25	526.68
Transportation equipment	17.27	17.43	17.54	17.55	761.61	772.15	767.55	782.73
Motor vehicles and equipment	17.97	17.96	18.08	18.13	815.84	808.20	828.06	821.29
Instruments and related products	13.03	13.38	13.46	13.45	538.14	561.96	568.01	562.21
Miscellaneous manufacturing	10.35	10.57	10.56	10.56	407.79	423.86	426.62	424.51
Nondurable goods	11.93	12.20	12.26	12.28	477.20	492.88	498.98	498.57
Food and kindred products	11.21	11.34	11.43	11.47	450.64	461.54	465.20	465.68
Tobacco products	20.55	18.79	19.67	20.52	809.67	734.69	769.10	794.12
Textile mill products	9.65	9.89	9.91	9.93	386.97	398.57	408.29	410.11
Apparel and other textile products	7.94	8.18	8.23	8.22	289.02	301.02	308.63	305.78
Paper and allied products	14.61	14.79	14.94	15.01	626.77	640.41	651.38	652.94
Printing and publishing	12.52	12.89	12.99	12.94	474.51	491.11	504.01	496.90
Chemicals and allied products	16.17	16.53	16.48	16.46	692.08	714.10	711.84	709.43
Petroleum and coal products	19.30	20.40	20.48	20.13	837.62	885.36	876.54	863.58
Rubber and misc. plastics products	11.19	11.45	11.50	11.55	459.91	475.18	480.70	481.64
Leather and leather products	8.41	8.92	8.87	8.89	315.38	337.18	342.38	342.27
Service-producing	11.22	11.65	11.67	11.65	363.53	383.29	383.94	380.96
Transportation and public utilities	14.49	14.67	14.68	14.76	568.01	583.87	584.26	584.50
Wholesale trade	12.76	13.23	13.25	13.30	486.16	509.36	510.13	509.39
Retail trade	7.92	8.23	8.26	8.28	224.93	236.20	237.89	236.81
Finance, insurance, and real estate	12.76	13.16	13.22	13.14	454.26	482.97	482.53	470.41
Services	11.72	12.25	12.26	12.22	377.38	400.58	399.68	395.93

[1] See footnote 1, table B-2.

p = preliminary.

Table B-4. Average hourly earnings of production or nonsupervisory workers[1] on private nonfarm payrolls by industry, seasonally adjusted

Industry	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997P	Apr. 1997P	Percent change from: Mar. 1997-Apr. 1997
Total private:							
Current dollars	$11.72	$12.04	$12.05	$12.10	$12.15	$12.14	-0.1
Constant (1982) dollars[2]	7.40	7.46	7.46	7.47	7.50	N.A.	(3)
Goods-producing	13.40	13.69	13.73	13.75	13.79	13.81	.1
Mining	15.44	15.90	16.01	15.95	15.99	16.10	.7
Construction	15.28	15.66	15.72	15.76	15.77	15.84	.4
Manufacturing	12.74	12.99	13.03	13.02	13.08	13.09	.1
Excluding overtime[4]	12.09	12.30	12.34	12.32	12.38	12.35	-.2
Service-producing	11.15	11.50	11.49	11.55	11.61	11.59	-.2
Transportation and public utilities	14.49	14.61	14.75	14.63	14.70	14.75	.3
Wholesale trade	12.71	13.16	13.08	13.20	13.28	13.24	-.3
Retail trade	7.90	8.16	8.18	8.20	8.24	8.26	.2
Finance, insurance, and real estate	12.64	13.01	12.95	13.08	13.15	13.05	-.8
Services	11.65	12.07	12.06	12.15	12.19	12.17	-.2

[1] See footnote 1, table B-2.
[2] The Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) is used to deflate this series.
[3] Change was .4 percent from February 1997 to March 1997, the latest month available.
[4] Derived by assuming that overtime hours are paid at the rate of time and one-half.
N.A. = not available.
P = preliminary.

Table B-5. Indexes of aggregate weekly hours of production or nonsupervisory workers[1] on private nonfarm payrolls by industry

(1982=100)

Industry	Not seasonally adjusted				Seasonally adjusted					
	Apr. 1996	Feb. 1997	Mar. 1997p	Apr. 1997p	Apr. 1996	Dec. 1996	Jan. 1997	Feb. 1997	Mar. 1997p	Apr. 1997p
Total private	133.6	136.1	137.6	138.1	135.2	139.3	137.1	140.7	140.7	139.6
Goods-producing	107.7	106.9	109.0	110.2	110.0	111.6	110.5	112.6	112.7	112.4
Mining	53.7	54.2	54.7	54.7	54.6	55.1	54.0	56.7	56.8	55.7
Construction	140.2	131.3	137.7	146.2	146.8	151.3	147.9	156.3	154.3	152.3
Manufacturing	104.3	105.2	106.5	106.1	105.7	106.8	106.1	106.9	107.4	107.6
Durable goods	106.8	108.6	110.1	109.9	107.7	109.3	108.8	110.0	110.5	110.9
Lumber and wood products	132.2	132.7	135.1	138.2	134.8	137.7	135.6	137.6	139.6	140.6
Furniture and fixtures	119.4	122.2	125.3	123.6	120.8	125.4	124.2	125.1	127.0	126.1
Stone, clay, and glass products	108.2	102.1	105.1	108.1	108.9	110.2	107.4	111.0	109.4	108.7
Primary metal industries	90.5	92.6	93.2	92.8	91.0	92.6	92.2	92.9	93.1	93.6
Blast furnaces and basic steel products	71.8	71.4	71.6	70.8	72.4	72.1	72.8	72.1	72.2	71.5
Fabricated metal products	112.0	115.5	116.5	116.8	113.5	115.9	115.3	116.5	117.0	118.8
Industrial machinery and equipment	102.8	106.1	107.3	106.9	103.6	104.0	104.4	105.8	106.0	107.3
Electronic and other electrical equipment	105.8	107.9	108.9	108.3	106.8	107.9	105.9	108.9	108.9	109.9
Transportation equipment	122.4	123.6	126.6	125.0	122.9	123.9	126.1	124.0	126.7	124.7
Motor vehicles and equipment	167.3	163.2	167.7	163.9	167.4	163.9	167.7	163.5	167.5	163.2
Instruments and related products	72.9	74.0	74.2	73.3	72.9	74.2	73.3	74.5	73.8	73.8
Miscellaneous manufacturing	100.5	102.0	103.2	102.3	101.4	103.9	103.5	105.0	103.5	103.7
Nondurable goods	100.9	100.7	101.6	100.9	102.9	103.4	102.5	102.7	103.1	103.0
Food and kindred products	107.2	109.1	108.8	107.7	114.1	114.2	113.7	114.1	114.2	114.2
Tobacco products	57.2	63.2	59.4	57.0	64.0	65.9	60.5	65.6	62.9	62.3
Textile mill products	89.7	88.5	90.8	90.7	90.1	92.1	91.2	89.2	90.9	90.9
Apparel and other textile products	75.4	71.7	72.5	71.7	75.5	73.9	73.1	72.7	72.8	72.3
Paper and allied products	106.6	107.7	108.1	108.0	108.5	109.8	109.5	109.5	110.0	109.8
Printing and publishing	122.2	121.7	124.1	122.9	122.7	123.2	121.8	123.2	124.2	123.4
Chemicals and allied products	99.7	98.3	98.6	98.4	100.1	99.8	98.7	99.1	98.7	99.0
Petroleum and coal products	73.0	70.9	71.0	72.9	72.8	75.5	76.3	73.8	74.1	72.9
Rubber and misc. plastics products	138.7	141.7	142.9	142.4	139.7	142.6	140.3	142.4	143.5	143.8
Leather and leather products	43.6	41.1	42.1	41.7	43.9	43.5	42.0	42.9	42.3	42.4
Service-producing	145.3	149.2	150.4	150.6	146.6	151.7	149.1	153.4	153.3	151.8
Transportation and public utilities	126.0	129.6	130.4	130.5	127.6	130.6	129.6	132.3	133.0	131.6
Wholesale trade	123.1	126.0	126.8	126.5	123.7	127.2	125.4	128.5	128.5	127.1
Retail trade	129.9	132.5	133.7	134.5	132.7	137.1	136.0	139.6	139.2	137.8
Finance, insurance, and real estate	123.9	129.5	129.5	127.8	124.2	130.6	125.6	131.1	131.3	128.1
Services	174.4	179.4	181.1	181.6	175.1	181.5	177.7	183.0	183.0	181.7

[1] See footnote 1, table B-2.

p = preliminary.

Table B-6. Diffusion indexes of employment change, seasonally adjusted

(Percent)

Time span	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Private nonfarm payrolls, 356 industries[1]											
Over 1-month span:												
1993	60.0	60.8	51.3	58.6	61.7	55.2	57.7	57.0	61.8	59.7	61.8	59.6
1994	58.8	62.1	68.0	64.2	60.3	63.5	61.5	62.1	60.8	61.5	63.1	63.9
1995	63.2	59.3	54.9	54.6	51.4	55.1	54.1	57.4	51.8	54.8	56.3	59.4
1996	52.4	63.2	60.0	52.4	62.2	57.4	55.8	57.3	52.7	63.1	57.2	59.0
1997	59.8	58.7	P55.6	P54.2								
Over 3-month span:												
1993	63.8	61.2	61.1	59.8	63.1	62.9	59.7	63.1	64.5	67.1	64.6	63.5
1994	67.1	69.5	70.4	68.7	66.4	66.0	68.5	69.5	65.3	65.6	68.0	67.8
1995	66.6	63.2	56.9	53.4	54.2	52.9	56.6	53.8	54.2	54.8	58.3	57.0
1996	60.7	61.8	61.2	60.0	61.0	63.6	60.3	58.7	60.8	60.0	64.6	62.9
1997	64.8	P63.6	P58.8									
Over 6-month span:												
1993	63.3	65.2	63.8	64.2	62.4	65.9	65.7	63.9	66.3	67.3	70.6	69.5
1994	70.8	71.6	69.0	69.8	69.5	69.5	69.2	69.0	69.2	68.5	69.1	66.6
1995	66.3	60.8	58.7	54.4	53.5	54.1	53.1	56.3	55.9	54.1	56.2	61.8
1996	60.3	62.9	63.8	63.8	62.6	59.0	65.2	62.6	61.8	63.9	65.6	P67.0
1997	P65.9											
Over 12-month span:												
1993	64.9	63.9	64.0	65.4	67.0	67.6	67.6	67.0	70.2	69.5	69.2	70.1
1994	70.2	71.6	71.8	71.8	72.1	71.8	71.5	72.1	70.1	69.4	65.7	65.0
1995	62.6	60.8	60.1	61.2	58.1	57.7	54.5	58.7	58.6	57.3	59.4	59.8
1996	61.0	61.7	61.5	61.1	62.8	64.3	64.2	64.6	P64.6	P66.0		
1997												
	Manufacturing payrolls, 139 industries[1]											
Over 1-month span:												
1993	52.5	56.5	50.7	45.7	54.0	45.7	49.3	49.3	59.4	53.2	53.6	55.0
1994	56.5	60.1	59.7	58.6	53.2	57.9	57.6	53.6	55.8	54.7	57.2	59.4
1995	56.8	55.0	46.0	45.3	39.2	40.3	45.0	45.0	42.4	45.3	48.4	47.5
1996	42.1	48.2	48.2	39.6	53.2	49.6	43.9	50.0	44.6	54.3	48.2	52.9
1997	54.0	50.4	P49.3	P49.6								
Over 3-month span:												
1993	60.8	58.3	53.2	47.8	48.9	54.0	50.4	58.3	57.6	59.7	54.7	57.6
1994	63.7	64.4	66.2	60.8	56.1	56.8	60.8	58.6	54.0	56.1	60.1	60.8
1995	60.4	51.8	43.5	34.9	33.1	32.0	33.1	35.6	38.8	39.6	40.6	38.8
1996	38.8	39.9	37.8	43.2	45.3	47.5	45.7	40.6	50.7	47.1	51.8	51.4
1997	55.8	P51.1	P47.5									
Over 6-month span:												
1993	56.5	59.0	56.8	55.4	50.7	57.9	59.4	56.5	57.6	58.6	64.4	60.8
1994	62.2	64.4	60.4	61.5	59.0	56.8	56.5	57.2	60.1	55.8	59.7	55.8
1995	55.4	45.0	38.5	33.5	27.7	28.8	28.8	30.6	33.5	33.1	34.2	38.8
1996	32.0	37.4	37.1	38.1	42.4	37.8	48.6	43.5	45.0	51.1	50.0	P52.2
1997	P50.4											
Over 12-month span:												
1993	56.8	57.9	55.8	58.6	57.2	57.6	58.6	59.0	61.2	59.7	60.1	57.6
1994	57.9	58.6	60.8	60.8	60.8	63.3	59.4	60.1	57.2	55.8	49.6	47.5
1995	42.1	40.3	39.9	40.6	34.5	31.7	25.9	28.8	28.1	24.1	27.0	29.1
1996	33.1	33.1	33.8	35.6	37.1	41.0	40.6	41.0	P44.6	P45.0		
1997												

[1] Based on seasonally adjusted data for 1-, 3-, and 6-month spans and unadjusted data for the 12-month span. Data are centered within the span.

P = preliminary.

NOTE: Figures are the percent of industries with employment increasing plus one-half of the industries with unchanged employment, where 50 percent indicates an equal balance between industries with increasing and decreasing employment.

CPI ISSUES AND PLANS

- The Bureau of Labor Statistics (BLS), which has responsibility for the Consumer Price Index (CPI), has been active in its efforts to identify and correct problems with the index. Much of the most important research that underlies recent assessments of bias in the CPI has been carried out by BLS researchers.

- This research has identified four main issues concerning the CPI. Three of the four -- the substitution effect, sample rotation effect and outlet substitution effect -- are associated with small upward biases in the CPI as a cost-of-living proxy, but the effect of the fourth -- the quality adjustment effect -- cannot be quantified with confidence. These are explained below.

- The substitution effect in the CPI arises because the CPI measures the cost of purchasing a fixed market basket of goods and services, and thus does not allow for the substitution of cheaper for more expensive products when relative prices change. For example, if bananas become relatively cheaper and apples relatively more expensive, consumers may substitute bananas for apples with no loss of overall well-being. Because the CPI is based on a fixed market basket, the BLS does not describe the CPI as a measure of the change in the cost of living. The use of a fixed market basket for the CPI is associated with an overstatement of perhaps 0.1 to 0.2 percent per year in the index when used as a cost-of-living proxy.

- The current CPI market basket reflects the 1982-84 pattern of consumer expenditures. As part of the CPI revision currently underway, the index from January 1998 forward will be based on a 1993-95 market basket. The BLS has been planning to ask that a Commission or other technical advisory group be formed to study the question of whether the CPI market basket should be updated more frequently than every ten years, as is the current practice. BLS also is studying more fundamental changes in the methods used to construct the CPI, such as the use of a geometric mean estimator. A Commission might be asked to evaluate that sort of change as well.

- The sample rotation effect arises because current procedures for systematically introducing new outlets and items into the CPI tend to give high weight to prices that are temporarily low in the month the new samples are introduced and low weight to prices that are temporarily high. Thus, these procedures can cause an overstatement of price change in the period immediately following sample replacement. The outlet substitution effect can arise because consumers are free to substitute where they buy goods and services as well as what they buy. For example, if consumers don't consider the lower level of customer service provided by a discount store to be of any consequence, they may shift to such stores. Current CPI procedures would not capture the price decline associated with such a shift. Together, these two factors contribute an upward bias of perhaps 0.1 to 0.3 percent per year to the CPI.

- Having recently established the existence of these latter two effects, the BLS has taken steps to address the sample rotation problem effective with the data for January 1995. If further corrective measures can be identified, they will be incorporated as part of the ongoing CPI revision and reflected in the data for January 1998 forward.

- Any estimate of overstatement in the CPI as large as 1.5 percent per year requires that there be a large quality-adjustment bias, arising as a consequence of substantial improvements in the quality of the goods and services consumers purchase that are not reflected in the construction of the index. The BLS currently makes a considerable effort to properly account for changes in the quality of the items it prices. Although many believe that the CPI is biased upward because quality improvements are not fully accounted for, there is little direct evidence to support this view. Indeed, some have even suggested that quality adjustment problems lead to a downward, not an upward, bias in the CPI.

- Assessments of the total bias in the CPI as a cost-of-living proxy vary. Federal Reserve Board research staff have concluded that the CPI may overstate the change in the cost of living by 0.4 to 1.5 percent per year, though they also say that "these estimates are by necessity extremely rough." Another review done recently by researchers at the Congressional Budget Office concludes that the bias in the index is probably much smaller, in the range from 0.2 to 0.8 percent. Researchers at the Dallas Federal Reserve Bank conclude that "a figure of less than 1 percent ... strikes us as a plausible estimate of the overall {upward} bias" in the CPI, but add "the true figure may be a lot larger or a lot smaller; at present we simply do not know."

Bureau of Labor Statistics
February 1, 1995

CHANGES IN CONSUMER PRICE INDEX COVERAGE AND METHODOLOGY INTRODUCED IN SUCCESSIVE REVISIONS

Expenditure weight period (introduced)	Number of areas included	Family characteristics	Methodology characteristics
1917-19 (1919)	32	Minimum of husband, wife, and one child. Salaried workers must earn less than $2,000 a year; no limits on wage earners. No slum or charity families; white only. Resident of U.S. for 5 or more years; no non-English speaking. families	U.S. city average based on unweighted average of city indexes, which used regional weights; no account of areas not sampled.
1934-36 (1940)	33	Two or more persons. Not more than 2 boarders or lodgers, or guests for more than 26 weeks. Earnings must exceed $300. Salaried workers must earn less than $2,000. No relief families. White only, except where black population was significant part of total; in areas for 9 months or more.	Indexes for cities weighted by population in calculation of U.S. City Average. Introduced new items such as automobiles, radios, and dry cleaning.
1947-49 (1951)	34	Family income under $10,000 after taxes in survey year. No minimum income limit, except that families with no income from wage and salary earners were excluded. No length of residency, nativity, or racial limitations.	Interim adjustment pending completion of 1953 CPI revision. Group weights were revised to reflect post WW II expenditure patterns. Rent index revised back to 1940 to correct for "new unit bias".
1950 (1953)	46	Major portion of income of family head must come from employment as wage earner or salaried clerical worker.	Expanded item coverage included owned homes and restaurant meals. Area sample included small urban places as well as larger cities.

1960-61 (1964)	56[1]	Single person family included. More than one-half of combined family income from wage-earner or worker occupation. A minimum of 37 weeks worked for at least one family member.	Limited probability sampling for selecting items for inclusion. First pricing outside of the central city.
1972-73 (1978)	85	Same as above for wage earner and clerical worker index. New all urban consumers index introduced, which excluded only rural, military, and institutionalized population.	Introduced more comprehensive index to reflect expenditures for the urban population other than wage and clerical workers. Full probability sampling of items and outlets was also introduced.
1982-84 (1987)	85[2]	Same as for 1972-73 for both populations.	Refinement of rental equivalence method of measuring homeownership costs, which was introduced in 1983 in the CPI-U and in 1985 in the CPI-W.

[1]Six areas were added in 1966 to the original 50 areas introduced in 1964.
[2]Six areas were dropped in 1988 from the original 91 areas introduced in 1987.

CPI SEMINAR--ATTACHMENT 3

IMPROVEMENTS TO THE CPI BETWEEN MAJOR REVISIONS

CHANGE	DATE IMPLEMENTED	DESCRIPTION
Adjustment of Item Weights	1943	Adjustment of commodity expenditure weights for items disappearing from market place.
Interim Market Basket Update	1951	a. Revised city population weights; b. Correction of new unit bias in rent index; c. Added a number of new products; e.g. TV, Group Health Insurance Payments; d. Revised commodity weights.
New Construction	1966	Augmented rent samples with units built after 1960.
Quality Adjustment of New Automobile Prices	1967	New automobile prices adjusted for quality differences after model change-overs.
Sample rotation	1981	Introduced a systematic replacement of outlets between major revisions.
Rental Equivalence	1983	Changed homeowners' component from cost of purchase to value of rental services for CPI-U.
Return from Sale Price Imputation	1984	Introduced procedure to eliminate downward bias for items discontinued by outlets that went out of index with discounted prices.
Rental Equivalence	1985	Changed CPI-W homeowners' component to value of services.
Enhanced Seasonal Products Methodology	1987	Enhanced methodology used for seasonal items by expanding the number of price quotations to select products from alternate seasons and eliminate under-representation of such items.
Quality Adjustment of Used Car Prices	1987	Prices of used cars adjusted for differences in quality after model change-overs.

Aging Bias Correction	1988	Adjustment of rental values for aging of the housing stock.
New Models Imputation	1992	Refinement of imputation methods used when introducing new models of products into the CPI.
Discount Air Fares	1992	Substitution rules modified to permit pricing of discount airline fares.
Quality Adjustment of Apparel Prices	1992	Regression models used to adjust apparel prices for changes in quality when new clothing lines are introduced and eliminate bias due to linking product substitutions into the CPI.
Hotels & Motels	1993	Samples for hotels and motels quadrupled to reduce variances related to seasonal prices.
Seasonal Adjustment	1994	Procedures for seasonal adjustment revised to eliminate residual seasonality effects.
Generic Drugs	1995	Will introduce new procedures which allow opportunity for generic drugs to be priced when a brand drug loses its patent.
Commodity & Services Base Period Prices	1995	Will introduce seasoning procedures to eliminate upward bias in setting of base period prices of newly initiated items.
Rental Equivalence Imputation	1995	Will modify imputation of homeowners' implicit rent to eliminate the upward drift property of the current estimator.
Composite Estimator Used in Housing	1995	Will replace current composite estimator with a six month chain estimator; under-reporting of one month rent changes results in missing price change in residential rent and homeowners' equivalent rent plus higher variances.

CPI SEMINAR--ATTACHMENT 4

OWNERS' IMPLICIT RENT

- The current Sauerbeck imputation formula for the 6-month owner relative is (except for a depreciation factor):

$$S_j = \frac{1}{n_j} \sum_{i \in Q_j} \frac{P_{i,t}}{P_{i,t-6}},$$

where $P_{i,t}$ is the current period pure rent of matched renter i, $P_{i,t-6}$ is the pure rent from 6 months previous, Q_j is the set of renters matched to owner j, and n_j is the number of renters in that set. This price relative is multiplied by the previous owner's implicit rent to arrive at the new estimated rent.

- This imputation formula does not satisfy the "proportionality" principle, as illustrated by the following example.

Date	Matched rent # 1	Matched rent # 2	Owner implicit rent: Sauerbeck formula	Owner implicit rent: ratio-of-sums formula
Jan-93	$500	$500	$500	$500
Jul-93	600	500	550	550
Jan-94	600	600	605	600

- An alternative formula for the 6-month owner price relative that satisfies the proportionality criterion is the ratio of sums (A):

$$A_j = \frac{\sum P_{i,t}}{\sum P_{i,t-6}}.$$

CPI SEMINAR--ATTACHMENT 5

ONE- AND SIX-MONTH RENT CHANGES FOR SAME-TENANT HOUSING UNITS CALENDAR YEAR 1993

PANEL	NUMBER OF HOUSING UNITS	% RENT CHANGES SINCE LAST COLLECTION	% EXPECTED RENT CHANGES SINCE LAST MONTH	% REPORTED RENT CHANGES SINCE LAST MONTH
All Panels	34,690	30.9	5.1	2.0
Panel 1 (Jan. & July)	5,612	31.0	5.2	2.7
Panel 2 (Feb. & Aug.)	5,899	30.3	5.0	2.0
Panel 3 (Mar. & Sep.)	5,785	30.8	5.1	1.8
Region 4 (Apr. & Oct.)	5,875	30.8	5.1	1.9
Region 5 (May & Nov.)	5,973	30.3	5.0	1.9
Region 6 (June & Dec.)	5,546	32.2	5.3	1.5

CPI SEMINAR--ATTACHMENT 6

Index Estimation for Shelter

- The current "composite" estimator for shelter was introduced with two objectives: to improve the timeliness of the index and to reduce the variance. The form of the composite estimator currently used for rent and homeowners' equivalent rent is

$$I_t = 0.65 \times R_{t,t-1} \times I_{t-1} \quad + \quad 0.35 \times R_{t,t-6} \times I_{t-6},$$

where I_t, I_{t-1}, and I_{t-6} are the current period, previous period, and period $t-6$ indexes for the area, $R_{t,t-1}$ is the 1-month relative, which is calculated using respondent recall of the previous month's rent, and $R_{t,t-6}$ is the 6-month relative, which is calculated from comparing current rent to the rent reported during the last interview, six months previously.

- Because the 6-month relative is considered much more reliable, in general, than the 1-month relative, the following "6-month chained" formula has been studied as an alternative to the current composite estimator:

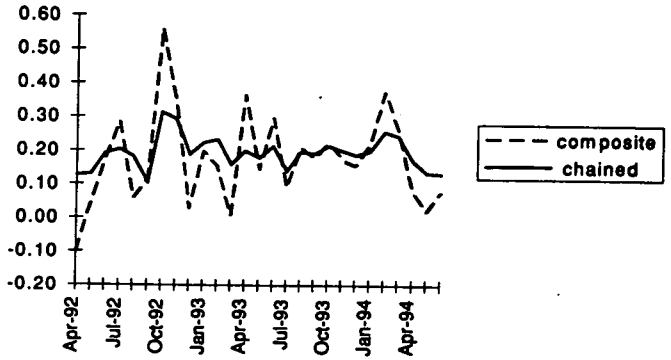
$$I_t = (R_{t,t-6})^{1/6} \times I_{t-1}$$

- The composite estimation formula for the shelter indexes led to substantial variation and oscillating patterns for the index estimates because the 6-month component of the formula produced large estimates of price change which were applied to a 6-month interval of time. The 6-month chained formula reduces the overall amount of variation by applying a dampened change to a 1-month interval.

CPI SEMINAR--ATTACHMENT 7

Composite Estimator for Shelter Causes Indexes to be Variable

Comparison of Monthly Changes (%) for Rent:
Current, Composite Estimator vs. 6-Month Chained Estimator



CPI SEMINAR--ATTACHMENT 8

IMPROVING CPI SAMPLE ROTATION PROCEDURES FOR FOOD AT HOME ITEMS

The current procedures assign too much importance to items with temporarily low prices, and too little to items with temporarily high prices.

Ideally, relative price change in the CPI ($R_{t,t-1}$) is a Laspeyres-based estimate using the ratio of the current cost of purchasing the base period quantities in period t to the cost in the previous period t-1,

$$R_{t,\,t-1} = \frac{\sum P_t Q_b}{\sum P_{t-1} Q_b}$$

where P is the price of an item and Q_b its base period quantity.

In practice, Point-of-Purchase base period quantities (Q_b) are not available; only estimates of expenditures (EX_b) are collected during the base period. Because expenditures are products of quantities and prices, a proxy for base period quantities can be estimated using the relation $Q_b = (EX_b/P_b)$, and the Laspeyres-based formula can be re-written as:

$$R_{t,\,t-1} = \frac{\sum P_t (EX_b / P_b)}{\sum P_{t-1} (EX_b / P_b)}$$

Because the sample is drawn after the base period, the base-period prices (P_b) are also unknown, and a proxy base price ($\hat{P}_b$) for each selected item is calculated by dividing the link-month price of the item by the price change of the component item-area relative from the POPS reference period to the link month, as in

$$\hat{P}_b = \frac{I_b}{I_{link}} P_{link},$$

where I_b is the component index value in the POPS base period and I_{link} is the index value at link month.

In the first month after the new sample is introduced, then, the price relative is

$$R_{link+1,\,link} = \frac{\sum P_{link+1}(EX_b / \hat{P}_b)}{\sum P_{link}(EX_b / \hat{P}_b)}$$

or

$$R_{link+1,\,link} = \frac{\sum P_{link+1}[EX_b / (X * P_{link})]}{\sum P_{link}[EX_b / (X * P_{link})]}$$

where $X = I_b/I_{link}$.

In the formula above, there is a negative correlation between the starting price for the new sample (P_{link}) and the implicit base period quantity weight $[EX_b/(X*P_{link})]$. Thus, the lower the starting (link month) price, the higher the weight of the quote. Because newly sampled items that are on sale or have unusually low link-month prices tend to increase in price in the next period, the formula has the effect of giving higher weights to items that are increasing in price the month after the introduction of the new sample.

For example, in our current procedures, suppose we sample two equally-weighted bananas where the average price in an area is always $2.00, but prices between outlets can vary. In this case, we might have:

CPI SEMINAR--ATTACHMENT 8

	Base period price (P_b)	Link month price (P_{link})	Link month+1 price (P_{link+1})
Banana #1	$2.50	$2.50	$2.00
Banana #2	$1.50	$1.50	$2.00

Since the average price of bananas is assumed to be unchanged over time in our example, the estimated base period price would be the same as the link month price. The formula, again, is

$$R_{link+1,\,link} = \frac{\sum P_{link+1}(EX_b / P_b)}{\sum P_{link}(EX_b / P_b)}$$

or, since the expenditures are equal in this example,

$$R_{link+1,\,link} = \frac{\sum (P_{link+1} / P_b)}{\sum (P_{link} / P_b)}$$

Therefore, the estimate of price change in link month +1 would be

$$\frac{(2.00/2.50) + (2.00/1.50)}{(2.50/2.50) + (1.50/1.50)} = \frac{0.8 + 1.333}{1 + 1} = \frac{2.133}{2} = +6.7\ \%$$

Change in CPI methodology for introducing new samples. Breaking the correlation between the weight and the starting (link month) price would alleviate this bias. One way to reduce the correlation would be to price the new sample, and estimate the base period price for each item in the new sample, some months

before actually using the prices for the new sample in index calculation. During this time frame, the old sample would continue to be used in index calculations. Although it is costly to collect prices for both the new and old sample at the same time, this approach would be of particular benefit for those items where prices are highly volatile from month to month, such as for most apparel and food items. Indeed, this method is already in place in the CPI for apparel commodities.

Starting in January 1995, BLS will begin pricing both the old and new samples for food-at-home categories for 3 months. This means that the CPI would continue to price and use in the index calculation the old samples for food-at-home observations for 3 months after the introduction of new food-at-home samples that would be priced but not used in index calculations. By doing this, base-period prices can be calculated that are much less likely to be correlated with price change after the new sample is linked into the index. Research indicates that the pricing of double samples for food at home for 3 months will result in the food at home index increasing about 0.3-0.4 percent less per year under the new method.

Mathematically, the calculation of the basic item-area price relatives for food at home will then be:

$$R_{link+1,\,link} = \frac{\sum P_{link+1}[EX_b / (X * P_{link-3})]}{\sum P_{link}[EX_b / (X * P_{link-3})]}$$

where $X = I_b/I_{link-3}$.

CPI SEMINAR--ATTACHMENT 9

TYPES OF QUALITY ADJUSTMENTS IN THE CPI

1. Measuring price per ounce to adjust for packaging size changes. This is common for food items, and household products like laundry detergent.

EXAMPLE	Shelf price	Size in ounces	Effective price/ounce
November 1994	$1.00	10	$0.100
December 1994	$1.00	8	$0.125

In this example we would show a 25% price increase because the effective price per ounce increased 25%.

2. Measuring direct change in quality between automobile model years. Here we use production costs marked up to retail.

EXAMPLE	Price
1994 model Ford Taurus	$15,000
1995 model Ford Taurus	$16,000

If the 1994 Ford Taurus improved its bumpers for the 1995 model year and could now absorb a 5 MPH crash without damage, compared to a 2.5 MPH crash the year before, we would obtain production costs from the manufacturer. If those production costs marked up to retail equalled $20, we would show a $980 increase, not a $1,000 increase.

3. Hedonic regression models used to measure change in quality. We use regression models to estimate quality change for both the apparel and shelter components of the CPI.

APPAREL EXAMPLE: We quality adjust the price for an apparel item leaving the sample based on the difference in item characteristics for both old and new items. We use parameter estimates developed in an hedonic regression model for women's coats and jackets to adjust the price. Parameter estimates are developed based on the equation:

$$\ln P_i = \beta_0 + \sum_{n=1}^{N} \beta_{in} X_{in} + \varepsilon_i$$

CPI SEMINAR--ATTACHMENT 9

Where $\ln P_i$ represents the natural logarithm of the price of item i, β_o is a constant, β_{in} is the parameter estimate developed for the n^{th} characteristic of item i, X_{in} is the quantity (or presence or absence) of the n^{th} characteristic for item i, and ε_i is a random disturbance term. The proportional effect of the characteristic's contribution to price will be $\exp(\beta_{in})$. In this example, assume only the fiber content for the new item is different.

Item Description:	Old Item Description	New Item Description
Design	Trenchcoat	Trenchcoat
Fiber	All Wool	All Cotton
Length	Mid-Calf	Mid-Calf
Lining	Full Lining	Full Lining

Price Information:

Old Item's Price = $63.00
New Item's Price = $40.00
Proportional Price Effect for All Wool Characteristic = 0.47896929
Proportional Price Effect for All Cotton Characteristic = 0.10039884

Hedonic Quality Adjustment Procedure:

1. Determine All Wool Value to Price (0.47896929)*(63.00) = 30.18
2. Determine All Cotton Value to Price (0.10039884)*(63.00) = 6.33
3. Determine the Quality Adjustment Amount (-30.18) + (6.33) = -23.85
4. Determine Quality Adjusted Price (-23.85) + (63.00) = 39.15

The New Price Change With Quality Adjustment:

Quality-adjusted price change =

[(New Item price/quality-adjusted price of old item)-1] * 100 = 2.2%.

We also use regressions to adjust for the age of the shelter stock.

4. Imputation. If we cannot directly compare prices between versions or directly quality adjust, we implictly quality adjust through *imputation*. We have generally two types of imputation methods available:

   - imputation by overall mean. This is common for most food and service items.
   - imputation by class mean. This is common for most nonfood commodities, like new cars and apparel.

EXAMPLE. In this example we have a sample of three items. The version of the last item has been discontinued, and its replacment version is not of comparable quality to the discontinued version and those quality differences cannot be factored out through direct quality adjustments.

	Price in November	Price in December
Item 1	$10	$12
Item 2	$10	$10
Item 3	$10	Unusable; new version has price of $15 and is not comparable in quality to the discontinued version.

In *overall mean imputation*, we would impute the price for item 3 in December by the average price change of both items 1 and 2. The average price change for items 1 and 2 is 10%, so the imputed price is $11. The implicit quality adjustment is $4 because no comparison was made between the old and new version.

For many new versions, however (e.g., apparel, new cars), price change is closely associated with the introduction of new lines or models. Therefore, for these types of nonfood commodities we use *imputation by class mean*, and impute price change for unusable substitutions only by other, usable (comparable or quality-adjusted) substitutions in the same area. If, for example, item 1 above was the only comparable or quality-adjusted substitution in the area, item 3 would have an imputed price $12, which is 20% higher than its previous price of $10. The implicit quality adjustment in this case is $3.

CPI SEMINAR--ATTACHMENT 10

Problems New Products Pose for the CPI

- **Timely introduction of new items**
- **Whether and how new items should be compared to previous items**
- **Entirely new items that do not fit in current classification structure**

Types of New Products

Replacement Products -- new models of previously available, but soon to be discontinued, items

May enter through: **Substitution, Reinitiation, Sample rotation, Sample augmentation, or Major revision**

Examples: ***New automobile models***

New season's coats or dresses

Supplemental Products -- newly added brands or varieties of currently available goods or services; items with new features

May enter through: **Substitution, Reinitiation, Sample rotation, Sample augmentation, or Major revision**

Examples ***Generic drugs***

Cereal varieties

Special airline ticket fares

Entirely New Products -- not closely tied to any previously available item; need a new category and therefore must wait for a CPI major revision

May enter only through: **Major revision**

Examples: ***Personal computers***

Video cameras and recorders

CPI SEMINAR--ATTACHMENT 10

How New Items Enter the CPI

Sample rotation

- *Regularly scheduled; 20% of sample rotates each year with whole sample rotating over 5 years.*
- *New outlet and item samples selected.*
- *New items introduced in proportion to their market share.*
- *New items have no predecessors in the sample; their prices are NOT compared to the prices of old items.*
- *Overlap pricing: The market prices of both the old and the new items are collected by the field representative in month t.*

  Current period price change: $\Delta P_t = P_t^{old} - P_{t-1}^{old}$

  Next period price change: $\Delta P_{t+1} = P_{t+1}^{new} - P_t^{new}$

- *Assumes quality difference = price difference (between observed market prices of new and old items)*

  Quality change between items: $\Delta Q = P_t^{new} - P_t^{old}$

Reinitiation

- *At the judgment of the National Office, the sample of items in an existing outlet or outlets is re-selected.*
- *Less common.*
- *Overlap pricing is used in these cases (as above).*
- *Assumes price difference = quality difference (as above).*

CPI SEMINAR--ATTACHMENT 10

Substitution

- *Usually forced by the marketplace. (Outlet permanently discontinues item we have been pricing).*
- *Occasionally directed by the National Office (for example, new car models; generic drugs).*
- *Common occurrence, last year, 3.5% of the prices collected for the CPI were for substitute items.*
- *No overlap pricing.*
- *Item has a predecessor; price of the new item may be compared to a previous item's price.*
- *Commodity analyst judges the comparability of the new and old items:*

The analyst may deem a newly introduced item to be <u>comparable</u> to its predecessor (essentially the same item) (56% of substitutes were deemed comparable.)

Price change between items: $\Delta P = P_t^{new} - P_{t-1}^{old}$

Quality change between items: $\Delta Q = 0$

OR the analyst may decide that is possible to adjust the price of the new item to account for the impact of any quality change on its price. (11% of substitutes were in this category.)

Price change between items: $\Delta P = P_t^{new} - P_{t-1}^{old} - QA$

Quality change between items: $\Delta Q = QA$

OR the analyst may declare the new and old items to be <u>noncomparable.</u> Price movement is imputed (set equal to the average price change of items in its stratum). (33% of substitutes deemed noncomparable.)

Imputation factor: $I = \underset{i \in stratum}{Avg} \left\{ \frac{P_t^i}{P_{t-1}^i} \right\}$

Current period price change: $\Delta P_t = I \times P_{t-1}^{old} - P_{t-1}^{old}$

Next period price change: $\Delta P_{t+1} = P_{t+1}^{new} - P_t^{new}$

Quality change between items: $\Delta Q = P_t^{new} - I \times P_{t-1}^{old}$

CPI SEMINAR--ATTACHMENT 10

Sample augmentation

- *Triggered by sample shortfall*
- *Additional items initiated*
- *Additional items are not compared to previously priced items; supplement current sample, so there are no previous prices for comparison.*

Major revision

- *At approximately 10 year intervals*
- *New strata and weights*
- *New base period*
- *No mapping of old items to new (below stratum level)*
- *New items introduced with new item strata*

CPI SEMINAR--ATTACHMENT 11

EXAMPLE OF NEW PRESCRIPTION DRUG PROCEDURES FOR SELECTING BETWEEN BRAND DRUG AND GENERIC EQUIVALENT DRUG AFTER THE PATENT EXPIRES.

Tagament - Patent Expired May, 1994. In January 1995, the field staff needs to obtain from the outlet the quantity of prescriptions dispensed for the brand Tagament versus the generic equivalent, Cimetidine.

Step 1

Item Selection Process -- Probability Proportional to Size

Outlet 1234567 Quote 200

Drug	Quantity of Prescriptions dispensed for last 3 months	Percent	Running total	Random number
Tagament	30	17	1-17	
Cimetidine	150	83	18-100	55
Total	180			

Step 2

A random number between 1 and 100 was selected from a random number table. In this example the selected number was 55 and that number falls within the running total for the generic equivalent, Cimetidine. Thus, the generic equivalent was selected.

Step 3

The quote described with Cimetidine will be compared to the previous Tagament description and any price difference will be reflected in the index for January 1995.

CPI SEMINAR--ATTACHMENT 12

Example of Laspeyres and geometric mean indexes

- The current CPI estimation formula is designed to estimate a Laspeyres index formula that holds the base-period quantity of an item fixed. The Laspeyres formula is the ratio of the sum of base-period quantities times comparison-period prices to the sum of base-period quantities times base-period prices:

$$I_t = \frac{\sum Q_0 P_t}{\sum Q_0 P_0}.$$

- The geometric mean formula is based on the assumption that a consumer responds to a 1 percent price increase by reducing the quantity purchased by 1 percent, thus holding the share of total expenditures on the item fixed. The formula is the product of the ratios of comparison-period price to base-period price, with each ratio raised to the power of the base-period expenditure share:

$$I_t^G = \prod \left(\frac{P_t}{P_0} \right)^{S_0}, \qquad \text{where } S_0 = \frac{Q_0 P_0}{\sum Q_0 P_0}.$$

- The difference between the two formulas can be illustrated by the following numerical example. Suppose that during the base period the consumer purchased 5 units of item A, which has a price of $1.00, and 10 units of item B, which has a price of $0.50. During the comparison period the price of item A and B both increase to $2.00.

Base Period					Comparison Period
Item	Quantity	Price	Expenditure	Expenditure Share	Price
A	5	$1.00	$5.00	0.5	$2.00
B	10	$.50	$5.00	0.5	$2.00

- The Laspeyres index is

$$I_t = \frac{5(2)+10(2)}{5(1)+10(0.5)} = \frac{10+20}{5+5} = \frac{30}{10} = 3.000.$$

The geometric mean index is

$$I_t^G = \left(\frac{2}{1}\right)^{0.5}\left(\frac{2}{0.5}\right)^{0.5} = (2)^{0.5}(4)^{0.5} = (8)^{0.5} = 2.828.$$

U. S. Department of Labor

Commissioner
Bureau of Labor Statistics
Washington, D.C. 20212

MAY 22 1997

Honorable James Saxton
Chairman, Joint Economic Committee
House of Representatives
Washington, D.C. 20515

Dear Congressman Saxton:

At the Joint Economic Committee hearing on May 2, you asked that I provide you with copies of any written materials pertaining to possible bias in the Consumer Price Index (CPI) that I had distributed at meetings or otherwise exchanged with Administration economists.

Based upon my own recollections and a review of my calendar, I have been able to identify five meetings at which I, together with other Bureau of Labor Statistics (BLS) staff, briefed Administration economists on issues pertaining to the CPI. The first of these briefings, organized by the Council of Economic Advisers (CEA), was held on December 21, 1994, and was followed by a similar briefing organized by the Office of Management and Budget (OMB), held on January 24, 1995. The written materials distributed at these meetings were approximately those included in the package labeled "Seminar on Current Consumer Price Index (CPI) Issues." (My staff and I briefed many different groups on CPI issues during the period from December 1994 through March 1995, including members of the Board of Governors of the Federal Reserve System, Congressional Budget Office staff, and Congressional committee staff; the materials used for these different briefings were very similar, but we have not retained a copy of a package that can be identified specifically as that used for either the CEA or the OMB briefing.)

A third briefing, organized by the CEA, was held on March 28, 1996; this meeting focused on BLS plans for resolving the so-called "formula bias" problem in the CPI. The announcement of those plans, released to the public the next day, is enclosed. A fourth briefing, also organized by the CEA, was held on December 10, 1996; that meeting focused on the preliminary BLS reaction to the Final Report of the Advisory Commission to Study

MAY 22 1997

the Consumer Price Index released on December 4, 1996. As best I can determine, no written materials were distributed at that session. Finally, a briefing which focused on BLS plans for addressing substitution bias in the CPI was held on April 7, 1997, again organized by the CEA and again with no written materials distributed.

Various Administration economists also received copies of the materials distributed at BLS press briefings held over the past two years on various aspects of the measurement of consumer price inflation and the construction of the CPI. Five separate press briefings were held on the following dates and topics:

(1) February 1, 1995--CPI measurement issues and January 1995 CPI improvements.

(2) March 29, 1996--Announcement and explanation of the June and July 1996 changes in sample rotation and substitution procedures to eliminate "formula bias."

(3) December 3, 1996--Background information relevant to the forthcoming Advisory Commission report: the CPI Revision process, the new item structure for 1998, the BLS scanner research program, geometric mean issues, the BLS experimental CPI for the elderly, and other matters.

(4) December 19, 1996--Initial response to the Advisory Commission's bias estimates and recommendations.

(5) April 10, 1996--Explanation of the new CPI-U-XG experimental index using geometric means.

I would be happy to provide you with copies of any of these press briefing packages you would like to have.

Finally, early this month, Janet Yellen, the Chairman of the CEA, wrote to me to ask whether it would be feasible for the BLS to provide, on an ongoing basis, estimates of the substitution bias in the CPI as a proxy for the cost of living. Her letter to me and my reply are enclosed.

Beyond the written materials I have described and transmitted, there has been considerable informal communication between BLS staff at all levels and numerous staff, again at all levels, from other parts of the executive branch. Given the nature of these communications, it would be impossible for me to reconstruct a history of them.

Honorable James Saxton--3

MAY 22 1997

Please let me know if there are any questions about the materials I have provided.

Sincerely yours,

Katharine Abraham

KATHARINE G. ABRAHAM
Commissioner

Enclosures

U. S. Department of Labor

Commissioner
Bureau of Labor Statistics
Washington, D C 20212

May 1, 1997

Dr Janet L. Yellen
Chairman
Council of Economic Advisers
Washington, D.C. 20500

Dear Chairman Yellen:

I am writing in response to the letter I received from you earlier today.

Based upon work the BLS has done and has planned, it would indeed be possible for us to produce, annually and on an ongoing basis, estimates of the substitution bias in the Consumer Price Index (CPI) as used in the tax and benefit indexation formulas cited in your letter. As you are aware, the CPI follows the approach of tracking the price of a fixed market basket of goods and services. The index therefore does not allow for shifts in consumer purchases in response to relative price change, and, for that reason, provides an upper bound on a true cost-of-living index (COLI).

As your letter indicates, and as I have discussed in recent Congressional hearings, substitution bias may show up at two levels. The CPI is constructed by first aggregating price quotations to form a series of subindexes for categories of items such as Apples, Men's Shirts, and Prescription Drugs, and then aggregating those subindexes to form the overall index. "Lower-level" substitution bias arises because the formula used to aggregate the individual price quotations to form the subindexes does not account for consumers' ability to substitute across items within item categories when the relative prices of those items change—for example, when the price of Delicious apples increases and the price of Granny Smith apples falls. Similarly, the formula used to aggregate the subindexes to form the overall CPI does not reflect the substitution across item categories that takes place when the relative prices of items in different categories change—for example, when the price of apples falls relative to the price of oranges. This leads to "upper-level" substitution bias.

The experimental "geometric mean" index which the BLS began publishing this month may, under certain conditions and assumptions, better reflect consumer substitution within CPI item categories than the existing measures. Evaluation of the geometric mean formula underlying the new measure is expected to lead to its partial adoption in the official CPI, which will address the lower-level substitution bias. We will make a decision by the end of this year as to which CPI categories should employ the geometric mean formula, and we will introduce these modifications into the official index, most likely with the release of data for January 1999. We have estimated that this will reduce the rate of CPI growth by between zero and one-quarter of one percentage point per year, depending on how many, and which, CPI categories are modified to use the geometric mean approach. Put another way, our current estimate is that lower-level substitution

bias in the CPI is between zero and 0.25 percent per year. By the end of 1997, we expect to have a refined estimate of the lower-level substitution bias in the CPI for the period beginning in January 1995 (or perhaps even earlier), based on our geometric mean research. Accordingly, we will be able to use these data to estimate the extent of lower-level substitution bias in the CPI as relevant for the indexation formulas you cite for fiscal year 1999 and thereafter.

With respect to upper-level substitution bias, it is possible to construct a measure that accounts for substitution across item categories in response to relative price changes, though not on the same schedule as the current CPI. The expenditure information required to construct such a measure—one of the so-called superlative indexes—is available only with a lag, so that the index cannot be produced during the year to which it applies. The BLS currently produces such measures on an experimental basis. Based on the historical values of those experimental indexes, our estimates have been that, for periods beginning after the scheduled January 1998 introduction of the updated 1993-1995 market basket, the upper-level substitution bias will average approximately 0.15 percent per year. We expect to be able to provide an updated estimate of upper-level substitution bias by mid-October of each year, based in part on the previous year's superlative inflation estimate, which should be available at that time. Our Fiscal Year 1998 budget submission includes funds to allow us to begin work on construction of a superlative index of enhanced quality, but such an index could not replace the current CPI due to the lags necessary for its computation.

Summing the above estimates, we estimate that the CPI will be subject to an overall substitution bias of 0.15 to 0.4 percent during 1998. Due to the anticipated incorporation of the geometric mean formula, we would expect the CPI itself to grow between zero and 0.25 percent per year less rapidly from January 1999 forward than it would have absent this planned change. As this change will address lower-level substitution bias in the CPI, the estimated average remaining substitution bias in the CPI declines to 0.15 percent per year for 1999 and thereafter. We emphasize that the particular upper-level substitution bias in any one year may vary somewhat from this average.

As you know, an updated market basket, reflecting consumer spending patterns in the 1993-1995 period, will be introduced into the CPI effective with data for January 1998. Based upon past experience with such updatings, along with other evidence, we expect that introduction of the new market basket will reduce the rate of increase in the index by 0.1 to 0.2 percentage point per year relative to the current index. For the period prior to January 1998, we estimate that the substitution bias in the CPI is higher than the figures cited above for 1998 by a corresponding amount, so that it is in the range from 0.25 to 0.6 percent per year.

Please let me know if I can provide you with any additional information.

Sincerely yours,

Katharine Abraham

Katharine G. Abraham
Commissioner

EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS
WASHINGTON, D.C. 20500

THE CHAIRMAN

May 1, 1997

Dr. Katharine Abraham
Commissioner
Bureau of Labor Statistics
Department of Labor
Washington, D.C. 20212

Dear Commissioner Abraham:

I am writing to ask if the Bureau of Labor Statistics can produce, annually, on an ongoing basis, estimates of the extent of substitution bias affecting the CPI-based indexation formulas of our federal tax and benefit programs.[1] Such estimates could be used by Congress to correct for the substitution bias now affecting the COLAs of existing tax and benefit programs. It would be up to the BLS to determine the appropriate methodology for this estimation, taking account of any changes that your agency may later implement to offset substitution bias in the Consumer Price Index.

As you know, economists are in agreement that the Consumer Price Index overstates increases in the cost of living due to a substitution bias that results from the CPI's methodology of pricing a fixed market basket of goods. Because such a Laspeyres price index fails to take account of the possibility that buying patterns change when relative prices change, the CPI represents, as you noted in recent testimony, "an upper bound on the change in the cost of living."

Ongoing research efforts at the BLS have enhanced considerably our knowledge of the likely magnitude of substitution bias in the CPI. For example, the experimental superlative indexes that BLS has been producing provide evidence on the so-called "upper level" substitution bias. And the recently announced experimental CPI-U-XG index provides insight into the likely magnitude of "lower level" substitution bias. I understand that BLS is in the process of evaluating which CPI basic indexes are best calculated using such geometric mean formulas and that adoption of such weighting in some lower level categories of the CPI is planned by January 1999.

Would it be possible for BLS, building on this body of research, to produce technical estimates of the magnitude of substitution bias on a timely and ongoing basis for use in adjusting the indexation of government programs currently linked to movements in the CPI? Such estimates would facilitate the application of a "substitution bias adjustment factor" to the annual

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[1] The indexation formula relevant to taxes in a given calendar year is the increase in the CPI-U for the 12 month period ending in August of the previous year over the prior 12-month period. The indexation formula relevant to Social Security and a variety of Federal pension programs is the increase in the CPI-W for the third quarter of the previous year over the third quarter of the prior year.

cost-of-living increases of the various Federal tax and benefit programs. If it is possible for BLS to produce such "substitution bias estimates", could you tell me when these estimates would be available and now provide your best estimate, or range of estimates, of the magnitude of the substitution bias currently embodied in these CPI-linked formulas? Could you also identify what steps you are planning to take to address substitution bias directly in the CPI, when you plan to take such steps, and their likely impact on both the CPI and also the magnitude of any remaining substitution bias in the index?

Estimating the substitution bias in the CPI is an important step in meeting the critical objective of more accurately measuring changes in the cost of living. I look forward to hearing from you.

Sincerely,

Janet L. Yellen

Janet L. Yellen

Dr. Katherine Abraham
Commissioner
Bureau of Labor Statistics
Department of Labor
Washington, DC 20212

FOR RELEASE: 11:00 A.M. E.S.T
Friday, March 29, 1996

Extending the Improvements in CPI Sample Rotation Procedures and Improving the Procedures for Substitute Items

Effective with the Consumer Price Index for June 1996, the Bureau of Labor Statistics will extend to all categories of items in the CPI the change in sample rotation procedures introduced in the January 1995 CPI for food-at-home categories. In addition, effective with the CPI for July 1996, the BLS will change the way it determines the weight of replacement items that enter the sample during certain types of item substitutions. These changes will complete the process of correcting a technical problem that ties an item's weight to its expected price change. BLS researchers originally identified this problem, and showed that it can lead to an overstatement of inflation whenever new items are introduced into the CPI sample. The Senate Finance Committee's Advisory Commission To Study the CPI has referred to this problem as "formula bias."

The sample rotation improvements

The CPI samples items in proportion to consumer expenditures for them. However, as a fixed quantity weight index, the CPI weights items by their quantities. BLS estimates the base period quantity of a sample item by dividing its base period expenditure by an estimate of its price during the same period. BLS estimates the item's base period price by projecting a recent price for the item back to the base period.

An article entitled "Improving CPI Sample Rotation Procedures" in the October 1994 *CPI Detailed Report* provides a mathematical description of how this procedure can lead to "formula bias." The CPI replaces its samples of items and retail outlets on a 5-year rotation to keep them from becoming out of date. As part of the sample rotation process, there is an initiation period during which BLS staff members find the new outlets and select the items in them. In the overlap period, which follows the initiation period, BLS prices both the new and old samples but uses only the old sample in the CPI. The old practice was to estimate the base period prices of the items in the new sample using their overlap-period prices. Then BLS would also use the overlap-period prices to calculate their subsequent price changes. This double use of the overlap-period prices can set up a correlation between quantity weight and price change. Relatively high weights were assigned to items with prices that were temporarily low and therefore more likely to rise in subsequent periods. Conversely, items with temporarily high prices received relatively low weights.

Many categories of food items exhibit short-term price fluctuations that make it especially likely that they will suffer from this problem. Effective with the index for January 1995, in a process called "seasoning," BLS lengthened the overlap period by three months for food-at-home items. The seasoning period is a time to obtain the data needed to properly weight each new sample observation before its use in the index. Seasoning breaks the link between the weights for food-at-home items and the prices eventually used in price index calculation. The *CPI Detailed Report*

article referred to above explained this change in the treatment of new samples in food-at-home categories.

Starting with the index for June 1996, this treatment will be extended to all other non-shelter categories in the CPI. (Residential rent and owners' equivalent rent are not subject to "formula bias" and their treatment will not be changed.) Prices used in CPI price change calculations will no longer be used also to determine item weights. Item weights for city outlet samples introduced into the index during 1996 will be based on prices collected during the samples' initiation periods. Subsequent city samples will be handled by an extension of the "seasoning" procedure from food-at-home categories to the remainder of the CPI. The overlap period for pricing of both old and new samples will be lengthened by a minimum of three months. Special seasoning or other procedures will be used in several minor sample rotation situations during 1996 and early 1997.

The item substitution procedure

When an outlet stops selling a CPI sample item, or other circumstances make it necessary or desirable for the CPI to replace an item it has been following, the CPI field agent finds a replacement item. The object of the substitution process is to find the item in the outlet that is most similar to the one the CPI had been following. About 3.5 percent of all pricings result in substitutions. Whenever there is a substitution, a CPI analyst determines if the new item is comparable to, that is, not significantly different from, the item it replaces. If the item is judged comparable, there is no break in the series or change in the item's weight. About 55 percent of substitutions are comparable. If the substitute is not comparable to the previous item, the analyst may be able to determine the value of the difference and make a quality adjustment to keep the series continuous. The weight will change according to the value of the quality adjustment, but, since the quality adjustment does not depend on the price of the new item, this will not cause "formula bias." CPI analysts quality-adjust about 15 percent of the substitutions. However, about 30 percent of the substitutes are neither comparable nor adjustable. In this case, the CPI starts the item's series anew and recalculates its base period price using the price of the substitute item. As in the sample rotation case, this creates a situation in which the item's weight is not independent of its probability of price change.

Effective with the CPI for July 1996, the CPI will--except in rare and extreme cases--no longer recalculate the base period price, and hence the implicit quantity weight, of a noncomparable substitute item. Instead, the CPI will use the originally calculated weight for the item throughout the life of that item series. This will prevent "formula bias" from entering the index through item substitution.

Research on alternative methods

Since the "formula bias" problem was first identified by BLS researchers, a number of theoretical and empirical research projects have been conducted to clearly define the problem and evaluate a number of proposed solutions. The evaluation included simulations of sample rotations using historical data, as well as mathematical derivations. The research indicated that the method of seasoning, as described above, should effectively eliminate any upward bias associated with estimation of base prices following sample replacement.

Results of simulations on the effects of these changes

BLS analyzed simulations based on two years of historical CPI data to assess the impact of the improvements to the sample rotation and item substitution procedures. The results of the simulations suggest that the combined effect of the two changes will be to reduce the measured rate of price change of the all-items CPI by about 0.10 percent per year. The methods used in the simulations are similar to those that were described in detail in BLS Working Paper No. 263, "Improvements to the Food at Home, Shelter, and Prescription Drug Indexes in the U.S. Consumer Price Index."

This estimated impact of 0.10 percent per year is in addition to the effects of the January 1995 change in rotation procedures for food at home. In combination with simultaneous improvements in the CPI shelter indexes, the 1995 food-at-home changes were estimated at that time to reduce the rate of growth in the all-items index by approximately 0.11 percent per year.

Because the exact magnitude of "formula bias" will vary from year to year, the impact of eliminating it from the index is impossible to calculate precisely in advance. Estimated percentage effects on the CPI must be based on historical simulations. As resources permit in the future, BLS will continue to prepare retrospective simulations of the effects of these and other methodological improvements.

For further information, write to the Bureau of Labor Statistics, Division of Consumer Prices and Price Indexes, Room 3615, 2 Massachusetts Ave., NE, Washington, D.C. 20212-0001, or call (202) 606-7000.

SEMINAR ON CURRENT CONSUMER PRICE INDEX (CPI) ISSUES

List of Attachments

SEMINAR ON CURRENT CONSUMER PRICE INDEX (CPI) ISSUES

The Conceptual Foundations for the Consumer Price Index (CPI)

- The CPI is a modified *Laspeyres price index* that captures changes in the cost of a fixed market basket of goods and services over time. (See attachment 1)
- The economic theory of the *cost-of-living index* provides a conceptual framework for dealing with practical questions that arise in the construction of the CPI.
- The concepts underlying the CPI and the economic theory of the cost-of-living index differ in some respects.
- The CPI is not designed to answer all questions about inflation.
- There has been a continuous history of improvements in the CPI. (See attachments 2 and 3)

Current Estimation and Procedural Issues in the CPI

- The rental equivalence approach to pricing the housing services received by home owners was introduced in 1983.
- The method used to impute home owner's implicit rent since 1987 tends to overstate rent changes and will change in January 1995. (See attachment 4)
- The formula for calculating the residential rent and home owners' equivalent rent indexes also will change in January 1995. (See attachments 5, 6 and 7)
- The procedures used to bring in new outlet and item samples results in an overstatement of price change in the first few months after the new samples are introduced. This problem will be corrected in the food at home component beginning in January 1995. (See attachment 8)

SEMINAR ON CURRENT CPI ISSUES

Capturing Changes in Quality and Introducing New Goods in the CPI

- Constructing a measure of pure price change requires identifying and excluding the effect of quality changes in goods and services. (See attachment 9)
- There are a number of areas for which we continue to improve adjustments for quality changes.
- The total magnitude--and even the direction--of quality change effects on prices not accounted for by our current procedures is unknown.
- New goods are introduced gradually into the CPI beginning soon after they appear in the market. (See attachment 10)
- New outlets are also introduced gradually into the CPI.
- Special case: New procedures for introducing generic prescription drugs will take effect in January 1995. (See attachment 11)
- Medical care pricing continues to be an area of concern.

Market Basket Updating and Imperfect Estimator Issues

- There are limitations to using an index with a fixed market basket as an approximation to a cost-of-living index.
- BLS plans to update the market basket as part of the CPI revision currently underway.
- BLS continues research on alternative formulas for index aggregation.
- The Geometric mean estimator is an alternative method of estimating price change for specific goods using expenditure shares for some previous period. (See attachment 12)

SEMINAR ON CURRENT CPI ISSUES

Other Issues: CPI for Different Groups in Population

- CPIs are currently available for two population groups.
- At the request of Congress, BLS produces a test index for Older Americans (62 years and over).
- Some interest has been expressed in a CPI for the poor.

CPI Appendix 4. Expenditure classes, item strata, and entry level items

EC 01 Cereals and cereal products
0101 Flour and prepared flour mixes
01011 Flour

01012 Prepared flour mixes

0102 Cereal
01021 Cereal

0103 Rice, pasta, and cornmeal
01031 Rice

01032 Macaroni, similar products, and cornmeal

EC 02 Bakery products
0201 White bread
02011 White bread

0202 Other breads, rolls, biscuits, and muffins
02021 Bread other than white

02022 Rolls, biscuits, muffins (excluding frozen)

0204 Cakes, cupcakes, and cookies
02041 Cakes and cupcakes (excluding frozen)

02042 Cookies

0206 Other bakery products
02061 Crackers

02062 Bread and cracker products

02063 Sweetrolls, coffee cake, and doughnuts (excluding frozen)

02064 Frozen bakery products and frozen/refrigerated doughs and batters

02065 Pies, tarts, turnovers (excluding frozen)

EC 03 Beef and veal
0301 Ground beef
03011 Ground beef

0302 Chuck roast
03021 Chuck roast

0303 Round roast
03031 Round roast

0304 Other steak, roast, and other beef
03041 Other roasts (excluding chuck and round)

03042 Other steak (excluding round and sirloin)

03043 Other beef

0305 Round steak
03051 Round steak

0306 Sirloin steak
03061 Sirloin steak

EC 04 Pork
0401 Bacon
04011 Bacon

0402 Pork chops
04021 Pork chops

0403 Ham
04031 Ham (excluding canned)

04032 Canned ham

0404 Other pork, including sausage
04041 Pork roasts, picnics, other pork

04042 Pork sausage

EC 05 Other meats
0501 Luncheons, lamb, organ meats, and game

05011 Frankfurters

05012 Bologna, liverwurst, salami

05013 Other lunchmeats (excluding bologna, liverwurst, salami)

05014 Lamb, organ meats, and game

EC 06 Poultry
0601 Fresh whole chicken
06011 Fresh whole chicken

0602 Fresh or frozen chicken parts
06021 Fresh or frozen chicken parts

0603 Other poultry
06031 Other poultry

EC 07 Fish and seafood
0701 Canned fish and seafood
07011 Canned fish or seafood

0702 Fresh or frozen fish and seafood
07021 Shellfish (excluding canned)

07022 Fish (excluding canned)

EC 08 Eggs
0801 Eggs
08011 Eggs

EC 09 Fresh milk and cream
0901 Fresh whole milk
09011 Fresh whole milk

0902 Other fresh milk and cream
09021 Other fresh milk and cream

EC 10 Processed dairy products
1001 Butter and other dairy products (excluding cheese, ice cream)
10011 Butter

10012 Other dairy products

1002 Cheese
10021 Cheese

1004 Ice cream and related products
10041 Ice cream and related products

EC 11 Fresh fruits
1101 Apples
11011 Apples

1102 Bananas
11021 Bananas

1103 Oranges
11031 Oranges

1104 Other fresh fruits
11041 Other fresh fruits

EC 12 Fresh vegetables
1201 Potatoes
12011 Potatoes

1202 Lettuce
12021 Lettuce

1203 Tomatoes
12031 Tomatoes

1204 Other fresh vegetables
12041 Other fresh vegetables

EC 13 Processed fruits
1301 Fruit juices and frozen fruits
13011 Frozen orange juice

13012 Other frozen fruits and fruit juices

13013 Fresh, canned/or bottled fruit juices

1303 Canned and dried fruits
13031 Canned and dried fruits

EC 14 Processed vegetables
1401 Frozen vegetables
14011 Frozen vegetables

1402 Canned and other processed vegetables
14021 Canned beans other than lima beans

14022 Canned cut corn

14023 Other processed vegetables

EC 15 Sugar and sweets
1501 Candy and other sweets
15011 Candy and chewing gum

15012 Other sweets (excluding candy and gum)

1502 Sugar and artificial sweeteners
15021 Sugar and artificial sweeteners

EC 16 Fats and oils
1601 Fats and oils
16011 Margarine

16012 Other fats and oils

16013 Nondairy cream substitutes

16014 Peanut butter

EC 17 Nonalcoholic beverages
1701 Carbonated drinks
17011 Cola drinks

17012 Carbonated drinks other than cola

1703 Coffee
17031 Roasted coffee

17032 Instant and freeze dried coffee

1705 Other noncarbonated drinks
17051 Noncarbonated fruit-flavored drinks

17052 Tea

17053 Other noncarbonated drinks

EC 18 Other prepared foods
1801 Canned and packaged soup
18011 Canned and packaged soup

1802 Frozen prepared foods
18021 Frozen prepared meals

18022 Frozen prepared foods other than meals

1803 Snacks
18031 Potato chips and other snacks

18032 Nuts

1804 Spices, seasonings, condiments, sauces
18041 Salt and other seasonings and spices

18042 Olives, pickles, relishes

18043 Sauces and gravies

18044 Other condiments (excluding olives, pickles, relishes)

1806 Other prepared food
18061 Canned or packaged salads and desserts

18062 Baby food

18063 Other canned or packaged prepared foods

EC 19 Food away from home
1901 Lunch
19011 Lunch

1902 Dinner
19021 Dinner

CPI Appendix 4. Expenditure classes, item strata, and entry level items—Continued

1903 Other meals and snacks
19031 Snacks and nonalcoholic beverages
19032 Breakfast or brunch

1909 Unpriced board and catered affairs
19090 Unpriced items

EC 20 Alcoholic beverages
2001 Beer, ale, and other alcoholic malt beverages at home
20011 Beer, ale, and other alcoholic malt beverages at home

2002 Distilled spirits at home
20021 Whiskey at home

20022 Distilled spirits at home (excluding whiskey)

2003 Wine at home
20031 Wine at home

2005 Alcoholic beverages away from home
20051 Beer, ale, and other alcoholic malt beverages away from home

20052 Wine away from home

20053 Distilled spirits away from home

EC 21 Pure rent-renter occupied
2101 Rent of dwelling
21011 Rent of dwelling

2102 Lodging while out of town
21021 Lodging while out of town

2103 Lodging while at school
21031 Housing at school, excluding board

EC 22 Rental equivalence and household insurance
2201 Owners' equivalent rent
22011 Owners' equivalent rent

2202 Household insurance
22021 Household insurance

EC 23 Maintenance and repair services
2301 Property maintenance and repair services
23011 Inside home maintenance and repair services

23012 Repair/replacement of hard surface flooring

23013 Replacement of installed wall-to-wall carpet

23014 Repair of disposal, built-in dishwasher, range hood

EC 24 Maintenance and repair commodities
2401 Materials, supplies, equipment for home repairs
24011 Paint, wallpaper and supplies

24012 Tools and equipment for painting

24013 Lumber, paneling, wall and ceiling tile; awnings, glass

24014 Blacktop and masonry materials

24015 Plumbing supplies and equipment

24016 Electrical supplies, heating and cooling equipment

2404 Other property maintenance commodities
24041 Miscellaneous supplies and equipment

24042 Hard surface floor covering

24043 Landscaping items

EC 25 Fuel oil and other fuels
2501 Fuel oil
25011 Fuel oil

2502 Other fuels
25021 Bottled or tank gas

25022 Coal

25023 Other fuels

EC 26 Gas (piped) and electricity
2601 Electricity
26011 Electricity

2602 Utility natural gas service
26021 Utility natural gas service

EC 27 Other utilities and public services
2701 Telephone services, local charges
27011 Telephone services, local charges

2702 Water and sewerage maintenance
27021 Residential water and sewer service

2703 Community antenna and cable television
27031 Community antenna or cable TV

2704 Garbage and trash collection
27041 Garbage and trash collection

2705 Interstate telephone services
27051 Interstate telephone services

2706 Intrastate telephone services
27061 Intrastate telephone services

EC 28 Textile housefurnishings
2801 Linens, curtains, drapes, sewing materials
28011 Bathroom linens

28012 Bedroom linens

28013 Kitchen and dining room linens

28014 Curtains and drapes

28015 Slipcovers and decorative pillows

28016 Sewing materials for household items

EC 29 Furniture and bedding
2901 Bedroom furniture
29011 Mattress and springs

29012 Bedroom furniture other than mattress/and springs

2902 Sofas
29021 Sofas

2903 Living room chairs and tables
29031 Living room chairs

29032 Living room tables

2904 Other furniture
29041 Kitchen and dining room furniture

29042 Infants' furniture

29043 Outdoor furniture

29044 Occasional furniture

EC 30 Household appliances
3001 Refrigerators and home freezers
30011 Refrigerators and home freezers

3002 Laundry equipment
30021 Washers

30022 Dryers

3003 Stoves, ovens, portable dishwashers, window air-conditioners

30031 Stoves and ovens (excluding microwave ovens)

30032 Microwave ovens

30033 Portable dishwashers

30034 Window air-conditioners

EC 31 Television and sound equipment
3101 Television sets
31011 Television sets

3102 Video cassette recorders, disc players, and tapes
31021 Video cassette recorders, disc players, cameras, and accessories

31022 Video cassettes and discs, blank and prerecorded

31023 Video game hardware, software and accessories

3103 Audio components, radios, recordings, and other audio equipment
31031 Radios, phonographs, and tape recorders/players

31032 Components and other sound equipment

31033 Records and tapes, prerecorded and blank

3109 Unpriced accessories for electronic equipment
31090 Unpriced items

EC 32 Other household equipment and furnishings
3201 Floor/window coverings, outdoor/infant/laundry/cleaning equipment
32011 Floor coverings

32012 Window coverings

32013 Infants' equipment

32014 Laundry and cleaning equipment

32015 Outdoor equipment

3202 Clocks, lamps, and decorator items
32021 Clocks

32022 Lamps and lighting fixtures

32023 Household decorative items

3203 Tableware, serving pieces, nonelectric kitchenware
32031 Plastic dinnerware

32032 China and other dinnerware

32033 Flatware

32034 Glassware

32035 Silver serving pieces

32036 Serving pieces other than silver or glass

32037 Nonelectric cookingware

32038 Tableware and nonelectric kitchenware

3204 Lawn and garden equipment, tools, hardware
32041 Lawn and garden equipment

32042 Power tools

32043 Other hardware

32044 Nonpowered handtools

CPI Appendix 4. Expenditure classes, item strata, and entry level items—Continued

3205 Small kitchen appliances, sewing machines, portable heating/cooling equipment
32051 Floor cleaning equipment and sewing machines

32052 Portable heating/cooling equipment, small electric kitchen appliances

3206 Indoor plants and fresh cut flowers
32061 Indoor plants and fresh cut flowers

3209 Unpriced household equipment parts, small furnishings
32090 Unpriced items

EC 33 Housekeeping supplies
3301 Laundry and cleaning products
33011 Soaps and detergents

33012 Other laundry and cleaning products

3303 Household paper products, including stationery
33031 Cleansing and toilet tissue, paper towels, napkins

33032 Stationery, stationery supplies, gift wrap

3305 Other household products, lawn and garden supplies
33051 Miscellaneous household products

33052 Lawn and garden supplies

EC 34 Housekeeping services
3401 Postage
34011 Postage

3402 Babysitting
34021 Babysitting services

3403 Domestic service
34031 Domestic services

3404 Other household services
34041 Gardening and lawncare services

34042 Water softening service

34043 Moving, storage, freight expense

34044 Household laundry and drycleaning, excluding coin operated

34045 Coin-operated household laundry and drycleaning

3406 Appliance and furniture repair
34061 Repair of television, radio, and sound equipment

34062 Repair of household appliances

34063 Reupholstery of furniture

3407 Care of invalids, elderly, and convalescents in the home
34071 Care of invalids, elderly, and convalescents in the home

3409 Unpriced rent/repair of household equipment, sound equipment
34090 Unpriced items

34091 Unpriced items

EC 35 Tenants' insurance
3501 Tenants' insurance
35011 Tenants' insurance

EC 36 Men's apparel

3601 Men's suits, coats, sportcoats, jackets
36011 Men's suits

36012 Men's sport coats and tailored jackets

36013 Men's coats and jackets

3603 Men's furnishings
36031 Men's underwear and hosiery

36032 Men's nightwear

36033 Men's accessories

36034 Men's sweaters

36035 Men's active sportswear

3604 Men's shirts
36041 Men's shirts

3605 Men's pants and shorts
36051 Men's pants and shorts

3609 Unpriced men's uniforms and other clothing
36090 Unpriced items

EC 37 Boys' apparel
3701 Boys' apparel
37011 Boys' coats and jackets

37012 Boys' sweaters

37013 Boys' shirts

37014 Boys' underwear, nightwear, and hosiery

37015 Boys' accessories

37016 Boys' suits, sport coats, and pants

37017 Boys' active sportswear

3709 Unpriced boys' uniforms and other clothing
37090 Unpriced items

EC 38 Women's apparel
3801 Women's coats and jackets
38011 Women's coats and jackets

3802 Women's dresses
38021 Women's dresses

3803 Women's separates, sportswear
38031 Women's tops

38032 Women's skirts

38033 Women's pants and shorts

38034 Women's active sportswear

3804 Women's underwear, nightwear, accessories
38041 Women's nightwear

38042 Women's underwear

38043 Women's hosiery

38044 Women's accessories

3805 Women's suits
38051 Women's suits

3809 Unpriced women's uniforms and other clothing
38090 Unpriced items

EC 39 Girls' apparel
3901 Girls' apparel
39011 Girls' coats and jackets

39012 Girls' dresses and suits

39013 Girls' tops

39014 Girls' skirts and pants

39015 Girls' active sportswear

39016 Girls' underwear and nightwear

39017 Girls' hosiery and accessories

3909 Unpriced girls' uniforms and other clothing
39090 Unpriced items

EC 40 Footwear
4001 Men's footwear
40011 Men's footwear

4002 Boys' and girls' footwear
40021 Boys' footwear

40022 Girls' footwear

4003 Women's footwear
40031 Women's footwear

EC 41 Infants' and toddlers' apparel
4101 Infants' and toddlers' apparel
41011 Infants' and toddlers' outerwear

41012 Infants' and toddlers' play and dresswear

41013 Infants' and toddlers' underwear

41014 Infants' and toddlers' sleepwear

4109 Unpriced infants' accessories and other clothing
41090 Unpriced items

EC 42 Sewing materials and luggage
4201 Sewing materials, notions, luggage
42011 Fabric for making clothes

42012 Sewing notions and patterns

42013 Luggage

EC 43 Jewelry
4301 Watches
43011 Watches

4302 Jewelry
43021 Jewelry

EC 44 Apparel services
4401 Other apparel services
44011 Shoe repair and other shoe services

44012 Coin-operated apparel laundry and drycleaning

44013 Alterations and repairs

44014 Clothing rental

44015 Watch and jewelry repair

4402 Apparel laundry and drycleaning, excluding coin operated
44021 Apparel laundry and drycleaning, excluding coin operated

EC 45 New vehicles
4501 New cars
45011 New cars

4502 New trucks
45021 New trucks

4503 New motorcycles
45031 New motorcycles

EC 46 Used vehicles
4601 Used cars
46011 Used cars

4609 Unpriced other used motor vehicles
46090 Unpriced items

EC 47 Motor fuel, motor oil, coolant, and fluids
4701 Motor fuel
47011 Motor fuels

4702 Motor oil, coolant, and other fluids

CPI Appendix 4. Expenditure classes, item strata, and entry level items—Continued

47021 Motor oil

47022 Coolant, brake fluid, transmission fluid, additives

EC 48 Automobile parts and equipment
4801 Tires
48011 Tires

4802 Vehicle parts and equipment other than tires
48021 Vehicle parts and equipment other than tires

EC 49 Automobile maintenance and repair
4901 Automotive body work
49011 Automotive body work

4902 Automotive drive-train, front end repair
49021 Automotive drive-train repair

49022 Automotive brake work

49023 Repair to steering, front end, cooling system, and air-conditioning

4903 Automotive maintenance and servicing
49031 Automotive maintenance and servicing

4904 Automotive power plant repair
49041 Automotive power plant repair

4909 Unpriced automotive repair service policy
49090 Unpriced items

EC 50 Automobile insurance
5001 Automobile insurance
50011 Automobile insurance

EC 51 Vehicle finance charges
5101 Automobile finance charges
51011 Automobile finance charges

5109 Unpriced other vehicle finance charges
51090 Unpriced items

EC 52 Vehicle rental, registration, and inspection
5201 State and local automobile registration, license, inspection
52011 State automobile registration

52012 Local automobile registration

52013 Driver's license

52014 Vehicle inspection

5205 Other automobile-related fees
52051 Automobile rental

52052 Truck rental

52053 Parking fees

52054 Vehicle tolls

52055 Automobile towing charges

52056 Other vehicle rentals

5209 Unpriced docking and landing fees
52090 Unpriced items

EC 53 Public transportation
5301 Airline fare
53011 Airline fare

5302 Other intercity transportation
53021 Intercity bus fare

53022 Intercity train fare

53023 Ship fares

5303 Intracity transportation
53031 Intracity mass transit

53032 Taxi fare

53033 Car and van pools

5309 Unpriced school bus
53090 Unpriced items

EC 54 Prescription drugs and medical supplies
5401 Prescription drugs and medical supplies
54011 Prescription drugs and medical supplies

EC 55 Nonprescription drugs and medical supplies
5502 Internal and respiratory over-the-counter drugs
55021 Internal and respiratory over-the-counter drugs

5503 Nonprescription medical equipment and supplies
55031 Topicals and dressings

55032 Medical equipment for general use

55033 Supportive and convalescent medical equipment

55034 Hearing aids

5509 Unpriced drugs
55090 Unpriced items

EC 56 Professional services
5601 Physicians' services
56011 Physicians' services

5602 Dental services
56021 Dental services

5603 Eyeglasses and eye care
56031 Eyeglasses and eye care

5604 Services by other medical professionals
56041 Services by other medical professionals

EC 57 Hospital and other medical care services
5701 Hospital room, in-patient
57011 Hospital room, in-patient

5702 Other in-patient services
57021 Hospital in-patient services other than room

57022 Nursing and convalescent home care

5703 Hospital out-patient services
57031 Hospital out-patient services

5709 Unpriced rent or repair of medical equipment
57090 Unpriced items

EC 58 Health insurance
5811 Commercial health insurance retained earnings–prescription drugs
58111 Commercial health insurance retained earnings–prescription drugs

5812 Commercial health insurance retained earnings–physicians' services
58121 Commercial health insurance retained earnings–physicians' services

5813 Commercial health insurance retained earnings–dental services
58131 Commercial health insurance retained earnings–dental services

5814 Commercial health insurance retained earnings–eye care services
58141 Commercial health insurance retained earnings–eye care services

5815 Commercial health insurance retained earnings–other professional services
58151 Commercial health insurance retained earnings–other professional services

5816 Commercial health insurance retained earnings–hospital room
58161 Commercial health insurance retained earnings–hospital room

5817 Commercial health insurance retained earnings–other in-patient hospital services
58171 Commercial health insurance retained earnings–other in-patient hospital services

5818 Commercial health insurance retained earnings–out-patient hosp services
58181 Commercial health insurance retained earnings–out-patient hosp services

58211 Blue Cross/Blue Shield retained earnings-prescription drugs

5822Blue Cross/Blue Shield retained earnings-physicians' services
58221 Blue Cross/Blue Shield retained earnings-physicians' services

5823 Blue Cross/Blue Shield retained earnings–dental services
58231 Blue Cross/Blue Shield retained earnings–dental services

5824 Blue Cross/Blue Shield retained earnings–eye care services
58241 Blue Cross/Blue Shield retained earnings–eye care services

5825 Blue Cross, Blue Shield retained earnings–other professionals' services
58251 Blue Cross/Blue Shield retained earnings–other professionals' services

5826 Blue Cross/Blue Shield retained earnings-hospital room
58261 Blue Cross/Blue Shield retained earnings-hospital room

5827 Blue Cross/Blue Shield retained earnings–other in-patient hospital services
58271 Blue Cross/Blue Shield retained earnings–other in-patient hospital services

5828 Blue Cross/Blue Shield retained earnings-out-patient hospital services
58281 Blue Cross/Blue Shield retained earnings-out-patient hospital services

5831HMO retained earnings–prescription drugs
58317 HMO retained earnings–prescription drugs

5832 HMO retained earnings–physicians' services
58321 HMO retained earnings–physicians' services

5833 HMO retained earnings–dental services
58331 HMO retained earnings–dental services

5834 HMO retained earnings–eyecare services
58341 HMO retained earnings–eyecare services

5835 HMO retained earnings–other professionals' services
58351 HMO retained earnings–other professionals' services

5836 HMO retained earnings–hospital room
58361 HMO retained earnings–hospital room

5837 HMO retained earnings–other in-patient hospital services
58371 HMO retained earnings–other in-patient hospital services

5838 HMO retained earnings–out-patient hospital services
58381 HMO retained earnings–out-patient hospital services

CPI Appendix 4. Expenditure classes, item strata, and entry level items—Continued

5841 Other health insurance retained earnings-prescription drugs
58411 Other health insurance retained earnings-prescription drugs

5842 Other health insurance retained earnings-physicians' services
58421 Other health insurance retained earnings-physicians' services

5843 Other health insurance retained earnings-dental services
58431 Other health insurance retained earnings-dental services

5844 Other health insurance retained earnings-eyecare services
58441 Other health insurance retained earnings-eyecare services

5845 Other health insurance retained earnings-other professionals' services
58451 Other health insurance retained earnings-other professionals' services

5846 Other health insurance retained earnings-hospital room
58461 Other health insurance retained earnings-hospital room

5847 Other health insurance retained earnings-other in-patient hospital services
58471 Other health insurance retained earnings-other in-patient hospital services

5848 Other health insurance retained earnings-out-patient hospital services
58481 Other health insurance retained earnings-out-patient hospital services

EC 59 Reading materials
5901 Newspapers
59011 Newspapers

5902 Magazines, periodicals, and books
59021 Magazines

59022 Books purchased through book clubs

59023 Books not purchased through book clubs

5909 Unpriced newsletters
59090 Unpriced items

EC 60 Sporting goods and equipment
6001 Sports vehicles, including bicycles
60011 Outboard motors and powered sports vehicles

60012 Unpowered boats and trailers

60013 Bicycles

6002 Sports equipment
60021 Indoor, warm weather, and winter sports equipment

60022 Hunting, fishing, and camping equipment

EC 61 Toys, hobbies, and other entertainment commodities
6101 Toys, hobbies, and music equipment
61011 Toys, games, and hobbies

61012 Playground equipment

61013 Music instruments and accessories

6102 Photographic supplies and equipment
61021 Film

61022 Photographic and darkroom supplies

61023 Photographic equipment

6103 Pets and pet products
61031 Pet food

61032 Purchase of pets, pet supplies, accessories

6109 Unpriced souvenirs, fireworks, optic goods
61090 Unpriced items

EC 62 Entertainment services
6201 Club membership dues and fees
62011 Club membership dues and fees

6202 Fees for participant sports
62021 Fees for participant sports

6203 Admissions
62031 Admission to movies, theaters, and concerts

62032 Admission to sporting events

6204 Fees for lessons or instructions
62041 Fees for lessons or instructions

6205 Photographers, film processing, pet services
62051 Photographer fees

62052 Film processing

62053 Pet services

62054 Veterinarian services

62055 Other entertainment services

6209 Unpriced rental of recreational vehicles
62090 Unpriced items

EC 63 Tobacco products
6301 Tobacco and smoking supplies
63011 Cigarettes

63012 Tobacco products other than cigarettes

63013 Smoking accessories

6309 Unpriced smoking products
63090 Unpriced items

EC 64 Toilet goods and personal care appliances
6401 Hair, dental, shaving, miscellaneous personal care products
64011 Products for the hair

64012 Nonelectric articles for the hair

64013 Woman's hair pieces and wigs

64014 Dental products, nonelectric dental articles

64015 Shaving products, nonelectric shaving articles

64016 Deodorant/suntan preparations, sanitary/footcare products

64017 Electric personal care appliances

6403 Cosmetics/bath/nail preparations and implements
64031 Cosmetics, bath/nail/make-up preparations and implements

EC 65 Personal care services
6501 Beauty parlor services for females
65011 Beauty parlor services for females

6502 Haircuts and other barber shop services for males

65021 Haircuts and other barber shop services for males

6509 Unpriced repair of personal care appliances
65090 Unpriced items

EC 66 School books and supplies
6601 School books and supplies for college
66011 College textbooks

6602 Reference books and elementary and high school books
66021 Elementary and high school books and supplies

66022 Encyclopedias and other sets of reference books

6609 Unpriced miscellaneous school purchases
66090 Unpriced items

EC 67 Daycare, tuition, and other school fees
6701 College tuition and fees
67011 College tuition and fixed fees

6702 Elementary and high school tuition and fees
67021 Elementary and high school tuition and fixed fees

6703 Child daycare, nursery school
67031 Daycare and nursery school

6704 Other tuition and fees
67041 Technical and business school tuition and fixed fees

6709 Unpriced miscellaneous school items, rentals and other services
67090 Unpriced items

EC 68 Legal, financial, and funeral services
6801 Legal fees
68011 Legal fees

6802 Banking and accounting expenses
68021 Safe deposit box rental

68022 Checking accounts and special check services

68023 Tax return preparation and other accounting fees

6803 Cemetery lots and funeral expenses
68031 Funeral expenses

68032 Cemetery lots and crypts

6809 Unpriced miscellaneous personal services
68090 Unpriced items

EC 69 Information processing equipment
6901 Information processing equipment
69011 Personal computers and peripheral equipment

69012 Computer software and accessories

69013 Telephone, peripheral equipment, and accessories

69014 Calculators, adding machines, and typewriters

69015 Other information processing equipment

EC 72 Utility average prices
7260 Utility natural gas, 40 therms
72601 Utility natural gas, 40 therms

7261 Utility natural gas, 100 therms
72611 Utility natural gas, 100 therms

7262 Electricity, 500 kilowatt hours
72621 Electricity, 500 kilowatt hours

Table 1. Relative importance of components in the Consumer Price Indexes: U.S. city average, December 1993

(Percent of all items)

Item and group	U.S. City Average	
	All Urban Consumers (CPI-U)	Urban Wage Earners and Clerical Workers (CPI-W)
All items	100.000	100.000
Food and beverages	17.398	19.344
Food	15.799	17.622
Food at home	9.853	11.187
Cereals and bakery products	1.454	1.660
Cereals and cereal products	.468	.541
Flour and prepared flour mixes	.072	.085
Cereal	.297	.341
Rice, pasta, and cornmeal	.099	.116
Bakery products	.986	1.119
White bread	.241	.298
Fresh other bread, biscuits, rolls, and muffins	.223	.233
Cookies, fresh cakes, and cupcakes	.250	.296
Other bakery products	.272	.292
Meats, poultry, fish, and eggs	2.964	3.513
Meats, poultry, and fish	2.825	3.327
Meats	2.014	2.435
Beef and veal	1.038	1.249
Ground beef other than canned	.361	.451
Chuck roast	.092	.107
Round roast	.053	.061
Round steak	.086	.113
Sirloin steak	.079	.099
Other beef and veal	.366	.418
Pork	.573	.704
Bacon	.091	.106
Chops	.147	.185
Ham	.135	.166
Other pork, including sausage	.199	.245
Other meats	.403	.482
Poultry	.442	.495
Fresh whole chicken	.145	.173
Fresh and frozen chicken parts	.216	.236
Other poultry	.081	.085
Fish and seafood	.370	.397
Canned fish and seafood	.076	.084
Fresh and frozen fish and seafood	.294	.313
Eggs	.159	.166
Dairy products	1.186	1.321
Fresh milk and cream	.602	.707
Fresh whole milk	.349	.435
Other fresh milk and cream	.253	.271
Processed dairy products	.585	.614
Cheese	.340	.351
Ice cream and related products	.151	.164
Other dairy products, including butter	.095	.099

See footnotes at end of table.

Table 1. Relative importance of components in the Consumer Price Indexes: U.S. city average, December 1993 —Continued

(Percent of all items)

Item and group	U.S. City Average	
	All Urban Consumers (CPI-U)	Urban Wage Earners and Clerical Workers (CPI-W)
Fruits and vegetables	1.909	2.019
Fresh fruits and vegetables	1.296	1.366
Fresh fruits	.703	.729
Apples	.111	.121
Bananas	.082	.087
Oranges, including tangerines	.087	.108
Other fresh fruits	.443	.436
Fresh vegetables	.595	.637
Potatoes	.106	.118
Lettuce	.059	.063
Tomatoes	.099	.116
Other fresh vegetables	.332	.341
Processed fruits and vegetables	.611	.653
Processed fruits	.348	.350
Fruit juices and frozen fruit	.272	.278
Canned and dried fruits	.076	.073
Processed vegetables	.263	.303
Frozen vegetables	.088	.097
Processed vegetables excluding frozen	.175	.205
Other food at home	2.320	2.674
Sugar and sweets	.331	.374
Sugar and artificial sweeteners	.085	.106
Sweets, including candy	.246	.268
Fats and oils	.246	.283
Nonalcoholic beverages	.712	.833
Carbonated drinks	.384	.474
Coffee	.190	.200
Other noncarbonated drinks	.139	.158
Other prepared food	1.030	1.184
Canned and packaged soup	.092	.102
Frozen prepared food	.174	.192
Snacks	.199	.227
Seasonings, condiments, sauces, and spices	.273	.311
Miscellaneous prepared food, including baby food	.292	.352
Food away from home	5.948	6.435
Lunch	2.107	2.399
Dinner	2.525	2.620
Other meals and snacks	1.004	1.194
Unpriced items	.311	.222
Alcoholic beverages	1.600	1.722
Alcoholic beverages at home	.855	.943
Beer and ale	.446	.562
Distilled spirits	.218	.208
Wine at home	.192	.173
Alcoholic beverages away from home	.744	.778

See footnotes at end of table.

Table 1. Relative importance of components in the Consumer Price Indexes: U.S. city average, December 1993 —Continued

(Percent of all items)

Item and group	U.S. City Average	
	All Urban Consumers (CPI-U)	Urban Wage Earners and Clerical Workers (CPI-W)
Housing	41.394	39.004
Shelter	27.948	25.682
Renters' costs	7.984	8.095
Rent, residential	5.771	6.628
Other renters' costs	2.213	1.467
Lodging while out of town	1.959	1.300
Lodging while at school	.220	.140
Tenants' insurance	.033	.027
Homeowners' costs	19.768	17.399
Owners' equivalent rent	19.386	17.074
Household insurance	.382	.324
Maintenance and repairs	.196	.188
Maintenance and repair services	.118	.102
Maintenance and repair commodities	.078	.085
Materials, supplies, and equipment for home repairs	.036	.039
Other maintenance and repair commodities	.042	.047
Fuel and other utilities	7.262	7.523
Fuels	3.983	4.093
Fuel oil and other household fuel commodities	.369	.339
Fuel oil	.255	.220
Other household fuel commodities	.115	.119
Gas (piped) and electricity (energy services)	3.614	3.754
Electricity	2.438	2.508
Utility (piped) gas	1.175	1.246
Other utilities and public services	3.279	3.429
Telephone services	1.748	1.781
Local charges	1.184	1.211
Interstate toll calls	.322	.322
Intrastate toll calls	.242	.247
Water and sewerage maintenance	.782	.789
Cable television	.551	.642
Refuse collection	.217	.217
Household furnishings and operation	6.183	5.800
Housefurnishings	3.601	3.525
Textile housefurnishings	.372	.352
Furniture and bedding	1.136	1.099
Bedroom furniture	.382	.420
Sofas	.211	.203
Living room chairs and tables	.193	.179
Other furniture	.350	.296
Appliances, including electronic equipment	.893	.848
Video and audio products	.481	.531
Televisions	.186	.189
Video products other than televisions	.090	.095
Audio products	.226	.247
Unpriced items	.000	.000
Major household appliances	.300	.332
Refrigerators and home freezers	.091	.101
Laundry equipment	.096	.111
Stoves, ovens, dishwashers, and air conditioners	.113	.120
Information processing equipment	.112	.083
Other housefurnishings	1.201	1.129
Floor and window coverings, infants', laundry, cleaning, and outdoor equipment	.176	.148
Clocks, lamps, and decor items	.236	.187
Tableware, serving pieces, and nonelectric kitchenware	.213	.193
Lawn equipment, power tools, and other hardware	.187	.230
Sewing, floor cleaning, small kitchen, and portable heating appliances	.132	.139
Indoor plants and fresh cut flowers	.170	.151
Unpriced items	.066	.079

See footnotes at end of table.

Table 1. Relative importance of components in the Consumer Price Indexes: U.S. city average, December 1993 —Continued

(Percent of all items)

Item and group	U.S. City Average	
	All Urban Consumers (CPI-U)	Urban Wage Earners and Clerical Workers (CPI-W)
Housekeeping supplies	1.109	1.141
Laundry and cleaning products, including soap	.393	.453
Household paper products and stationery supplies	.359	.355
Other household, lawn, and garden supplies	.357	.332
Housekeeping services	1.473	1.134
Postage	.254	.249
Appliance and furniture repair	.182	.141
Gardening and other household services	.384	.218
Babysitting	.253	.326
Domestic services	.234	.067
Care of invalids, elderly, and convalescents	.051	.039
Unpriced items	.115	.091
Apparel and upkeep	5.897	5.909
Apparel commodities	5.333	5.379
Apparel commodities less footwear	4.552	4.513
Men's and boys'	1.389	1.393
Men's	1.141	1.088
Suits, sport coats, coats, and jackets	.350	.277
Furnishings and special clothing	.261	.251
Shirts	.263	.265
Dungarees, jeans, and trousers	.233	.255
Unpriced items	.015	.020
Boys'	.247	.305
Women's and girls'	2.421	2.356
Women's	2.067	1.948
Coats and jackets	.208	.167
Dresses	.338	.341
Separates and sportswear	.975	.957
Underwear, nightwear, hosiery, and accessories	.334	.337
Suits	.183	.119
Unpriced items	.030	.027
Girls'	.354	.408
Infants' and toddlers'	.203	.261
Other apparel commodities	.539	.502
Sewing materials, notions, and luggage	.090	.080
Watches and jewelry	.449	.422
Watches	.084	.079
Jewelry	.365	.343
Footwear	.781	.866
Men's	.251	.296
Boys' and girls'	.156	.203
Women's	.374	.367
Apparel services	.564	.530
Laundry and dry cleaning other than coin operated	.296	.229
Other apparel services	.268	.301

See footnotes at end of table.

Table 1. Relative importance of components in the Consumer Price Indexes: U.S. city average, December 1993 —Continued

(Percent of all items)

Item and group	U.S. City Average	
	All Urban Consumers (CPI-U)	Urban Wage Earners and Clerical Workers (CPI-W)
Transportation	16.954	18.863
Private	15.295	17.613
New vehicles	5.025	4.948
New cars	4.031	3.606
New trucks	.908	1.184
New motorcycles	.086	.158
Used cars	1.245	2.256
Motor fuel	3.010	3.705
Automobile maintenance and repair	1.533	1.615
Body work	.158	.164
Automobile drive train, brake, and miscellaneous mechanical repair	.450	.494
Maintenance and servicing	.497	.478
Power plant repair	.406	.458
Unpriced items	.023	.021
Other private transportation	4.483	5.089
Other private transportation commodities	.629	.795
Motor oil, coolant, and other products	.058	.074
Automobile parts and equipment	.570	.721
Tires	.284	.338
Other parts and equipment	.286	.382
Other private transportation services	3.854	4.295
Automobile insurance	2.554	2.900
Automobile finance charges	.531	.665
Automobile fees	.769	.730
Automobile registration, licensing, and inspection fees	.389	.423
Other automobile-related fees	.353	.269
Unpriced items	.027	.018
Public transportation	1.659	1.251
Airline fares	1.141	.717
Other intercity transportation	.148	.102
Intracity public transportation	.360	.421
Unpriced items	.012	.010
Medical care	7.108	6.044
Medical care commodities	1.287	1.061
Prescription drugs [1]	.890	.715
Nonprescription drugs and medical supplies	.397	.346
Internal and respiratory over-the-counter drugs	.258	.260
Nonprescription medical equipment and supplies	.139	.086
Medical care services	5.821	4.983
Professional medical services	3.353	2.865
Physicians' services [2]	1.825	1.562
Dental services [3]	1.018	.914
Eye care [4]	.340	.285
Services by other medical professionals [5]	.171	.104
Hospital and related services	2.154	1.893
Hospital rooms [6]	.844	.797
Other inpatient services [7]	.821	.709
Outpatient services [8]	.483	.383
Unpriced items	.006	.004
Health insurance [9]	.313	.226

See footnotes at end of table.

Table 1. Relative importance of components in the Consumer Price Indexes: U.S. city average, December 1993 —Continued

(Percent of all items)

Item and group	U.S. City Average	
	All Urban Consumers (CPI-U)	Urban Wage Earners and Clerical Workers (CPI-W)
Entertainment	4.351	4.028
Entertainment commodities	1.986	2.077
Reading materials	.709	.626
Newspapers	.356	.331
Magazines, periodicals, and books	.353	.294
Unpriced items	.000	.000
Sporting goods and equipment	.424	.527
Sport vehicles, including bicycles	.194	.309
Other sporting goods	.230	.218
Toys, hobbies, and other entertainment	.853	.924
Toys, hobbies, and music equipment	.394	.434
Photographic supplies and equipment	.123	.111
Pet supplies and expense	.326	.366
Unpriced items	.010	.014
Entertainment services	2.365	1.951
Club memberships	.380	.212
Fees for participant sports, excluding club memberships	.392	.350
Admissions	.683	.566
Fees for lessons or instructions	.235	.170
Other entertainment services	.654	.620
Unpriced items	.022	.014
Other goods and services	6.897	6.807
Tobacco and smoking products	1.601	2.121
Personal care	1.184	1.146
Toilet goods and personal care appliances	.628	.650
Other toilet goods and small personal care appliances, including hair and dental products	.356	.393
Cosmetics, bath and nail preparations, manicure and eye makeup implements	.271	.257
Personal care services	.556	.496
Beauty parlor services for females	.443	.392
Haircuts and other barber shop services for males	.112	.104
Unpriced items	.000	.000
Personal and educational expenses	4.112	3.540
School books and supplies	.249	.219
School books and supplies for college	.177	.145
Elementary and high school books and supplies	.059	.061
Unpriced items	.013	.013
Personal and educational services	3.863	3.321
Tuition and other school fees	2.569	2.147
College tuition	1.504	1.106
Elementary and high school tuition	.452	.384
Day care and nursery school	.363	.443
Tuition for technical, business, and other schools	.145	.146
Unpriced items	.104	.068
Personal expenses	1.295	1.174
Legal service fees	.475	.412
Personal financial services	.356	.294
Funeral expenses	.363	.372
Unpriced items	.101	.096

See footnotes at end of table.

PREPARED STATEMENT OF REPRESENTATIVE CAROLYN B. MALONEY

Thank you, Mr. Chairman. I welcome today's distinguished witness, the Commissioner for the Bureau of Labor Statistics, Katharine Abraham, who will give us valuable information on the Consumer Price Index, the CPI.

Versions of the CPI are used as measures of inflation that affect every American. The CPI is used to adjust the benefits of over 40 million Social Security recipients as well as the benefits of millions of other pensioners in government and private plans. It is also used to determine the cost-of-living adjustments in workers' wage agreements. Finally, the Interna Revenue code requires that the personal exemption, the standard deduction, the minimum and maximum dollar amounts of each tax bracket, among other provisions, all be indexed to the CPI.

During fiscal year 1994, 31 cents of every federal spent, or $460 billion, and 44 cents of every dollar in tax revenue collected, or $550 billion, were indexed to the CPI.

The recent flurry of interest in the CPI started on January 10, 1995 when Federal Reserve Chairman Alan Greenspan told a joint meeting of the House and Senate Budget Committee that he thought the CPI exaggerates annual inflation anywhere from ½ to 1 ½ percentage points.

At first, many people saw a wonderful opportunity to raise revenue for the Federal government by lowering the cost-of-living adjustment to the millions of Americans on government pension plans.

On December 4, 1996 the Senate Finance Committee issued the final report of an Advisory Committee it had directed to study the Consumer Price Index. The commission became known as the "Boskin Commission" after its distinguished chairman, Michael Boskin.

Let me say something about the views of four of the five highly qualified and distinguished members of this commission. Their 1995 estimates of the overstatement of the CPI were reported to be one percent or more, with Professor Robert Gordon being the highest at 1.7 percent. That high estimate would turn the March 1997 reported 0.1 percent inflation rate into a report of <u>falling</u> prices. A lot of consumers shopping in the real world would find this hard to believe.

But many experts do not share these views. For example, Professor Charles Hulten at the University of Maryland informed my staff yesterday that the

errors in the CPI have not been estimated with enough accuracy to justify an arbitrary adjustment in the CPI. Professor Hulten says that there are a number of elements in the CPI that might understate inflation as well as elements that might overstate inflation. He suggested that we should leave this adjustment to the Bureau of Labor Statistics.

Joel Popkin, whose company has been estimating price indexes for many years, wrote in his report for the American Association of Retired Persons that the Boskin Commission's "conclusions are not convincing and provide no basis for Congress to change federal indexation formulas that are based on the CPI..."

It is too bad that the Boskin Commission did not contain some of the experts who do not believe its final conclusion of a 1.1 percent overstatement of the CPI. The calculation of the CPI directly affects too many Americans to arbitrarily change it on the basis of a controversial conclusion.

Noble Laureate Milton Friedman stated recently that "to manipulate [the CPI] now is not good. In effect, an arbitrary adjustment of the CPI would involve an increase in taxes."

I am asking my colleagues on both sides of the isle to support the resolution I have submitted with my Republican colleagues Jon Fox and Phil English, and my Democratic colleague Joe Kennedy. House Resolution 93 expresses the sense of the House that the Bureau of Labor Statistics alone should make any adjustments, if any are needed, to the methodology used to determine the Consumer Price Index. We argue that the Consumer Price Index is only useful if it is a technical , not a political measurement.

Our resolution has the support of the American Association of Retired Persons, the Council on Aging, and the National Council of Senior Citizens.

I understand that the Bureau of Labor Statistics is in the middle of a six-year program from 1995 to 2000 to make improvements in the calculation of the CPI. I want to hear today from Commissioner Abraham about the progress being made in that program and the budget needs for assuring the best possible product.

Thank you, Mr. Chairman.

CAROLYN B. MALONEY
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May 20, 1997

The Honorable Katharine G. Abraham, Commissioner
Bureau of Labor Statistics
United States Department of Labor
2 Massachusetts Avenue, N.E., Room 4040
Washington, DC 20212

Dear Commissioner Abraham:

It was a pleasure to receive your testimony before the Joint Economic Committee on May 2, covering the Consumer Price Index (the C.P.I.) and the April employment situation. I was especially pleased to hear that the unemployment rate in April was 4.9 percent, the lowest it has been in almost 25 years. I do appreciate the fact that the statistics you presented are national averages -- and as such do not reflect the condition of all workers. That said, I would certainly appreciate your answers to the following questions:

1. The gap between wages for men and women appears to have narrowed over the last several years, although there seems to be some discrepancies in the data. The gap in median annual earnings for year-round workers between men and women is reported to be larger than the gap in median weekly earnings for men and women over the same period. How do you explain this discrepancy? How are self-employed women treated in the weekly and annual series?

Further, over the last several years, what has been the trend in the earning differentials between men and women? And how does the Bureau calculate these earning differentials?

2. As part of the trend toward increased globalization, the value of U.S. imports has almost doubled over the last 10 years. Part of this increase has also been due to the continued strength of the dollar *vis-a-vis* the other major trading currencies. Has the Bureau performed any research on what impact this significant increase in trade and the continued strength of the dollar has had on the C.P.I.? Are there estimates of what would have happened to the C.P.I. in the absence of these developments?

Given how important international trade is to the US economy and how much it dominates policy discussions, I would encourage you to make this issue a high priority for your Bureau's research agenda. I would appreciate if you would share with me, as well as with the other members of the Committee, any findings as soon as they become available.

3. I understand the Bureau recently announced some changes in the way it calculates the Consumer Price Index. Would you please describe the types of improvements you have already made, as well as those the Bureau plans to make over the next several years? Can you provide an estimate of how much lower or higher the current C.P.I. would have been, had these changes already been in place over the last year?

4. According to the Bureau's statistics, the unemployment rate for New York City is approaching close to twice the national average. Can you provide any further details -- including break-downs by age, sex, race, education and occupation -- which might help explain this large differential?

I look forward to receiving your answers to these questions and to furthering our dialogue on the condition of American workers.

Sincerely,

Carolyn B. Maloney
Member, Joint Economic Committee

cc: The Honorable Jim Saxton, Chairman, Joint Economic Committee
Ms. Colleen Healy

U. S. Department of Labor

Commissioner
Bureau of Labor Statistics
Washington, D.C. 20212

JUL 17 1997

Honorable Carolyn B. Maloney
House of Representatives
Washington, D.C. 20515-3214

Dear Congresswoman Maloney:

I am writing in response to your letter of May 20, in which you requested information on the female-to-male earnings ratio, the effects of international trade on the Consumer Price Index (CPI), planned improvements to the CPI, and the unemployment situation in New York City.

Your first question concerned differences in measured annual and weekly earnings for men and women. Earnings data from the Current Population Survey (CPS), a monthly survey of about 50,000 households that is the primary source of information on the Nation's labor force, are widely used to examine trends in the women's-to-men's earnings ratio. Two different measures of earnings typically are used for this purpose: (1) median annual earnings derived from the March supplement to the CPS, published by the Census Bureau and (2) median weekly earnings derived from a portion of the monthly CPS sample, published quarterly by the Bureau of Labor Statistics (BLS). In 1995, the women's-to-men's earnings ratio based on the annual earnings figures was 71.4 percent for persons employed year-round, full-time. The ratio based on the monthly CPS data was 75.5 percent for full-time workers.

Both these ratios are simple comparisons of the earnings of all the men and women in the defined universe. There are no controls for differences between men and women in measurable demographic or work-related characteristics, such as age, education, and experience, nor do the ratios take into account differences in men's and women's occupational distributions.

There are several conceptual and methodological differences between the annual and weekly earnings data series. For example, the annual earnings estimates include earnings from all jobs held during the year and earnings from both wage and salary employment and self employment. The weekly earnings estimates pertain to the primary job only and

include only wage and salary earnings. Given these differences, it is not surprising that the women's-to-men's earnings ratios based on the two data series differ somewhat, but we know of no research that allows us to identify the specific contributing factors.

Regarding the trend in the women's-to-men's earnings ratio, I have enclosed tables that show the BLS data series on median usual weekly earnings for women and men from 1979 to 1996 by various characteristics, as well as the women's-to-men's earnings ratio for that period (see Enclosures 1, 2, and 3). As you can see, with the exception of a brief pause in the late-1980's, the women's-to-men's earnings ratio rose steadily from 1979 to 1993. Several factors contributed to the shrinking of the female-versus-male earnings differential over this period, including rapid increases in the educational attainment of employed women and the movement of women into more highly paid managerial and professional occupations. Between 1994 and 1996, the overall ratio of women's-to-men's median earnings edged down, although, as shown in the enclosed tables, there has been some variation by age, education, and level of earnings. (The decline in the women's-to-men's earnings ratio in 1994 reflects, at least in part, the major redesign of the CPS that took effect in that year.)

The recent decline in women's relative earnings may reflect a number of factors such as the impact of the business cycle on earnings, secular changes in occupation and industry concentrations, and the trends in women's and men's years of work experience and level of educational attainment. Sorting through these various effects would require in-depth analysis that is beyond the scope of this letter.

In response to your second question, BLS has not conducted studies of the impact of international trade and imports on the overall CPI since the major revision of the index that was implemented in 1987. Prior to that revision, the CPI program had a general provision for "Country-of-origin"

codes, which enabled us, with limited success, to identify imported items and track their direct contributions to changes in the CPI. Over time, however, we lost confidence in the accuracy of our measurement of the importance of imports. It is relatively easy to identify imports at the border, as goods are shipped into the country, but much more difficult in retail outlets. The difficulties may be as mundane as labels indicating country of origin being concealed by plastic packaging. For items in many categories--produce is a good example--country-of-origin information may be burdensome for our respondents to supply and thus difficult for us to collect. Difficulties also arise as a consequence of the production and distribution system having grown more complex. Many goods are produced by multinational firms, and the determination of such items' foreign content is subject to the sometimes-arbitrary cost-accounting procedures of those firms. A further consideration is that imports may have indirect effects on inflation that our direct measurements of imported goods' prices could not capture. Increases in the price of imported oil, for example, will affect the prices of transportation services, which contribute to the retail costs of many items. Conversely, import competition may constrain the ability of domestic firms to increase prices.

I should mention that for some items, particularly in the apparel area, we have resumed the collection of data regarding the country of origin over the past four years. For these items, country of origin has become more important in advertising and may affect the perceived quality of the items.

As a general matter, the BLS has focused its research efforts on the improvement of its measures. While interesting and important, the relationships between exchange rates and import prices, and between the volume of imports and the pricing behavior of domestic firms, are subjects in which the BLS has no special competence.

In response to your third question, which concerned past and planned future improvements to the CPI, I am enclosing an

additional copy of a paper, entitled "Measurement Issues in the Consumer Price Index," that we recently furnished to all members of the Joint Economic Committee (see Enclosure 4). This paper was requested by Congressman Jim Saxton in a letter dated January 28, 1997. As noted on page 9 of this paper, in 1995 and 1996 we made several changes to eliminate formula bias in the CPI; we have estimated that these changes reduced the rate of growth of the index by approximately 0.24 percentage point per year. In addition, we are currently investigating an experimental CPI that uses a geometric mean formula in the calculation of CPI component indexes. As noted on page 25 of the paper, partial adoption of this approach in the official CPI would be expected to have a downward impact on its growth rate of between zero and one-quarter of one percent a year. Other changes that we have made and that we have planned include the January 1997 change in the hospital and related services component and the January 1998 updating of the CPI market basket. These and other improvements are discussed in the concluding section VII of the paper.

In response to your fourth question, I am enclosing a series of tables that may shed light on the joblessness situation in New York City, per your request. Unemployment in New York City has been above the U.S. average over most of the past 30 years, with 1987 and 1988 being the most notable exceptions (see Table A). The jobless rate in the city began to rise before the most recent national upturn and, unlike the rate in most areas, has failed to return to pre-recession levels (see Chart 1). In 1996, New York City's unemployment rate was about the same as that for some other major cities, such as Los Angeles and Washington, D.C., places where the 1996 rate also remained well above the 1990 figure (see Table B).

For all major demographic groups in the city, labor force participation rates and employment-population ratios are substantially lower than the U.S average, and unemployment rates are noticeably higher (see Table C). New York's unemployment rates are also well above the U.S. average for most major industries and occupations (see Tables D and E).

Honorable Carolyn B. Maloney--5

JUL 17 1997

A substantially-larger-than-average share of the city's employed population is comprised of African Americans and Hispanics (see Table F).

I hope you find these responses to be informative and the enclosed materials useful. If I can provide further assistance to you on any of these topics, please let me know. Philip Rones, Assistant Commissioner for Current Employment Analysis, on 202--606-6378, would be happy to answer any followup questions from your staff concerning labor force data and John Greenlees, Assistant Commissioner for the Division of Consumer Prices and Price Indexes, on 202--606-6950, may be contacted regarding the CPI.

Sincerely yours,

Katharine Abraham

KATHARINE G. ABRAHAM
Commissioner

Enclosures

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May 20, 1997

The Honorable Katharine G. Abraham, Commissioner
Bureau of Labor Statistics
United States Department of Labor
2 Massachusetts Avenue, N.E., Room 4040
Washington, DC 20212

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Sincerely,

Carolyn B. Maloney
Member, Joint Economic Committee

cc: The Honorable Jim Saxton, Chairman, Joint Economic Committee
Ms. Colleen Healy

Table 2. Median usual weekly earnings of full-time wage and salary workers, by sex, age, race, and Hispanic origin, quarterly averages (not seasonally adjusted) and annual averages, 1979-96

Characteristic	Annual averages																	
	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
SEX AND AGE																		
Both sexes																		
Total, 16 years and over	$240	$261	$283	$302	$313	$326	$343	$358	$373	$385	$399	$412	$426	$440	$459	$467	$479	$490
16 to 24 years	172	187	200	208	210	217	223	231	242	249	259	269	277	276	282	286	292	298
16 to 19 years	144	156	161	164	163	168	173	178	185	195	204	209	213	212	214	221	231	240
20 to 24 years	185	200	213	220	222	230	240	248	258	265	276	285	291	290	297	300	306	312
25 years and over	265	286	308	326	343	361	378	391	403	414	427	449	467	479	491	500	510	520
25 to 54 years	266	287	309	328	344	362	379	391	403	414	429	450	468	479	492	501	511	521
25 to 34 years	255	275	296	311	321	335	349	360	373	383	394	407	415	422	436	439	451	463
35 to 44 years	280	301	325	353	369	389	405	418	435	449	472	486	498	503	517	527	550	559
45 to 54 years	276	297	320	345	366	385	400	415	429	452	472	489	507	522	542	566	582	594
55 years and over	255	276	301	319	337	356	374	389	398	411	420	440	457	472	483	490	502	518
55 to 64 years	261	284	308	325	346	365	380	396	405	419	431	457	469	483	492	501	514	535
65 years and over	198	203	222	253	260	271	296	298	310	323	334	343	381	378	393	384	389	384
Men																		
Total, 16 years and over	291	312	339	364	378	391	406	419	433	449	468	481	493	501	510	522	538	557
16 to 24 years	196	208	218	224	223	231	240	245	257	261	271	282	285	284	288	294	303	307
16 to 19 years	154	162	167	170	167	174	182	185	195	209	209	218	219	218	221	228	244	251
20 to 24 years	210	223	237	244	241	250	258	264	274	279	290	298	300	297	303	307	315	321
25 years and over	314	339	371	393	406	422	442	462	477	487	500	512	523	536	555	576	588	599
25 to 54 years	315	340	372	393	406	421	441	459	475	485	498	511	521	533	553	575	586	596
25 to 34 years	295	316	339	357	370	382	393	401	411	420	434	449	458	466	476	479	490	499
35 to 44 years	335	367	397	422	442	471	486	498	510	517	540	560	574	581	596	617	624	632
45 to 54 years	337	366	396	418	443	469	488	505	519	549	569	591	612	634	653	671	685	698
55 years and over	305	334	368	393	409	427	455	478	488	501	512	527	551	564	576	591	611	628
55 to 64 years	312	344	377	398	416	439	467	484	495	508	521	546	563	579	586	603	623	643
65 years and over	219	228	266	300	308	327	367	358	380	394	393	403	467	421	451	441	441	477
Women																		
Total, 16 years and over	182	201	219	238	252	265	277	290	303	315	328	346	366	380	393	399	406	418
16 to 24 years	154	167	180	191	197	203	210	218	226	235	246	256	266	267	273	276	275	284
16 to 19 years	131	145	156	157	158	161	165	169	171	184	197	198	205	205	205	211	215	223
20 to 24 years	161	174	191	201	207	213	221	231	241	251	260	269	280	280	289	290	291	298
25 years and over	194	212	233	254	267	282	296	308	321	335	351	369	387	400	415	421	428	444
25 to 54 years	196	214	235	256	269	285	298	310	323	338	354	373	390	403	418	425	433	448
25 to 34 years	199	218	239	257	271	284	295	305	316	326	340	356	371	382	395	397	403	415
35 to 44 years	195	214	237	258	271	291	307	319	336	353	370	390	408	418	435	436	453	463
45 to 54 years	192	208	226	251	263	278	291	308	324	339	357	377	398	417	440	450	464	481
55 years and over	187	202	218	241	253	265	281	292	302	312	328	342	358	371	389	391	398	410
55 to 64 years	188	204	222	246	257	269	284	295	308	317	333	348	363	376	395	398	403	420
65 years and over	170	174	188	211	211	218	242	255	260	279	292	300	319	328	335	336	353	334

Source: Unpublished tabulations from the Current Population Survey, U.S. Department of Labor, Bureau of Labor Statistics. Data for 1994 and later years are not strictly comparable with data for earlier years.

Table 2. Median usual weekly earnings of full-time wage and salary workers, by sex, age, race, and Hispanic origin, quarterly averages (not seasonally adjusted) and annual averages, 1979-96

Characteristic	Annual averages																	
	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
WOMEN'S-TO-MEN'S EARNINGS RATIO (Percent)																		
Total																		
Total, 16 years and over	62.5	64.4	64.6	65.4	66.7	67.8	68.2	69.2	70.0	70.2	70.1	71.9	74.2	75.8	77.1	76.4	75.5	75.0
16 to 24 years	78.6	80.3	82.6	85.3	88.3	87.9	87.5	89.0	87.9	90.0	90.8	90.1	93.3	94.0	94.8	93.9	90.8	92.5
16 to 19 years	85.1	89.5	92.2	92.4	94.6	92.5	90.7	91.4	87.7	89.8	94.3	90.8	93.6	94.0	92.8	92.5	88.1	88.8
20 to 24 years	76.7	78.0	80.6	82.4	85.9	85.2	85.7	87.5	88.0	90.0	89.7	90.3	93.3	94.3	95.4	94.5	92.4	92.8
25 years and over	61.8	62.5	62.8	64.6	65.8	66.8	67.0	66.7	67.3	68.8	70.2	72.1	74.0	74.6	74.8	73.1	72.8	74.1
25 to 54 years	62.2	62.9	63.2	65.1	66.3	67.7	67.6	67.5	68.0	69.7	71.1	73.0	74.9	75.6	75.6	73.9	73.9	75.2
25 to 34 years	67.5	69.4	70.5	72.0	73.2	74.3	75.1	76.1	76.9	77.6	78.3	79.3	81.0	82.0	83.0	82.9	82.2	83.2
35 to 44 years	58.2	58.3	59.7	61.1	61.3	61.8	63.2	64.1	65.9	68.3	68.3	69.6	70.8	71.9	73.0	70.7	72.6	73.3
45 to 54 years	57.0	56.8	56.8	60.0	59.4	59.3	59.6	61.0	62.4	61.7	62.7	63.8	65.0	65.8	67.4	67.1	67.7	68.9
55 years and over	61.3	60.5	59.2	61.3	61.9	62.1	61.8	61.1	62.1	62.3	64.1	64.9	65.0	65.8	67.5	66.2	65.1	65.3
55 to 64 years	60.3	59.3	58.9	61.3	61.8	61.3	60.8	61.0	62.2	62.4	63.9	63.7	64.5	64.9	67.4	66.0	64.7	65.3
65 years and over	77.6	76.3	70.7	70.3	68.5	66.7	65.9	71.2	68.4	70.8	74.3	74.4	68.3	77.9	74.3	76.2	80.0	70.0
White																		
Total, 16 years and over	61.7	63.3	63.0	64.3	65.6	67.0	67.4	67.9	68.2	68.4	69.3	71.5	73.7	75.3	76.5	74.6	73.3	73.8
16 to 24 years	77.9	79.2	82.3	84.3	87.7	86.9	86.5	88.0	87.1	89.1	89.9	89.5	92.7	93.4	93.9	93.6	90.6	92.3
25 years and over	61.4	61.8	61.8	64.2	65.3	66.1	65.4	65.6	66.8	68.4	69.7	71.9	73.2	72.7	73.1	72.9	72.7	74.1
25 to 54 years	61.5	62.2	62.5	64.7	65.9	67.0	66.3	66.3	67.9	69.5	70.8	72.9	73.4	73.9	74.0	74.0	73.9	75.4
55 years and over	60.7	59.6	58.5	61.0	61.3	61.4	60.1	60.4	61.4	61.9	63.7	62.8	62.9	64.6	66.8	65.9	64.5	64.0
Black																		
Total, 16 years and over	74.4	75.8	76.5	78.1	78.8	79.8	82.9	82.7	84.4	83.0	86.5	85.3	86.1	88.2	88.8	86.5	86.4	87.9
16 to 24 years	86.2	91.3	89.0	92.7	94.8	90.9	97.0	93.4	96.7	97.3	98.2	94.0	97.6	94.5	101.6	97.3	93.2	94.9
25 years and over	72.2	73.5	75.1	76.4	78.0	77.3	81.5	80.5	80.8	79.6	82.8	82.7	85.4	87.3	87.9	84.9	83.9	86.4
25 to 54 years	71.9	73.8	75.6	76.9	78.4	77.9	82.2	80.9	80.7	80.0	83.3	83.0	85.7	88.3	88.4	86.1	84.4	86.8
55 years and over	73.6	71.9	71.8	72.4	72.2	70.6	74.6	75.4	81.1	73.5	78.0	79.7	81.6	78.9	82.9	76.9	79.0	79.3
Hispanic																		
Total, 16 years and over								80.6	82.0	84.7	85.4	87.4	90.4	89.1	90.5	88.9	87.1	88.8
16 to 24 years								95.8	95.9	96.9	95.3	91.6	92.9	100.4	98.8	92.9	90.2	100.0
25 years and over								78.2	78.3	81.7	81.4	81.6	83.8	84.3	86.0	84.0	83.2	84.9
25 to 54 years								79.0	78.6	81.9	81.8	82.0	84.7	85.6	87.7	85.7	83.7	85.1
55 years and over								71.1	74.2	76.5	77.5	77.7	74.9	66.6	73.9	70.4	76.8	81.7

Source: Unpublished tabulations from the Current Population Survey, U.S. Department of Labor, Bureau of Labor Statistics. Data for 1994 and later years are not strictly comparable with data for earlier years.

Enclosure 2

Median usual weekly earnings of full-time wage and salary workers 25 years and over by sex and educational attainment, annual averages, 1979-96

Total, both sexes

Year	Total	Less than 4 years	4 years of high school or more					College, 4 years or more	
			Total	High school, 4 years	College, 1			Total	4 years only
1979	$265	$210	$280	$249	$282			$344	$320
1980	286	222	302	266	304			376	352
1981	308	240	324	286	324			407	385
1982	327	248	349	302	351			438	410
1983	343	256	365	311	363			461	423
1984	362	263	382	323	382			486	454
1985	379	270	398	333	399			506	481
1986	391	278	410	344	409			525	497
1987	403	284	422	356	421			564	513
1988	414	288	438	368	430			585	527
1989	427	297	457	375	452			609	563
1990	449	303	477	386	476			638	595
1991	467	307	490	397	489			666	607

	Total	Less than a high school diploma	High school graduate or more					College graduates	
			Total	High school graduates, no college	Some college or associate degree			Total	Bachelor's degree
					Total	Some college, no degree	Associate degree		
1992	$480	$312	$499	$404	$485	$475	$509	$697	$640
1993	493	316	512	416	495	484	519	716	661
1994	500	307	522	421	499	487	522	733	670
1995	510	309	538	432	508	496	537	747	686
1996	520	317	556	443	518	504	556	758	697

NOTE: Since 1992, data on educational attainment have been based on the "highest diploma or degree received" rather than the "number of years of school completed." Data, beginning in 1994, are not directly comparable with data for 1993 and earlier years due to the introduction of a major redesign of the Current Population Survey questionnaire and collection methodology. For additional information, see "Revisions in the Current Population Survey Effective January 1994," in the February 1994 issue of Employment and Earnings, a periodical published monthly by the Bureau of Labor Statistics. Data for 1990, 1991, and 1994 forward incorporate 1990 census-based population controls, adjusted for the estimated undercount.

Source: Bureau of Labor Statistics, Current Population Survey.

Median usual weekly earnings of full-time wage and salary workers 25 years and over by sex and educational attainment, annual averages, 1979-96
Total, men

Year	Total	Less than 4 years	4 years of high school or more						College, 4 years or more	
			Total	High school, 4 years	College, 1				Total	4 years only
1979	$314	$252	$334	$308	$329				$396	$381
1980	339	267	363	327	358				427	411
1981	372	286	393	356	389				475	453
1982	393	293	415	374	411				503	489
1983	407	301	430	388	422				518	500
1984	422	308	453	399	446				562	523
1985	443	314	476	407	472				590	557
1986	463	321	488	416	485				618	587
1987	477	324	499	423	497				653	608
1988	487	332	510	437	503				679	621
1989	500	346	523	450	517				705	650
1990	512	349	547	459	542				741	683
1991	523	349	567	470	563				764	704

	Total	Less than a high school diploma	High school graduate or more					College graduates	
			Total	High school graduates, no college	Some college or associate degree			Total	Bachelor's degree
					Total	Some college, no degree	Associate degree		
1992	$539	$355	$579	$480	$557	$541	$587	$793	$736
1993	559	360	592	488	574	564	591	807	757
1994	576	342	607	496	587	578	607	826	756
1995	588	347	618	507	596	588	613	845	771
1996	599	357	631	516	604	593	625	874	795

NOTE: Since 1992, data on educational attainment have been based on the "highest diploma or degree received" rather than the "number of years of school completed." Data, beginning in 1994, are not directly comparable with data for 1993 and earlier years due to the introduction of a major redesign of the Current Population Survey questionnaire and collection methodology. For additional information, see "Revisions in the Current Population Survey Effective January 1994," in the February 1994 issue of Employment and Earnings, a periodical published monthly by the Bureau of Labor Statistics. Data for 1990, 1991, and 1994 forward incorporate 1990 census-based population controls, adjusted for the estimated undercount.

Source: Bureau of Labor Statistics, Current Population Survey.

Median usual weekly earnings of full-time wage and salary workers 25 years and over by sex and educational attainment, annual averages, 1979-96

Total, women

Year	Total	Less than 4 years	4 years of high school or more						
			Total	High school, 4 years	College, 1			College, 4 years or more	
								Total	4 years only
1979	$195	$152	$206	$185	$211			$264	$244
1980	213	164	224	201	231			290	269
1981	233	175	247	217	255			318	294
1982	255	184	269	236	274			346	318
1983	268	195	282	246	288			369	338
1984	283	200	298	259	305			390	362
1985	296	202	311	268	317			414	385
1986	308	208	323	277	330			436	401
1987	321	214	340	288	347			466	423
1988	335	221	355	298	360			485	444
1989	351	231	371	304	379			507	468
1990	369	240	388	315	395			535	498
1991	387	250	405	328	409			562	511

			High school graduate or more						
					Some college or associate degree			College graduates	
	Total	Less than a high school diploma	Total	High school graduates, no college	Total	Some college, no degree	Associate degree	Total	Bachelor's degree
1992	$400	$256	$416	$337	$408	$395	$445	$594	$545
1993	416	264	435	348	423	407	471	611	573
1994	421	257	442	351	423	408	461	634	587
1995	428	262	451	356	427	412	468	644	598
1996	444	268	466	365	442	423	482	657	608

NOTE: Since 1992, data on educational attainment have been based on the "highest diploma or degree received" rather than the "number of years of school completed." Data, beginning in 1994, are not directly comparable with data for 1993 and earlier years due to the introduction of a major redesign of the Current Population Survey questionnaire and collection methodology. For additional information, see "Revisions in the Current Population Survey Effective January 1994," in the February 1994 issue of Employment and Earnings, a periodical published monthly by the Bureau of Labor Statistics. Data for 1990, 1991, and 1994 forward incorporate 1990 census-based population controls, adjusted for the estimated undercount.

Source: Bureau of Labor Statistics, Current Population Survey.

Median usual weekly earnings of full-time wage and salary workers 25 years and over by sex and educational attainment, annual averages, 1979-96
Women's-to-men's earnings ratio

Year	Total	Less than 4 years	4 years of high school or more					College, 4 years or more	
			Total	High school, 4 years	College, 1			Total	4 years only
1979	62.1	60.3	61.7	60.1	64.1			66.7	64.0
1980	62.8	61.4	61.7	61.5	64.5			67.9	65.5
1981	62.6	61.2	62.8	61.0	65.6			66.9	64.9
1982	64.9	62.8	64.8	63.1	66.7			68.8	65.0
1983	65.8	64.8	65.6	63.4	68.2			71.2	67.6
1984	67.1	64.9	65.8	64.9	68.4			69.4	69.2
1985	66.8	64.3	65.3	65.8	67.2			70.2	69.1
1986	66.5	64.8	66.2	66.6	68.0			70.6	68.3
1987	67.3	66.0	68.1	68.1	69.8			71.4	69.6
1988	68.8	66.6	69.6	68.2	71.6			71.4	71.5
1989	70.2	66.8	70.9	67.6	73.3			71.9	72.0
1990	72.1	68.8	70.9	68.6	72.9			72.2	72.9
1991	74.0	71.6	71.4	69.8	72.6			73.6	72.6

	Total	Less than a high school diploma	High school graduate or more					College graduates	
			Total	High school graduates, no college	Some college or associate degree			Total	Bachelor's degree
					Total	Some college, no degree	Associate degree		
1992	74.2	72.1	71.8	70.2	73.2	73.0	75.8	74.9	74.0
1993	74.4	73.3	73.5	71.3	73.7	72.2	79.7	75.7	75.7
1994	73.1	75.1	72.8	70.8	72.1	70.6	75.9	76.8	77.6
1995	72.8	75.5	73.0	70.2	71.6	70.1	76.3	76.2	77.6
1996	74.1	75.1	73.9	70.7	73.2	71.3	77.1	75.2	76.5

NOTE: Since 1992, data on educational attainment have been based on the "highest diploma or degree received" rather than the "number of years of school completed." Data, beginning in 1994, are not directly comparable with data for 1993 and earlier years due to the introduction of a major redesign of the Current Population Survey questionnaire and collection methodology. For additional information, see "Revisions in the Current Population Survey Effective January 1994," in the February 1994 issue of Employment and Earnings, a periodical published monthly by the Bureau of Labor Statistics. Data for 1990, 1991, and 1994 forward incorporate 1990 census-based population controls, adjusted for the estimated undercount.

Source: Bureau of Labor Statistics, Current Population Survey.

Table 2. Usual weekly earnings of full-time wage and salary workers 25 years and over, by upper limits of selected quartiles and deciles, 1979-96 annual averages

Total, both sexes

Year	Upper limit of:					Upper limit of:					
	First decile	First quartile	Second quartile (median)	Third quartile	Ninth decile	First decile	First quartile	Second quartile (median)	Third quartile	Ninth decile	CPI-U (1982-84=100)
	In current dollars					In constant (1996) dollars					
1979	$135	$185	$265	$369	$493	$292	$400	$573	$797	$1,065	72.6
1980	146	199	286	399	522	278	379	545	760	994	82.4
1981	159	215	308	430	582	274	371	532	742	1,005	90.9
1982	167	228	327	467	619	272	371	532	759	1,006	96.5
1983	175	238	343	487	658	276	375	540	767	1,037	99.6
1984	181	249	362	507	699	273	376	547	766	1,056	103.9
1985	185	258	379	522	730	270	376	553	761	1,064	107.6
1986	190	267	391	550	764	272	382	560	787	1,094	109.6
1987	195	277	403	577	798	269	383	557	797	1,102	113.6
1988	202	285	414	596	824	268	378	549	790	1,093	118.3
1989	209	293	427	617	867	264	371	540	781	1,097	124.0
1990	220	304	450	646	909	264	365	540	775	1,091	130.7
1991	230	314	468	674	950	265	362	539	776	1,094	136.2
1992	234	321	480	694	982	262	359	537	776	1,098	140.3
1993	241	331	493	716	1,000	262	359	535	777	1,086	144.5
1994	238	331	500	738	1,035	252	350	529	781	1,096	148.2
1995	244	339	510	754	1,069	251	349	525	776	1,101	152.4
1996	250	348	520	771	1,113	250	348	520	771	1,113	156.9

Source: Unpublished tabulations from the Current Population Survey, U.S. Department of Labor, Bureau of Labor Statistics. Data for 1994 and later years are not strictly comparable with data for earlier years.

Table 2. Usual weekly earnings of full-time wage and salary workers 25 years and over, by upper limits of selected quartiles and deciles, 1979-96 annual averages

Total, men

Year	Upper limit of:					Upper limit of:					
	First decile	First quartile	Second quartile (median)	Third quartile	Ninth decile	First decile	First quartile	Second quartile (median)	Third quartile	Ninth decile	CPI-U (1982-84=100)
	In current dollars					In constant (1996) dollars					
1979	$171	$231	$314	$415	$542	$370	$499	$679	$897	$1,171	72.6
1980	183	249	339	455	598	348	474	645	866	1,139	82.4
1981	194	269	372	493	647	335	464	642	851	1,117	90.9
1982	200	281	393	519	707	325	457	639	844	1,150	96.5
1983	205	289	407	548	752	323	455	641	863	1,185	99.6
1984	213	299	422	582	785	322	452	637	879	1,185	103.9
1985	218	308	443	604	816	318	449	646	881	1,190	107.6
1986	224	316	463	624	867	321	452	663	893	1,241	109.6
1987	231	324	477	656	911	319	447	659	906	1,258	113.6
1988	237	334	487	683	971	314	443	646	906	1,288	118.3
1989	244	343	500	707	985	309	434	633	895	1,246	124.0
1990	254	358	514	735	1,006	305	430	617	882	1,208	130.7
1991	261	367	525	758	1,022	301	422	605	873	1,177	136.2
1992	264	373	539	777	1,078	295	417	603	869	1,206	140.3
1993	272	383	559	799	1,117	295	416	607	868	1,213	144.5
1994	270	382	576	828	1,160	286	404	610	877	1,228	148.2
1995	276	391	588	850	1,201	284	403	605	875	1,236	152.4
1996	279	398	599	874	1,236	279	398	599	874	1,236	156.9

Source: Unpublished tabulations from the Current Population Survey, U.S. Department of Labor, Bureau of Labor Statistics. Data for 1994 and later years are not strictly comparable with data for earlier years.

Table 2. Usual weekly earnings of full-time wage and salary workers 25 years and over, by upper limits of selected quartiles and deciles, 1979-96 annual averages

Total, women

Year	Upper limit of:					Upper limit of:					
	First decile	First quartile	Second quartile (median)	Third quartile	Ninth decile	First decile	First quartile	Second quartile (median)	Third quartile	Ninth decile	CPI-U (1982-84=100)
	In current dollars					In constant (1996) dollars					
1979	$110	$146	$195	$260	$338	$238	$316	$421	$562	$730	72.6
1980	128	159	213	287	375	244	303	406	546	714	82.4
1981	138	175	233	315	413	238	302	402	544	713	90.9
1982	144	187	255	346	451	234	304	415	563	733	96.5
1983	150	196	268	367	480	236	309	422	578	756	99.6
1984	155	205	283	389	509	234	310	427	587	769	103.9
1985	159	212	296	410	532	232	309	432	598	776	107.6
1986	165	221	308	427	570	236	316	441	611	816	109.6
1987	172	231	321	455	601	238	319	443	628	830	113.6
1988	178	240	335	476	630	236	318	444	631	836	118.3
1989	185	250	351	497	675	234	316	444	629	854	124.0
1990	194	263	370	519	711	233	316	444	623	854	130.7
1991	205	277	388	548	751	236	319	447	631	865	136.2
1992	211	286	400	577	785	236	320	447	645	878	140.3
1993	219	294	416	599	816	238	319	452	650	886	144.5
1994	213	293	421	613	853	226	310	446	649	903	148.2
1995	220	299	428	627	868	226	308	441	646	894	152.4
1996	227	307	444	646	902	227	307	444	646	902	156.9

Source: Unpublished tabulations from the Current Population Survey, U.S. Department of Labor, Bureau of Labor Statistics. Data for 1994 and later years are not strictly comparable with data for earlier years.

Table 2. Usual weekly earnings of full-time wage and salary workers 25 years and over, by upper limits of selected quartiles and deciles, 1979-96 annual averages

Ratio of women's to men's earnings

Year	Upper limit of: First decile	First quartile	Second quartile (median)	Third quartile	Ninth decile
1979	64.3	63.2	62.1	62.7	62.4
1980	69.9	63.9	62.8	63.1	62.7
1981	71.1	65.1	62.6	63.9	63.8
1982	72.0	66.5	64.9	66.7	63.8
1983	73.2	67.8	65.8	67.0	63.8
1984	72.8	68.6	67.1	66.8	64.8
1985	72.9	68.8	66.8	67.9	65.2
1986	73.7	69.9	66.5	68.4	65.7
1987	74.5	71.3	67.3	69.4	66.0
1988	75.1	71.9	68.8	69.7	64.9
1989	75.8	72.9	70.2	70.3	68.5
1990	76.4	73.5	72.0	70.6	70.7
1991	78.5	75.7	73.9	72.3	73.5
1992	79.9	76.7	74.2	74.3	72.8
1993	80.5	76.8	74.4	75.0	73.1
1994	78.9	76.7	73.1	74.0	73.5
1995	79.7	76.5	72.8	73.8	72.3
1996	81.4	77.1	74.1	73.9	73.0

Source: Unpublished tabulations from the Current Population Survey, U.S. Department of Labor, Bureau of Labor Statistics. Data for 1994 and later years are not strictly comparable with data for earlier years.

Enclosure 4

MEASUREMENT ISSUES IN THE CONSUMER PRICE INDEX*

Bureau of Labor Statistics

U.S. Department of Labor

June 1997

*Prepared in response to a letter from Jim Saxton, Chairman of the Joint Economic Committee, to Katharine Abraham, Commissioner of the Bureau Labor Statistics, dated January 28, 1997.

I. Introduction

This paper on the Consumer Price Index (CPI) has been prepared in response to a letter from Jim Saxton, Chairman of the Joint Economic Committee, to Katharine Abraham, Commissioner of the Bureau Labor Statistics, dated January 28, 1997. The letter requested "a serious, detailed response by the professional career staff of the Bureau of Labor Statistics (BLS)...to fully inform Congress, the media, and the public of the central issues raised by the Boskin Commission report, and the BLS response to them."

The following pages address the definition and measurement objective of the CPI, together with the BLS response to the estimates of bias put forward in the final report of the Advisory Commission to Study the Consumer Price Index and to the specific recommendations made to the Bureau by the commission. Decisions concerning whether and how the CPI should be used in escalation, however, lie outside the purview of a statistical agency such as the BLS, so the budgetary implications of any bias in the CPI are not discussed.

The Advisory Commission to Study the Consumer Price Index (CPI), established by the Senate Finance Committee and chaired by Michael Boskin, delivered its final report on December 4, 1996.[1] The present paper summarizes the response of the Bureau of Labor Statistics to the findings of the commission.

The advisory commission compares the U.S. CPI to a hypothetical ideal measure of the change in the cost of living and concludes that in several respects the CPI is biased relative to this standard. The categories of bias discussed by the commission include: substitution bias (due in large part to the fixed-weight nature of the index), outlet bias (which may occur if the benefits to consumers from switching to discount outlets are not accounted for in the index), quality change bias (which results when the quality differences between the goods priced in two consecutive periods cannot be accurately measured and deducted from the accompanying price

[1] U.S. Senate, Committee on Finance, *Final Report of the Advisory Commission to Study the Consumer Price Index.* Print 104-72, 104 Cong., 2 sess.. (Washington, D.C., Government Printing Office, 1996).

difference between the goods), and new product bias (due to the failure to reflect adequately the value to consumers of new products that are introduced into the market). The commission, using empirical evidence and the members' own judgments about the magnitude of these biases, concludes that the CPI overstates the true cost-of-living change by 1.1 percentage points per year. The commission also discusses the fiscal impact of CPI bias through its use as an adjustment factor in several areas of the federal budget, including Social Security, military and civil service retirement, and the income tax.

The advisory commission emphasizes that the U.S. economy is exceedingly complex and dynamic, with the available offerings of goods and services constantly changing. It also acknowledges that index number construction is a complex and difficult task. It recommends that the BLS make several changes in the methods used in constructing the CPI, including more frequent updates of the market basket and expenditure information required by the index and the use of formulas more consistent with the theoretical cost-of-living concept. Most prominently and fundamentally, the commission recommends explicitly adopting the cost-of-living index as the measurement objective of the CPI, replacing the current index by two indexes—a monthly index that takes account of the changing market basket and a second annual index calculated using a "superlative" formula and subject to revision—and using geometric means for aggregating elementary price quotes. The commission also makes several intermediate and longer run methodological and research recommendations.

The objectives of the present paper are: first, to discuss the relationship of the CPI to the conceptual cost-of-living index; second, to review and critique the advisory commission's estimates of bias; and third, to respond to the detailed recommendations made by the commission. The advisory commission's report also raises a number of issues that will not be addressed here. These include: first, the various uses of the CPI; second, the revenue impacts of changes in the CPI; third, recommendations made to Congress and to the economics profession; fourth, separate indexes for demographic subgroups of the population; and fifth, the potential impact of including social and environmental factors (such as crime, AIDS, and pollution) in an

official index. The first three of these topics generally involve the formulation of policy and so are outside the purview of the Bureau of Labor Statistics. The latter two are topics on which relatively little research has been conducted.[2]

II. The CPI in a Cost-of-Living Framework

The CPI is a measure of the average change in the prices paid by urban consumers for a fixed market basket of goods and services. Measuring price change through the use of a fixed market basket has a long history in economics, going back to the early 1700's in England.[3] Over time the state of the art for specification of the market basket has evolved from a judgmental selection of representative items to the modern survey-based approach of defining a comprehensive categorization of goods and services, selecting a representative sample of items to track, and weighting them according to the consumption of the average consumer during a base period.

The CPI is computed using an index number formula, known as the Laspeyres formula, that measures the change in the cost of a fixed market basket.[4] In this formula the quantities of the goods and services purchased by urban consumers during a base period serve as the weights for the prices, so that the value of the market basket represents the cost of purchasing the same items as were purchased during the base period. The CPI measures the current cost of the market basket relative to its cost during a reference period. In other words, the Laspeyres price index

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[2] For experimental index results for the poor and elderly subgroups, see Thesia I. Garner, David S. Johnson, and Mary F. Kokoski, "An Experimental Consumer Price Index for the Poor", *Monthly Labor Review*, vol. 119, no. 9, September, 1996, pp. 32- 42; and Nathan Amble and Ken Stewart, "Experimental Price Index for Elderly Consumers", *Monthly Labor Review*, vol. 117, no. 5, May, 1994, pp. 11-16. These experimental indexes simply reweight CPI price measures to reflect the expenditure patterns of the poor and the elderly, so the price measures are not necessarily representative of the outlets at which these groups shop or the specific items that they purchase. The non-market aspects of quality of life present conceptual and theoretical problems that have not been resolved and, thus, have not received a comprehensive empirical treatment to date.

[3] See W. E. Diewert, "The Early History of Price Index Research," in W. Erwin Diewert and Alice O. Nakamura, eds., *Essays in Index Number Theory*, Volume 1 (Amsterdam, North-Holland, 1993).

[4] The formula used by the BLS for the CPI is sometimes referred to as a "modified" Laspeyres formula because the market basket is representative of expenditures during an earlier period than the period in which it is first used for price comparisons.

answers the question: "What is the value of the base-period market basket in today's prices?" An important underlying assumption in the comparison of market basket values is that the price changes are measured net of any changes in the quality of the goods and services that may have occurred. Indeed, adjusting for changes in product quality is one of the main problems facing index number practitioners and is a problem to which the BLS devotes considerable effort.

The computation of the CPI is an undertaking that involves the collection of prices from approximately 7,300 housing units and 22,500 retail/service establishments each month. The CPI is constructed in two stages. In the first stage, often referred to as the "lower" level, the elementary indexes are constructed. These indexes are the 206 item category indexes constructed for each of the 44 urban areas from which prices are collected for specific items in specific outlets.[5] In the second stage, the "upper" level, the BLS combines the 206 item indexes formulated for the 44 index areas. Thus the overall U.S. CPI is an aggregation of 9,064 indexes.

To construct the market basket of goods and services, the BLS uses information from the Consumer Expenditure Survey (CEX). This is a household survey that collects comprehensive data on consumer spending. Currently the expenditure base period of the CPI is 1982-84, but with the revision scheduled for 1998 the base period will change to 1993-95. To measure price changes, a sample of outlets is selected from locations identified by consumers from the Point of Purchase Survey (POPS). Specific sample items are then selected from each sample outlet, to ensure that the market basket is representative of what households purchase and where they shop. To keep up with changing shopping patterns, the Bureau replaces about 20 percent of the outlet sample in every year, thus turning over the sample every five years.

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[5] Until January 1997 there were 207 strata of items. The construction of these indexes involves the random sampling of outlets and areas, and the use of an aggregation formula. The 27 largest Metropolitan Statistical Areas (MSA) along with Anchorage and Honolulu are selected as self-representing Primary Sampling Units (PSU) with certainty. To represent the remaining urban areas a random sample of representative PSU's is selected. The sample of areas underlying the CPI will change in January 1998 as part of the CPI Revision process, as discussed by Janet L. Williams, "The Redesign of the CPI Geographic Sample," *Monthly Labor Review*, 119, no. 12, December 1996, pp. 10-17.

The CPI is used for many purposes, but measurement of changes in the cost of living is one of the most important of these. The BLS has for many years used the concept of the cost-of-living index as a framework for making decisions about the CPI and accepts the COLI as the measurement objective for the index.[6] The cost-of-living index is a theoretical construct, however, not a single or straightforward index formula readily amenable to practical use.

The cost-of-living index compares the cost to the consumer at different points in time of maintaining a constant standard of well-being, without restrictions on the market basket. It is a theoretical concept based on the well-being of the individual consumer, so that additional assumptions about how to apply it as a measurement objective for an aggregated set of consumers (such as the U.S. urban population) must be made. In addition, for an aggregate measure, assumptions must be made about the implications of the distribution of prices paid for the same good across markets. The general cost-of-living theory does not prescribe how any compensation for changes in well-being would or should be administered. Thus, while the CPI may be described formally in the context of a cost-of-living index, there is no single all-purpose definition of this target.[7]

In the most general sense, the cost-of-living index answers the following question: "What is the minimum change in expenditure that would be required in order to leave a specified consumer unit indifferent (or as well off) between a specified reference period's prices and a comparison period's prices?"[8] The consumer's well-being depends on many aspects of life other than market goods and services, e.g., environmental quality and amenities (such as clean air and

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[6] For a discussion of the relationship of the CPI to the cost-of-living index, see Robert Gillingham, "A Conceptual Framework for the Consumer Price Index," *Proceedings of the American Statistical Association 1974 Business and Economic Statistics Section*, (Washington, D.C., American Statistical Association, 1974).

[7] To some extent, the definition of a price index is motivated by the uses for which it is intended; see Jack E. Triplett, "Escalation Measures: What is the Answer? What is the Question?" in W.E. Diewert and C. Montmarquette, eds., *Price Level Measurement: Proceedings from a Conference Sponsored by Statistics Canada* (Ottawa, Statistics Canada, 1983), pp. 457-87.

[8] An alternative formulation of the cost-of-living index is in terms of required income rather than expenditure. This formulation would imply the inclusion of income- and wage-based taxes. See, for example, Robert A. Pollak, "The Treatment of Taxes in the Consumer Price Index," in *The Theory of the Cost-of-Living Index* (New York, Oxford University Press, 1989), pp. 193-199, and Robert Gillingham and John S. Greenlees, "The Impact of Direct Taxes on the Cost of Living," *Journal of Political Economy*, 95, no. 4, August 1987, pp. 775-796.

low crime), goods provided through taxes (such as national defense and fire protection), health status, and future consumption goals (which depend on both current and expected future income, and savings). All of these aspects of life can, and do, change over time along with commodity and service prices. Most of these also are difficult to measure, and it would be even more difficult to translate them into measured increments to well-being. The cost-of-living index approximated by the CPI is a subindex of the all-encompassing cost-of-living concept, specifically a subindex that is conditional on the excluded factors that affect consumer well being, such as health status and the quantity and quality of government-provided goods and services.[9] The BLS defines the scope of the CPI to include only market goods and services or government-provided goods for which explicit user charges are assessed.

In the case of medical care, for example, the CPI includes direct out-of-pocket expenditures for medical care commodities and services, plus expenditures for the purchase of health insurance. This definition includes the employee-paid share of premiums for employer-provided health insurance coverage, as well as Medicare Part B monthly insurance premiums, but excludes the portion of income and payroll tax payments used to fund the provision of medical care for elderly and low-income beneficiaries. Although the advisory commission states that all medical care spending should be included in the CPI, the BLS believes that the exclusion of Medicaid and Medicare Part A is appropriate and consistent with the treatment of public schools and other tax-funded goods and services.[10]

Practical price index measures exist that do not hold the market basket of goods and services fixed at its original value. Some of these index measures, known as "superlative" indexes, have been shown theoretically to be closer to the cost-of-living concept than measures

[9] See Pollak, *Theory of the Cost-of-Living Index*, and Gillingham, "A Conceptual Framework."
[10] U.S. Senate, Committee on Finance, *Final Report*, p. 37. The proper treatment of employer-provided medical care, as well as other in-kind employee compensation, involves more difficult conceptual issues, and depends in part on the uses made of the index. See Ralph Turvey et al., *Consumer Price Indices: An ILO Manual* (Geneva, International Labour Office, 1989).

that track the cost of a fixed basket.[11] The major superlative indexes are the Fisher and Törnqvist measures. Using these formulas, one can construct an index that accounts for the changes that consumers make in the quantities of the goods and services they consume in response to changes in relative prices. By substituting goods that have become relatively cheaper for those that have become relatively more expensive, consumers can achieve the same standard of well-being for less than the cost of purchasing their original market basket. The difference between an index that accurately accounts for this substitution and an index that does not (e.g. the Laspeyres index used in the CPI) is known as *substitution bias*. Because the CPI holds the market basket fixed at base period quantities, it incurs substitution bias by putting too much weight on the relatively more expensive items from which consumers have shifted away. The superlative indexes, because they adjust for changes in consumer expenditures, tend to avoid this type of bias. The superlative indexes do, however, require estimation of the comparison period market basket. Because it takes time to collect and process consumer expenditure data, a superlative index can be produced only with a time lag.[12]

III. Review of Advisory Commission Bias Estimates

Substitution Bias

The Commission report produces two estimates of substitution bias in the CPI: one for the lower level of aggregation and one for the upper level of aggregation. At the lower level of aggregation individual price quotes are aggregated to form subindexes for each category of goods, such as apples, watches, or dental services. At the upper level of aggregation these

[11] See W. E. Diewert, "Exact and Superlative Index Numbers," in Diewert and Nakamura, eds., *Essays in Index Number Theory*, Volume 1, pp. 223-252.

[12] Whereas the BLS collects and processes CPI price data monthly, most CPI expenditure data are drawn from the CEX household interview survey, which is conducted quarterly. Fully edited expenditure data for a given year are not available until late in the following year. As will be described in section VII below, the BLS plans to take steps to expedite the processing of the CEX data, but updating of expenditure weights on a monthly basis would be prohibitively expensive.

subindexes are collected into an all-items index. The formula currently used to aggregate the individual price quotations to form the subindexes does not account for consumers' ability to substitute across items within item categories when the relative prices of those items change—for example, when the price of Delicious apples increases and the price of Granny Smith apples falls. Similarly, the formula used to aggregate the subindexes to form the overall CPI does not reflect the substitution across item categories that takes place when the relative prices of items in different categories change—for example, when the price of apples falls relative to the price of oranges.

For substitution bias at the upper level the commission's estimate of 0.15 percentage point per year is based on BLS research that compares indexes calculated using superlative formulas to an index calculated using the fixed-weight Laspeyres formula.[13] The BLS and the advisory commission essentially agree on the size and nature of the bias at this level.

Substitution bias at the lower level is sometimes confused with the separate problem of *formula bias*.[14] To understand what is meant by "formula bias," recall that the CPI measures the change in the cost of purchasing goods and services using a formula that weights each item's price by the quantity that was purchased during a base period. Because the household

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[13] The original research was published in Ana M. Aizcorbe and Patrick C. Jackman, "The Commodity Substitution Effect in CPI Data, 1982-1991," *Monthly Labor Review*, 116, no. 12, December 1993, pp. 25-33. These estimates subsequently have been updated by BLS staff. Until the introduction of the updated market basket in January 1998, the CPI may exceed the superlative indexes by somewhat more than this amount, as indicated by John S. Greenlees, "Expenditure Weight Updates and Measured Inflation," paper prepared for Third Meeting of the International Working Group on Price Indices, Voorburg, Netherlands, April 16-18, 1997 (Washington, D.C., Bureau of Labor Statistics); and Matthew D. Shapiro and David W. Wilcox, "Alternative Strategies for Aggregating Prices in the CPI," paper presented at Federal Reserve Bank of St. Louis Fall Policy Conference on Measuring Inflation and Real Growth, St. Louis, October 16-17, 1996 (University of Michigan).

[14] For example, the commission is unclear about whether, in their usage, substitution bias equals, includes, or is distinct from formula bias. At one point they state "...what we called 'formula bias' [we] now refer to as Lower Level Substitution Bias" (see U.S. Senate, Committee on Finance, *Final Report*, p. 19). Subsequently, they state "BLS has reduced so-called formula bias, the part of Lower Level Substitution Bias resulting in substantial measure from the introduction of sample rotation procedures" (p. 44). Then they state "Changing to geometric means will not only solve the 'formula bias' problem...but will also alleviate the below-stratum-level substitution bias" (p. 51). The last of these statements, indicating that formula bias and substitution bias are distinct phenomena, most closely agrees with definition of formula bias that was given when it was originally identified by BLS research; see Marshall B. Reinsdorf, "Price Dispersion, Seller Substitution, and the U.S. CPI," BLS working paper 252 (Washington, D.C., Bureau of Labor Statistics, 1994). Appendix A of the present paper describes an additional confusion with the commission's example of the related property of "time reversibility."

expenditure surveys give information on dollar expenditures rather than quantities, the CPI quantity weights must be derived indirectly, as expenditures divided by price. Until 1995 quantity weights for the items in the sample were formed by, first, projecting the initial price collected for each item backwards using information on price trends for similar items, and, then, dividing the appropriate expenditure figure by this backwards-projected price. This procedure, however, had an unintended consequence. Items that were on sale as of the point in time when they were first priced were systematically overweighted—expenditure divided by a low price gives a high quantity weight. Because the prices of sale items are apt to rise in subsequent months, this procedure imparted an upward bias, i.e., formula bias, to the index. The BLS introduced procedures (principally what is known as "seasoning") to eliminate this formula bias beginning in January 1995 for food-at-home and shelter, and June and July 1996 for all other items.

To calculate the lower level substitution bias the commission first asserts that the geometric means index is an unbiased estimate of the true cost-of-living index. They cite BLS research showing from June 1992-December 1994 the difference between the growth rate of the geometric means index and the CPI was 0.49 percentage point per year.[15] Then the commission makes an adjustment to take account for the changes made by the BLS during 1995 and 1996 to eliminate formula bias, which the BLS has estimated to have reduced the rate of growth of the CPI by 0.24 percentage point per year.[16] Their estimate of lower level substitution bias therefore is computed as the difference between 0.49 and 0.24, or 0.25 percentage point per year.

This estimate, however, may be too large. As described in Appendix A, the commission fails to mention several strong assumptions about the distribution of price changes that they

[15] The research paper cited by the commission is Brent R Moulton and Karin E. Smedley, "A Comparison of Estimators for Elementary Aggregates of the CPI," paper presented at Western Economic Association International conference, San Diego, July 7, 1995 (Washington, D.C., Bureau of Labor Statistics).

[16] See Robert McClelland, "Evaluating Formula Bias in Various Indexes Using Simulations," BLS working paper 289, 1996; and Brent R. Moulton, "Estimation of Elementary Indexes of the Consumer Price Index," paper presented at American Statistical Association conference, Chicago, August 5, 1996 (Washington, D.C., Bureau of Labor Statistics).

implicitly use when claiming that the geometric means index is unbiased, or to note that, under these same assumptions, the Laspeyres formula currently used by the BLS also is unbiased. There is, moreover, reason to believe that the assumptions in question may not hold for many or most of the CPI component strata. If they do not hold, the geometric means index still may be unbiased, but only if the elasticity of substitution is exactly equal to one.[17] If, on the other hand, this elasticity is zero, the "seasoned" Laspeyres used by the BLS will correctly show price change with no substitution.

As will be described in section IV, the BLS has made a commitment to evaluate the likely applicability of the geometric mean aggregation formula this year, item category by item category, and to make a decision by the end of the year about whether to adopt the geometric mean approach to calculating some components of the CPI. It is unlikely that the conditions necessary for the geometric mean formula to be unbiased will be found to hold in all cases. Thus, the commission's estimate of lower level substitution bias may be too large.

New Outlet Bias

The commission estimates that the entry of lower-priced outlets causes a bias of 0.1 percent per year. This estimate appears to be based on research conducted at the BLS by Reinsdorf, which compared price levels in newly selected outlet samples with price levels in outlet samples leaving the CPI.[18] His estimates imply a price decline of about 0.25 percent a year, which gives a figure of 0.1 percent per year on an assumption that 40 percent of the CPI is affected by new outlet bias.

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[17] The elasticity of substitution is a measure of consumer willingness to substitute between commodities and is defined by economists as the proportionate change of relative quantities demanded divided by the proportionate change of relative prices.

[18] See Marshall Reinsdorf, "The Effect of Outlet Price Differentials on the U.S. Consumer Price Index," in Murray F. Foss, Marilyn E. Manser and Allan H. Young, eds., *Price Measurements and Their Uses*, (Chicago, University of Chicago Press, 1993).

This estimate is subject to considerable uncertainty for three reasons. First, the effect of outlet entry is likely to vary from year to year, and Reinsdorf's data cover only two years from the late 1980's. Those years may be unrepresentative of long run trends. Second, Reinsdorf's estimates have large enough standard errors so that conservative statistical hypothesis tests would not rule out the hypothesis that the true effect of outlet changes is zero. Third, there is no assurance that the item categories studied by Reinsdorf, food and gasoline, are representative of other categories that may be subject to outlet bias.

Two additional considerations suggest that the estimate of 0.25 percent per year for the items affected by new outlet bias is too high. First, this bias estimate is based on an assumption that the new lower-priced outlets provide service of the same quality as the higher-priced incumbents. In many discount and off-price stores reductions in costly retailer services help make the low prices possible. (Examples of retailer services that might be less available at the lower-priced outlets include knowledgeable sales staff, breadth and depth of product assortment, assurance of item availability and quality, convenient location and hours, liberal return policy and store ambiance.) Furthermore, under some circumstances, entry by low-priced outlets with reduced services also could cause incumbents to reduce their services, thereby creating a downward bias unless adjustments for these quality reductions were made in the CPI. Indeed, because of the likelihood of quality declines, Reinsdorf interprets the 0.25 percent figure as an upper bound estimate of outlet bias in those components of the index where such bias might plausibly exist.

Second, changes other than entry of lower-priced outlets probably contribute to the price declines in Reinsdorf's data. Since 1978, the BLS has updated its sample of brands and product versions at the same time that it updates its outlet samples. Thus, if consumers were shifting over time to cheaper brands or product versions, these choices would be reflected, through the probability sampling methods used by the BLS, in selections of cheaper brands or product versions in the newly sampled outlets, making their price advantage appear larger than it really is. In a more recent study, Reinsdorf compares growth rates of sample average prices for food items

and CPI food indexes over periods from 1948 to 1963 and from 1967 to 1976, when the BLS rarely changed the product version in the sample.[19] These comparisons imply a price decline from new outlets of just 0.1 percent per year, compared to the 0.25 percent estimate above. This figure reflects price differences between outlets entering and leaving the sample because, for most of those years, the BLS had a policy of allowing price differences between outlets to affect its average price series but not its indexes.

Quality and New Products Bias

The largest share of the bias in the CPI that the commission concludes exists—0.6 percentage point per year, or more than half of the total of 1.1 percentage points per year—arises from an alleged failure to make adequate adjustment for changes in the quality of the goods and services people buy and to account properly for the value to consumers of newly available goods.

Before commenting on the evidence marshaled by the commission in support of its conclusions in the quality/new goods area, we emphasize that the BLS already has procedures in place designed to account for changes in the quality of the items being priced. (It often mistakenly has been assumed, though not by the commission, that the BLS makes few or no such adjustments.) Although these adjustment procedures are not perfect, they do have a very important effect on the rate of price change the BLS reports. The best available information on this point applies to a CPI subindex covering roughly the commodities and services component of the market basket (about 70 percent of the total, with shelter the largest exclusion). During 1995, this subindex would have risen by 3.9 percentage points had these procedures not been applied. Because of their application, however, the subindex actually rose by only 2.2 percentage points over the year. Roughly speaking, these figures imply that the adjustments made by the

[19] Reinsdorf, "Price Dispersion."

BLS for changes in the quality of these goods and services amounted to 1.7 percentage points over the course of a single year.[20]

The BLS also has established procedures for bringing new items into the index. The BLS has updated the expenditure share information used to aggregate the CPI subindexes only once every ten years or so, but the specific stores in which prices are collected and the specific items priced are reselected on a five-year cycle. Although more frequent sample rotations undoubtedly would be desirable, it is a fact that the BLS, by replacing 20 percent of the sample each year through the POPS and the initiation of new samples of outlets and items, already devotes considerable resources to ensuring that the sample of items priced is representative of what consumers actually are purchasing.

The commission does not argue, of course, that the BLS is not making a good effort to address quality/new goods biases, but rather that, in spite of a good effort, residual bias remains. The report's approach to assessing this residual bias is to divide the CPI into 27 categories, and then to make a judgment about the magnitude of the bias in each case. Unfortunately, the evidence applicable to many of these categories is rather sparse.

Of the 27 categories, the commission assigns eight a quality/new goods bias of zero (fuels, housekeeping supplies, housekeeping services, other private transportation, public transportation, health insurance, entertainment services, and tobacco). Each of the remaining 19 categories is assigned an estimated bias, in all cases positive (i.e., they concluded that price change is overstated because quality change is understated or the value of new products ignored). The commission supported its estimates of bias using three types of evidence: first, analysis of published and unpublished studies of quality/new goods bias for particular goods, second,

[20] See Brent R. Moulton and Karin E Moses, "Addressing the Quality Change Issue in the Consumer Price Index," forthcoming in *Brookings Papers on Economic Activity 1997:1* (Washington, D.C., Bureau of Labor Statistics, 1997). These figures are somewhat different from those reported in an earlier version of their paper. They refined their prior estimates principally to exclude some "quality adjustments" that are made to account for simple changes in units of measurement or package size.

quantitative evidence assembled by the commission from independent sources of data, and third, in the absence of direct evidence, estimates based on the judgment of the members.

For nine of the 19 categories (food at home other than produce, fresh fruits and vegetables, food away from home, alcoholic beverages, other utilities including telephone, other house furnishings, motor fuel, nonprescription drugs and medical supplies, and personal and educational expenses), absent evidence, the commission is forced to fall back on its best judgment. The alleged bias in these categories accounts for 0.11 of the 0.61 percentage point bias the commission attributes to quality/new goods problems. The food and beverages categories are an example; the commission's estimates of upward biases in these categories rest exclusively on judgments regarding the value to consumers of increased variety on grocery and liquor store shelves, together with the value of greater choice in restaurants, as shown in the following quotation from the report:[21]

> "...there is little if any published evidence on the food category, other than [Jerry] Hausman's ... attempt to establish the value for the introduction of a new variety of breakfast cereal...How much would a consumer pay to have the privilege of choosing from the variety of items available in today's supermarket instead of being constrained to the much more limited variety available 30 years ago? A conservative estimate of the value of extra variety and convenience might be 10 percent for food consumed at home other than produce, 20 percent for produce where the increased variety in winter (as well as summer farmers' markets) has been so notable, and 5 percent for alcoholic beverages where imported beer, microbreweries, and a greatly improved distribution of imported wines from all over the world have improved the standard of living."

[21] U.S. Senate, Committee on Finance, *Final Report*, p. 28.

In putting forward these estimates. the commission does not cite any published or unpublished studies, and indeed they comment on the absence of such evidence. Moreover, the commission does not specify how their estimates were developed in the absence of evidence. In several places the report characterizes the commission's specific estimates of bias as "conservative," but it generally is not clear why this is believed to be so. The commission's standard, the cost-of-living index, is defined as a function of consumer preferences, so reasonable questions to ask are, "Whose preferences are being described?" and "How were they assessed?" Although economists have methods for drawing inferences about preferences from market data on observed consumer choices, the report does not indicate that the commission used such methods in these cases. Appendix B presents an analysis of two categories, fresh fruits and vegetables and motor fuel, which attempts to quantify the missed consumer benefit or "surplus" that was described by the commission.[22] In both cases this analysis concludes that the commission's estimates overstate the bias.

For four categories (shelter, apparel and upkeep, new vehicles, and used cars) members of the commission have produced evidence that bears on the trend in prices for particular sorts of items. The alleged bias in these categories accounts for 0.16 of the 0.61 percentage point bias the commission attributes to quality/new goods problems. In each of these cases there are significant problems with the inferences drawn by the commission.

An example of these problems is found in the commission's estimate of the quality bias in the index for rent of shelter. The commission's reasoning is essentially as follows. Over the period 1976 to 1993 the median rent increased about 1 percent per year faster than the CPI rent index. This fact might suggest that the quality changes already accounted for in the index are substantial. According to the advisory commission, however, these quality adjustments remain inadequate because of a supposed 20 percent increase in the average size of apartments between

[22] The analysis is taken from Moulton and Moses, "Addressing the Quality Change Issue."

1976 and 1993.[23] In addition, they estimate that other improvements including "appliances, central air conditioning, and improved bathroom plumbing, and other amenities" amount to 10 percent over the past 40 years, giving a net upward bias of 0.25 percent per year.

There are two fundamental problems with this analysis. First, rents generally increase less than proportionally to apartment size, which implies that the advisory commission's proportional adjustment for apartment size would overstate the value of the increase. Second, the commission's factual premise—the assertion that average apartment size has increased 20 percent from 1976 to 1993—appears to be wrong. Although data giving an exact measure of the growth in size of rental units since 1976 are not available, a recent study analyzing data from the Residential Energy Consumption Survey, the American Housing Survey, and Current Construction Reports concluded that the increase was probably about 6 percent—i.e., the commission's estimate is too high by roughly a factor of three.[24] After correcting this error, the data cited by the commission no longer support an upward bias of the CPI rent index.

Another example is the commission's estimate that the growth in prices of new and used cars has been overstated by 0.6 percentage point per year in the recent past. This estimate is based on a flow of services approach in which the cost of consuming automobile services declines as the useful life of the car increases. The commission presents data showing that the average age of cars on the road has risen, which it takes as a measure of the increase in the useful life of a car. To justify treating the increase in average age of cars as reflective of bias, the commission also assumes that current CPI procedures do not capture any of the increases in automobile durability that may have occurred. This latter assumption, however, is incorrect; Appendix C lists some of the many durability-related model changes for which adjustments have

[23] U.S. Senate, Committee on Finance, *Final Report*, p. 30. The commission provides no direct support for this estimate, although reference is made to the changing characteristics of new single-family houses over the same period. They also cite increases in the average number of bathrooms, and in the share of units containing central air conditioning, within the stock of rental units.

[24] Brent R. Moulton, "Issues in Measuring Price Changes for Rent of Shelter," unpublished paper presented at Conference on Service Sector Productivity and the Productivity Paradox, Ottawa Canada, April 11-12, 1997 (Washington, D.C., Bureau of Labor Statistics).

been made in the CPI over the past few years. Like other automobile quality adjustments in the CPI, these are derived from manufacturer cost data, marked up to retail values. The commission provides no evidence that this adjustment procedure would lead to an underestimate of the value of quality improvements that have contributed to enhanced durability.

Finally, the commission's estimate that the CPI has overstated the rate of growth of apparel prices by 1.0 percentage point per year since 1985 rests on a comparison of the official CPI data with price indexes constructed using Sears catalogue prices for items whose characteristics remain unchanged from one year to the next. Clearly one ought to have reservations about drawing any general conclusions based upon the prices charged by a single catalogue merchant. Moreover, BLS research has shown that price changes often are timed to coincide with changes in product characteristics, particularly in the apparel market segment where changing fashion is so important.[25] To the extent that this is true, the commission's reliance on the data for unchanging items is likely to result in a downward bias, vitiating its criticism of the CPI apparel index.

For the six remaining categories (appliances including electronic, prescription drugs, professional medical services, hospital and related services, entertainment commodities, and personal care) the advisory commission reviewed existing studies of bias in the price trends for specific items to draw inferences about likely bias in the price trends for unstudied related items within the category. These six categories can be categorized as constituting two major areas of the index: medical care and high-tech consumer goods. More than half (0.34 percentage point)

[25] See Jack E. Triplett, "Quality Bias in Price Indexes and New Methods of Quality Measurement," in Zvi Griliches, ed., *Price Indexes and Quality Change: Studies in New Methods of Measurement*, (Cambridge, MA, Harvard University Press, 1971); Paul A. Armknecht, "Quality Adjustment in the CPI and Methods to Improve It," in *American Statistical Association 1984 Proceedings of the Business and Economic Statistics Section* (Washington, D.C., American Statistical Association, 1984); Paul A. Armknecht and Donald Weyback, "Adjustments for Quality Change in the U.S. Consumer Price Index, Journal of Official Statistics 5, 1989, pp. 107-23; Paul R. Liegey, Jr., "Adjusting Apparel Indexes in the Consumer Price Index for Quality Differences," in Murray F. Foss, Marilyn E. Manser, and Allan H. Young, eds., *Price Measurements and Their Uses*, (Chicago, University of Chicago Press. 1993); Paul R. Liegey, Jr., "Apparel Price Indexes: Effects of Hedonic Adjustment," *Monthly Labor Review* 117, May 1994, pp. 38-45; Marshall B. Reinsdorf, Paul Liegey, and Kenneth Stewart, "New Ways of Handling Quality Change in the U.S. Consumer Price Index," BLS working paper no. 276 (Washington, D.C., Bureau of Labor Statistics, 1995); and Moulton and Moses, "Addressing the Quality Change Issue."

of the quality/new goods bias the commission believes exists in the overall CPI is judged to occur in just these areas of the index. These clearly are components of the index in which the BLS faces particularly difficult measurement problems, though the inferences that the commission has drawn about the magnitude of any bias in these index components involves some degree of speculation and extrapolation.

The advisory commission's estimate of bias in the medical care component of the index appears to have been largely based on just two recent empirical studies, one of cataracts, the other of heart attacks, which both identified large quality improvements that are missed in the calculation of the CPI.[26] Although we acknowledge that there have been enormous improvements in medical technology over time, we also note the heterogeneity of the medical services category, which includes services as diverse as dentistry, eyeglasses and eye care, psychological counseling, podiatry, chiropractic, and physical therapy. Thus we are not convinced that the two conditions cited by the commission should be considered representative with respect to the unmeasured quality advances in the treatment of all medical conditions.

In some cases quality bias in the medical care component of the index may have arisen as a result of failure by the BLS to capture improvements in procedures that led to shorter hospital stays and out-patient treatment. The BLS recently has taken steps that, at least in principle, should address medical care quality improvements of this type. For hospital services, beginning in January 1997 the CPI has adopted the practice that previously had been used in the Producer Price Index (PPI) of pricing completed treatments (as represented by the service bundles on selected patient bills) rather than individual medical inputs. This change should permit BLS staff to track changes in treatment over time.[27] This change, however, will not resolve all quality

[26] The studies cited by the commission are Matthew D. Shapiro and David W. Wilcox, "Mismeasurement in the Consumer Price Index: An Evaluation," in Ben S. Bernanke and Julio J. Rotemberg, eds., *NBER Macroeconomics Annual 1996*, (MIT Press, 1996); and David M. Cutler, Mark McClellan, Joseph P. Newhouse, and Dahlia Remler, "Are Medical Prices Declining?" NBER working paper no. 5750 (Cambridge, MA, National Bureau of Economic Research, 1996). The latter study, of heart attacks, was supported in part by the BLS.

[27] See Elaine M. Cardenas, "Revision of the CPI Hospital Services Component," *Monthly Labor Review*, vol. 119, no. 12, December 1996, pp. 40-48.

adjustment problems in the medical care component. Some kinds of quality change are difficult to evaluate, involving changes in patient outcomes, such as improved mortality or reduction in pain. The BLS is continuing to support and encourage research on this topic, but we are skeptical that it will be possible to develop methods that will permit reliable evaluation of all kinds of quality changes on an on-going basis within the monthly CPI.

The area of high-tech consumer goods (e.g., consumer electronics) is one for which there are a number of published studies documenting systematic quality bias of the CPI. Most of these studies are based on the method of "hedonic" quality adjustment (i.e., adjustments based upon the empirical relationship between the prices of various items and their characteristics), with studies having been conducted of personal computers, television, video equipment, etc. The BLS is currently applying hedonic methods in the PPI for personal computers and peripherals. Projects are underway at the BLS to develop hedonic quality adjustment methods and improved sampling of new products within the appliance category of the CPI.

In addition to these specific comments about the nature of the evidence on quality/new goods biases assembled by the commission, there are several general remarks to be made. The commission's estimates of bias are made case by case using a variety of methods, without any clear statement of what methods are appropriately used in each circumstance. The absence of a well defined methodology for deriving the commission's estimates represents a fundamental reason why the BLS reaction to the quality/new products section of the report has been skeptical. Also, in general, the commission's discussion of quality/new goods biases does not include explicit recommendations regarding the adoption of procedures to correct the problems it believes exist. In part, this appears to reflect a lack of consensus among economists about what is practical and theoretically justified for measuring the benefit to consumers from new products.[28] For production of the CPI and other national statistics the BLS must use methods that are objective, reproducible, and verifiable.

[28] For examples of some of the methods that have been proposed, see the papers in Timothy F. Bresnahan and Robert J. Gordon, eds., *The Economics of New Goods*, (Chicago, University of Chicago Press, 1997).

The commission also failed to make any systematic effort to explore the possible existence of negative biases in the CPI. Other analysts have hypothesized reduced convenience and comfort of air travel and deteriorating quality of higher education as examples of quality decreases that are ignored in the CPI. More generally, whereas the commission notes some service quality improvements, such as the introduction of automatic credit-card readers at gasoline pumps, the BLS often hears complaints about broad-ranging declines in the quality of customer service, which are equally difficult to incorporate in the CPI.

A more subtle issue is that price increases for many goods occur intermittently and often are timed to coincide with model replacements or other quality improvements. The BLS commonly adjusts for quality differences between successive models by, in effect, treating the difference in price between them as wholly attributable to a difference in quality. There is a risk that this procedure may over-adjust for quality change, imparting a downward bias to the index. Methods have been introduced to try to minimize that possibility, but the commission paid little attention to this potential problem.

From a BLS perspective, the most important question about possible quality/new goods problems is what we might do to improve our procedures and ameliorate those problems. Recognizing the particular difficulties associated with measuring medical care prices and high-tech consumer goods prices, the BLS has devised and announced important improvements in our methods. These include the changes noted above in our hospital price measurement procedures, and prospective changes in our sample rotation procedures that will allow us to update item samples in rapidly changing market segments more frequently than once every five years (at the cost of less frequent updates in more static market segments). In addition, the President's 1998 budget includes funds to improve the accuracy, timeliness, and relevance of the consumer price data available from the BLS. The FY 1998 budget request, if approved, would allow us to make important progress in the quality/new goods area by supporting greater use of hedonic techniques and implementation of more aggressive procedures for identifying and beginning to price new goods promptly once they appear in the marketplace.

IV. Short Run Recommendations[29]

Recommendation i. The BLS should establish a cost of living index (COLI) as its objective in measuring consumer prices.

The advisory commission's report begins with one overarching recommendation: "The BLS should establish a cost of living index (COLI) as its objective in measuring consumer prices." The BLS basically concurs with this; indeed, the BLS long has said that it operates within a cost-of-living framework in producing the CPI. That framework has guided, and will continue to guide, operational decisions about the construction of the index.[30] Putting things slightly differently, if the BLS staff or other technical experts knew how to produce a true cost-of-living index on a monthly production schedule, that would be what we would produce. While the BLS has no fundamental disagreement with the commission about what the objective of our CPI program ought to be, we disagree to some extent about what changes to the index would be feasible and prudent and about the timetable on which those changes could be implemented.

Because the cost-of-living concept does not imply a single all-purpose cost-of-living index, the BLS will continue to need to make choices about the specific issues of formula, coverage, and index construction. The BLS will continue to describe the scope and theoretical assumptions of its price measures, as well as any necessary caveats with respect to their use.

Recommendation ii. The BLS should develop and publish two indexes: one published monthly and one published and updated annually and revised historically.

Recommendation iii. The timely, monthly index should continue to be called the CPI and should move toward a COLI concept by adopting a "superlative" index formula to account for

[29] The advisory commission uses two different methods for numbering their recommendations. See U.S. Senate, Committee on Finance, *Final Report*, pp. 2-3 and pp. 49-55. Herein we follow the numbers and text from pp. 2-3.
[30] *BLS Handbook of Methods*, Bulletin 2490, 1997, p. 170.

changing market baskets, abandoning the pretense of sustaining the fixed-weight Laspeyres formula.

Recommendation iv. The new annual COL index would use a compatible "superlative-index" formula and reflect subsequent data, updated weights, and the introduction of new goods (with their history extended backward).

Because these three recommendations address methods for dealing with the upper-level substitution bias problem, we will discuss them together. The commission recommends that the BLS should move to a "trailing Tornquist" formula for the monthly index.[31] The *Final Report* did not explicitly define this formula, but based on subsequent discussions with commission members, we interpret this to mean a geometric mean formula in which the weights are lagged expenditure shares, the weights are regularly updated, and the indexes are chained. The commission also recommends that the BLS develop a new annual index that is calculated using a superlative formula and is subject to revision.

The BLS continues to investigate several experimental indexes that use a superlative formula at the upper level of aggregation. These include formulas which, due to the need for current expenditure data, create indexes that must be produced with a lag, as well as new methods that may approximate the superlative formula and allow the production of indexes in a timely fashion.

While the method of calculating the current CPI could be changed to incorporate a superlative formula, the CPI would then have to be produced with a lag. Moreover, the expenditure data that are required to derive the weights for the superlative index are available with sufficient precision to be used in calculating such an index only at annual intervals, and thus would not support a true monthly CPI.

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[31] U.S. Senate, Committee on Finance, *Final Report*, p. 50.

The timeliness of the CPI might be maintained by using some form of an approximation to a superlative index. The commission's proposed "trailing Tornquist" formula, however, has been shown to produce price changes that systematically understate the increases in the cost of living, as measured by the superlative formulas.[32] More recently, other approximation strategies have been proposed, including a method based on the "constant elasticity of substitution" (CES) formula.[33] But such an approximation would not track the superlative indexes precisely—during some years an index based on an approximation would rise more than the superlative index, during other years it would rise less. This feature raises the issue of whether such an index subsequently would need to be revised once the data were available to calculate the superlative index. Another issue that needs to be addressed in considering use of approximations is the issue of estimating the subaggregate indexes, i.e., the indexes for intermediate levels of aggregation, such as for "food" or "transportation." Some of these indexes may consist of item categories that are relatively close substitutes—fresh fruits, for example, consists of apples, bananas, oranges, etc.—whereas others may consist of item categories that probably are not close substitutes—medical professional services, for example, includes physicians, dentists, and eyecare. Because the CES function is based on a single elasticity parameter which is assumed to be the same for all items, while consumers' willingness to substitute is likely to vary across categories of items, further research is needed to determine whether a simple approximation such as the CES would produce sensible approximations for all of these subaggregates. Also, the use of an index based on statistical approximation might be difficult to interpret and explain to users of the data. We believe we would gain little, and possibly do much damage to the credibility of our statistical system, if we were to move hastily to adopt untested techniques for producing the official CPI.

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[32] See Ana M. Aizcorbe, Robert A. Cage, and Patrick C. Jackman, "Commodity Substitution Bias in Laspeyres Indexes: Analysis Using CPI Source Data for 1982-1994," paper presented at the Western Economic Association International Conference in San Francisco, July 1996 (Washington, D.C., Bureau of Labor Statistics); and Shapiro and Wilcox, "Alternative Strategies."

[33] See Shapiro and Wilcox, "Alternative Strategies." The CES formula that they proposed was originally derived by P.J. Lloyd, "Substitution Effects and Biases in Nontrue Price Indices," *American Economic Review*, vol. 65, June 1975, 301-13, and was suggested by BLS staff as a method for approximating a superlative index without current expenditure data.

The President's 1998 budget includes funds to improve the accuracy and timeliness of the CPI. and an important part of this request will support the production of a superlative index, produced to a greater degree of accuracy than is now possible. The BLS plans to begin publishing this measure in early 2002. In the interim, the superlative measures we currently produce can be used to estimate the magnitude of the upper level substitution bias in the CPI, and indeed are the best measures currently available for this purpose.

Recommendation v. The BLS should change its procedure for combining price quotations by moving to geometric means at the elementary aggregates level.

To address lower-level substitution bias, the commission has suggested adoption of a geometric mean formula for aggregating price quotations, a formula that has been under investigation by the BLS over the past several years. As discussed above, the current CPI formula does not allow for the potential substitution among items within a category, such as between different varieties of apples, when the relative prices of those items change. The proposed geometric mean formula is based on an alternative assumption, namely that consumers substitute among items in such a way as to hold the share of their expenditures devoted to each item constant. Although this assumption is not likely to hold exactly for any particular stratum, the geometric mean formula should provide a close approximation to the exact cost-of-living subindex in cases where the stratum consists of substitutes, such as different varieties of apples, and the price elasticity of demand for each variety is fairly large. If the elasticity of substitution is zero, then the fixed weight Laspeyres formula is the appropriate measure of the cost-of-living subindex. Again this assumption is not likely to hold exactly, but the Laspeyres index should provide a close approximation to the exact cost-of-living subindex in cases where the price elasticity of demand for each variety is quite small. It may be more plausible to assume that consumers substitute freely between, for example, types of apples or between brands of

television sets when their relative prices change than to assume similar substitutability between, for example, types of prescription drugs.

The BLS has begun issuing a monthly experimental measure that is constructed using the geometric mean formula in all index components, and will make a decision by the end of this year as to which components of the official CPI should employ the geometric mean formula.[34] Scanner data, studies of substitutions between brands, and other information will be used to assess the propensity of consumers to substitute across items within individual item categories as the relative prices of those items change. The likely date for implementation of any changes decided upon for the official CPI is with the release of January 1999 CPI data.

Our best estimate is that the use of the geometric mean formula in all CPI subindexes would lower the growth rate of the index by approximately one-quarter of one percent per year. Partial adoption of the geometric mean formula, which is more likely than a full adoption, would be expected to have a downward impact of between zero and one-quarter of one percent per year, depending on how many, and which, indexes use the new formula.

V. Intermediate Run Recommendations

Recommendation vi. The BLS should study the behavior of the individual components of the index to ascertain which components provide most information on the future longer-term movements in the index and which items have fluctuations which are largely unrelated to the total and emphasize the former in its data collection activities.

Sample resources for the CPI are allocated between the two major price surveys, commodities and services (C&S) and housing, according to the relative importance and variability of the survey estimators for each component, while taking into account the relative costs of each survey. The sample for the C&S component of the CPI was designed to allocate

[34] See Bureau of Labor Statistics, "The Experimental CPI using Geometric Means (CPI-U-XG)," (Washington, D.C., Bureau of Labor Statistics, April 10, 1997).

resources systematically among major item groups and sample cities, utilizing models to minimize the sampling variance of estimated price change, as measured by the all-items (less shelter), national CPI, subject to cost and sample coverage constraints. Solution allocations among items, outlets, and cities thus strike a balance with respect to the contributions of components of sampling variability by sample items, their relative importance with respect to the total consumer budget, and the relative cost of data collection and processing, while keeping within the cost and coverage constraints of the program.[35]

The commission's recommendation suggests that data collection activities should focus on a different objective, namely to provide information on the future longer term movements of individual prices or the index as a whole. Forecasting inflation is a widespread and important use of the CPI, of course, but one that is conceptually distinct from the measurement of cost-of-living changes. If prediction of future inflation, or the measurement of "inflationary pressure," were the measurement objective of the CPI, this might imply different choices with respect to the formulas and weights used in construction of the index, as well as with respect to the allocation of the sample. The commission, however, emphasizes the use of the CPI as a measure of past and contemporaneous changes in the cost of living in choosing the index formulas and weights, on the one hand, while emphasizing the uses of the CPI in forecasting future price movements in determining the sample allocation, on the other. This appears to be an internally inconsistent strategy.

The commission suggests that resources devoted to the sample for bananas, a perishable fresh fruit whose price-change sampling variability has been estimated to be substantial, but whose price fluctuations are "not systematically related to the underlying trend movements of the CPI," would be better allocated to surgical treatments, consumer electronics, and communication services.[36] The potential for saving resources by reducing data collection of items like bananas is

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[35] See S.G. Leaver, W.H. Johnson, R.M. Baskin, S. Scarlett, and R. Morse, "Commodities and Services Sample Redesign for the 1998 Consumer Price Index Revision," *Proceedings of the Survey Research Methods Section, American Statistical Association*, 1996, forthcoming.

[36] U.S. Senate, Committee on Finance, *Final Report*, p. 51.

fairly limited because the marginal cost of collection and processing is quite small—the stores are already being visited to collect other grocery items and very little analysis is required after collection. Because the sample has been allocated to minimize the variance, a reallocation of resources away from any item with a high sampling variance toward other items necessarily would result in an increase in the variability of its index and the reliability of the all-items index would be diminished.

Recommendation vii. The BLS should change the CPI sampling procedures to de-emphasize geography, starting first with sampling the universe of commodities to be priced and then deciding, commodity by commodity, what is the most efficient way to collect a representative sample of prices from which outlets, and only later turn to geographically clustered samples for the economy of data collection.

Because geographical coverage impinges on many aspects of the CPI data collection and index estimation process, the practical meaning of this recommendation is somewhat unclear. By the same token, the importance of the geographic structure underlying the CPI makes it a continuing subject of BLS research.

The statement that the BLS should decide commodity by commodity, what is the most efficient way to collect a sample, has been and will continue to be the standard practice. In several cases, for example, postage and used cars, the BLS currently collects data on a national level. In most cases, however, it is not possible to select samples of specific items at the national level because of the lack of a national list (or *frame*) of items to sample, together with the sales volume information needed to determine the probabilities of selection. Moreover, if specific items were selected nationally, there would not usually be a feasible way to determine whether a selected item was, in fact, carried by any particular sample retail outlet. These considerations have led the Bureau to do sampling locally, by first selecting the urban area, then the outlet, and finally the specific item within the outlet. This method helps to ensure that the sample of items is

timely and representative. The BLS is currently investigating potential uses of point-of-sale (scanner) data which are available from private vendors, and in the future it might be possible in some cases for the BLS to use such data to draw national samples of items.[37]

Recommendation viii. The BLS should investigate the impact of classification, that is item group definition and structure, on the price indexes to improve the ability of the index to fully capture item substitution.

As part of the 1998 CPI revision activities, the BLS has just completed a process of modifying the item classification structure.[38] The ability of the index to capture consumer substitution was one of the prominent factors that was considered in developing the new item classification. In putting together the item classification, the BLS "also tried to see that [the strata] formed natural groups, as consumers would view them...For example, using the consumer view, items within the same stratum should have some affinity, such as substitutes (butter and margarine), or complements (washers and dryers)."[39]

The commission points to some examples which cross item boundaries, such as "on-line news services which compete with newspapers, automobile purchases with leases, and drugs with surgical procedures they replace" as examples for which direct price comparisons are needed so that the full substitution effect can be measured.[40] The BLS is sympathetic to the commission's concern, and will continue to work to improve the CPI item structure.[41] It seems to us, however, that no feasible item classification system would completely capture the current and

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[37] See Ralph Bradley, Bill Cook, Sylvia G. Leaver, and Brent R. Moulton, "An Overview of Research on Potential Uses of Scanner Data in the U.S. CPI," paper presented at the Third Meeting of the International Working Group on Price Indices, Voorburg, Netherlands, April 16-18, 1997 (Washington, D.C., Bureau of Labor Statistics).

[38] Walter Lane, "Changing the Item Structure of the Consumer Price Index," *Monthly Labor Review* vol. 119 no. 12, December 1996, 18-25.

[39] Lane, "Changing the Item Structure," p. 22.

[40] See U.S. Senate, Committee on Finance, *Final Report*, p. 52.

[41] The January 1997 consolidation of three CPI strata—hospital room, other inpatient services, and outpatient services—into one hospital services stratum was designed in part to capture substitution among those three settings for treatment provision. The inclusion of new cars and new trucks in a single new vehicles stratum is an example of a similar change taking place as part of the January 1998 introduction of the revised CPI market basket.

possible future developments in consumer substitution behavior. Nor does it seem to us that the item classification system is necessarily the most significant impediment to measuring the effects of these substitutions. The more fundamental issue is the need to develop systematic methods for identifying the substitution and accounting for differences in quality between the substituted items.

Recommendation ix. There are a number of additional conceptual issues that require attention. The price of durables, such as cars, should be converted to a price of annual services, along the same lines as the current treatment of the price of owner-occupied housing. Also, the treatment of "insurance" should move to an ex-ante consumer price measure rather than the currently used ex-post insurance profits based measure.

When the BLS adopted the rental equivalence approach to pricing housing services in 1983, BLS staff were aware that the same conceptual issues arise in the pricing of other consumer durables.[42] In principle the CPI is intended to measure the cost of consuming goods and services, and durable goods provide a flow of services over time rather than immediate consumption. To implement a flow-of-services approach, however, requires information on either rental equivalence or user cost of the durable asset. In the case of housing, the existence of rental markets makes it relatively easy to implement the rental equivalence approach, while the long life of housing assets and the likelihood of price appreciation made the standard asset price approach uniquely problematic. During the mid-1980s, BLS researchers investigated the potential use of automobile leasing data to price automotive services, but at that time concluded that the leasing markets were not sufficiently developed to support a leasing equivalence approach to index construction. Subsequently, automobile leasing has grown to the point that in 1998 an automobile leasing stratum will be added to the CPI market basket. Currently BLS

[42]See "Changing the CPI Homeownership Method to Rental Equivalence," *CPI Detailed Report*, Bureau of Labor Statistics, January 1983, pp. 3-17.

researchers are reexamining the flow-of-services approach for automobiles, possibly using a leasing equivalence methodology. For durables other than automobiles, the lack of widespread rental markets as well as the lack of data needed for direct estimation of user cost suggest that the flow of services approach may not be practicable. As explained in our discussion of the commission's quality bias estimate for automobiles, we do not agree with the commission's premise that failure to price a flow of services necessarily leads to systematic quality bias.

The commission recommends that the BLS move the CPI for insurance to an "ex ante consumer price measure" from the currently used "ex post insurance profit based measure." The current CPI for health insurance does not directly price policies purchased by consumers.[43] Instead, an indirect approach to measuring the price of a policy is used; the price is seen as deriving from the services provided by the insurer and the value of benefits paid to providers of health care. The BLS prices these two parts separately, obtaining from insurers information on retained earnings to measure changes in the value of the insurance service component, and using the price indexes in the CPI medical care component to measure changes in the cost of the health benefits paid to providers. It is possible that direct pricing of health insurance policies would have the virtue of automatically reflecting cost-reducing innovations in the treatment of medical problems (such as the substitution of less-costly outpatient procedures). The countervailing difficulty, however, is that health insurance policies can increase or decrease in price due to changes in coverage or in the characteristics of the covered populations, and these changes may be very difficult to observe or adjust for in the index.

The current CPI approach was adopted in 1964. Prior to that the CPI collected the price of the most widely-sold community-rated Blue Cross/Blue Shield policy. That approach was dropped, however, when it became evident that the quality of the policies was changing in ways for which it was difficult to adjust the policy price. In 1984-85 the Bureau experimented with the direct pricing of a sample of health insurance policies but the experiment was terminated because

[43] Automobile and tenants insurance policies are priced directly in the CPI.

it again proved too difficult to maintain constant quality and coverage of risk over time. The BLS recognizes the importance of the health insurance price movements to consumers as well as to policy makers and will continue to search for ways to overcome the obstacles to accurate adjustment for changes in policy characteristics.[44]

Recommendation x. The BLS needs a permanent mechanism for bringing outside information, expertise, and research results to it. At the request of the BLS, this group should be organized by an independent public professional entity and would provide BLS an improved channel to access professional and business opinion on statistical, economic, and current market issues.

The BLS already has in place many mechanisms for bringing in outside information, expertise, and research results. Business and labor research advisory committees meet regularly with BLS staff and management and have long been a source of outside information and expertise. A price research division has been a part of the price index programs since 1965, and much of the discussion of CPI bias has been based upon the results of research conducted by BLS staff. BLS economists and statisticians regularly solicit opinions from outside researchers by presenting research papers at conferences and submitting them for publication at peer reviewed journals. Academic researchers are regularly invited to present their research findings to BLS staff in seminars. The Bureau's ASA-NSF-BLS fellowship program brings in scholars for extended on-site research projects. The BLS has funded research by academic economists when research by experts was needed to solve difficult measurement problems.[45]

The BLS agrees that continued input from outside researchers is useful, and is currently studying the possibility of creating an academic advisory commission. In addition, the BLS is interested in having outside researchers address the important measurement issues that it faces,

[44] For discussions of past BLS research on the direct pricing of health insurance policies, and on the user-cost and leasing-equivalence approaches to pricing of automobile services, see Paul A. Armknecht and Daniel H. Ginsburg, "Improvements in Measuring Price Changes in Consumer Services: Past, Present, and Future," in Zvi Griliches, ed., *Output Measurement in the Service Sectors*, (Chicago, University of Chicago Press, 1992).

[45] See, e.g., Pollak, *Theory of the Cost-of-Living Index*; and Cutler, et al., "Are Medical Prices Declining?"

and will provide researchers with access to research databases to the extent possible, while meeting data confidentiality requirements.

VI. Longer Run Recommendations

Recommendation xi. The BLS should develop a research program to look beyond its current "market basket" framework for the CPI.

This recommendation suggests that the BLS should develop research programs exploring "quality of life" issues such as time-saving benefits of new medical procedures and new communication devices, and changes in the social or natural environment caused by rising crime or new diseases. Because these things clearly affect our standard of living, a complete accounting of U.S. economic progress would include them.

We do, however, have a reservation about this recommendation. Implicit in this recommendation is a suggestion that the BLS should adjust the CPI for these effects. We think that valuing changes in time allocation or in the general social environment may require too many subjective judgments to furnish an acceptable basis for adjusting the CPI. Furthermore, arriving at a comprehensive measure of changes in the quality of life will be quite difficult, yet making such adjustments in only a few selected cases could make the CPI less accurate if these cases are not representative. Finally, it is unclear whether "quality of life" valuations really belong in an index used for the escalation of payments and adjustment of tax parameters. For example, the advisory commission suggests that the CPI rent index should have made a quality adjustment for changes in climate as renters migrated to the south.[46] Such a quality-of-life adjustment, however, is properly viewed as out of scope under the current definition of the CPI.[47] Most of the uses of the CPI have evolved within the context of an index limited to market goods

[46] U.S. Senate, Committee on Finance, *Final Report*, p. 30.

[47] The commission's discussion of the appearance of AIDS, however, suggests agreement with the idea that not all changes in the quality of life ought to be reflected in the CPI (U.S. Senate, Committee on Finance, *Final Report*, p. 47).

and services, and presumably the appropriate uses of an index that incorporated changes in crime levels, disease incidence, or income tax rates would be somewhat different from the current uses of the CPI.

Recommendation xii. BLS should investigate the ramifications of the embedded assumption of price equilibrium and the implications of it sometimes not holding.

Any systematic method for distinguishing quality change from price change must be based on some theoretical framework and set of assumptions. In most cases the BLS, like academic economists who do research in this field, relies on one or another assumption about price equilibrium. An equilibrium assumption underlies hedonic methods for quality adjustment, for example, as well as the matched model price comparisons commonly used by the BLS.[48] Although virtually all systematic methods for quality adjustment are based to some extent on assumptions about price equilibrium, the nature of the assumptions differs between methods. Of the methods used for quality adjustment by BLS, two (the "overlap method" and the "link method") are based on a particularly strict equilibrium assumption—that quality differences can be inferred from the price differences between individual items.[49] The hedonic method, in contrast, allows for random deviations of prices from equilibrium values and may allow for differences in rates of price change between items of different vintages.

The commission recommends that the BLS investigate the assumption of price equilibrium that underlies certain quality adjustment and item substitution procedures. We agree that reducing reliance upon this assumption can sometimes make the CPI more accurate,

[48] See Jack E. Triplett, "Concepts of Quality in Input and Output Price Measures: A Resolution of the User Value-Resource Cost Debate," in Murray F. Foss, ed., *The U.S. National Income and Product Accounts: Selected Topics* (Chicago, University of Chicago Press, 1983).

[49] For discussion of the quality adjustment methods used by the BLS, see Paul A. Armknecht, Walter F. Lane, and Kenneth J. Stewart, "New Products and the U.S. Consumer Price Index," in Timothy F. Bresnahan and Robert J. Gordon, eds., *The Economics of New Goods* (Chicago, University of Chicago Press, 1997); Reinsdorf, Liegey, and Stewart, "New Ways of Handling Quality Change;" and Moulton and Moses, "Addressing the Quality Change Issue."

particularly for long run comparisons. Indeed, the BLS already has made considerable progress in doing this. Recent tabulations indicate that item replacements adjusted for quality using the methods that embody a strong price equilibrium assumption (i.e., the "overlap method" and the "link method") declined from about 2 percent of prices collected in 1983 to 0.62 percent in 1995.[50] In addition, the CPI for prescription drugs now reflects consumers' savings from buying therapeutically equivalent generic substitutes for branded products. We plan to continue research on avoiding bias from unwarranted price equilibrium assumptions.

Recommendation xiii. The BLS will require a number of new data collection initiatives to make some progress along these lines. Most important, data on detailed time use from a large sample of consumers must be developed.

The final longer run recommendation is that the BLS should develop new data collection initiatives on time use and "quality of life" issues. These data would support the research programs described in the commission's first longer run recommendation. We agree that time use data would be valuable to researchers, and we concur with the focus on using them for supplementary indicators rather than as part of the main cost-of-living framework.

VII. Conclusion

The advisory commission report has performed a service by calling to the attention of policy makers the many and varied issues that the BLS faces in constructing the CPI. Most public attention has been focused on the commission's estimates of CPI bias, but the central argument of the report is that almost every assumption underlying the procedures used around the world for price index construction is called into question by the pace and form of market developments. The issues are not new to index number experts (many of the issues are discussed, for example,

[50] Moulton and Moses, "Addressing the Quality Change Issue," Table 4.

in the articles in the December 1993 *Monthly Labor Review*), but the quantitative and budgetary importance of price measurement problems and techniques have not always been appreciated by users.

As discussed earlier in this paper, the BLS has a vigorous program of research and development activities aimed at improving the CPI. In one category are the activities related to upper- and lower-level substitution bias. These include:

- The continued monthly publication of the experimental geometric mean index (the CPI-U-XG) and the evaluation of the geometric mean formula for use in the CPI-U and CPI-W, probably beginning in January 1999.
- The continuing annual publication of experimental superlative indexes, and (assuming approval of the Bureau's associated budget requests) introduction of an official superlative index as a supplement to the CPI-U and CPI-W in 2002. With the development of the CPI-U-XG, the experimental superlative indexes can be constructed and compared using individual category indexes based on both arithmetic and geometric mean formulas.
- Introduction of a new CPI market basket in January 1998 based on 1993-95 consumer expenditure patterns, and consideration of a more frequent schedule of market basket updates than the roughly ten-year cycle followed in the past. The BLS FY 1998 budget initiative also calls for development of an enhanced processing system that will enable us to construct expenditure weights that are just two years old when introduced into the index. (By contrast, the 1993-95 market basket will be 3 1/2 years old when it is introduced in January 1998.)

The advisory commission recommends using a geometric mean formula for upper-level aggregation, and annual market basket updates, to approximate a superlative index while avoiding the need for index lags or revisions. Evidence indicates that such an index would be downward-biased relative to a cost-of-living index. As recommended by Shapiro and Wilcox,

however, one could develop an index based on the CES formula that provides a close approximation to a superlative index over some historical period. The BLS plans to estimate such an index as part of its experimental superlative index program. Additional research is needed on the approximation properties of the CES formula, especially below the U.S. all-items level, before it could be considered for use in the CPI-U or CPI-W. Moreover, a move away from the arithmetic-mean Laspeyres formula above the category level could make the CPI more difficult to use and explain, and these considerations would have to be weighed against the potential advantages of a closer approximation to a cost-of-living index. Also weighing in would be the potential disadvantages of using a formula based upon an approximation to a superlative index, which might need to be revised once the data were available to calculate the superlative index.

This paper has emphasized that substitution bias, and especially upper level substitution bias, accounts for a relatively small part of the total bias that the advisory commission argues exists in the CPI. Quality change in existing goods and services, the introduction of new products, the establishment of new outlets, and the disappearance of older products and outlets, present extremely important issues for which there are, as yet, no general solutions. The absence of general solutions explains why the commission has no short-run recommendations in these areas. The BLS will continue to study the pertinent intermediate-run recommendations—use of leasing equivalence for automobiles, direct pricing of health insurance, and investigation of improved item classification structures—but these are unlikely to solve the fundamental measurement problems even in specific CPI components. Finally, the absence of systematic, well-accepted ways to deal with these problems also means that there are no rigorous ways to measure the new outlet or quality/new goods biases potentially created in the CPI. The advisory commission, like other observers, was forced to use introspective or extrapolation methods to obtain many of their bias estimates.

The BLS specifically rejects several of the estimated quality or new goods biases, in cases where the commission presented new evidence. Examples of these cases noted in Section III above include the estimates of a 0.25 percentage point annual bias in shelter, a 1.0 percentage

point annual bias in apparel and upkeep, and 0.59 percentage point annual biases in new and used cars. Together, these comprise 0.16 of the 0.6 total estimated quality/new goods bias in the overall CPI. In addition, the evidence presented in Appendix B suggests that the commission's estimates of bias for the food and motor fuel components likely are overstated. Most of the remaining estimated bias comes from two areas of the index: medical care and high-tech consumer goods. These clearly are components of the index that present particularly difficult measurement problems, but the quantitative evidence is very fragmentary and the BLS is reluctant to speculate as to what the magnitude of any bias in these index components might be. Finally, some analysts have cited potentially countervailing declines in quality, particularly in services, that are not reflected in the CPI or in the advisory commission's bias estimates.

For the BLS, the primary task is not to evaluate the bias estimates set forward by the advisory commission or other groups, but rather to employ the most accurate methods available for dealing with quality change and with new goods and outlets. Those methods must be rigorous, objective and reproducible, minimizing the role of analyst judgment, although these considerations make it very difficult to incorporate in the CPI the benefits of some types of product innovation.[51] Improvements in medical care that enable patients to lead more active lives have undoubted value, for example, but that value cannot now be, and may never be, measured objectively enough to be reflected in official data series. Notwithstanding such limitations, the BLS is taking several steps to improve its methods for dealing with quality change and new products:

- Effective in January 1997, two improvements were made in the hospital and related services component of the CPI. The hospital room, other inpatient, and outpatient subcomponents were consolidated to enable the index to reflect shifts in the mix and importance of treatment. At the same time, there was a shift from pricing individual

[51] Martin Feldstein, in testimony before the Senate Finance Committee (February 11, 1997), has agreed that the CPI must be based on tested and reliable statistical methods, even though in his view the resulting estimate will overstate the true increase in the cost of living.

items (like units of blood) to pricing the collections of services on selected patient bills; among the benefits of this change are a better reflection of alternative reimbursement methods and an enhanced potential for quality adjustment.

- In 1999, the BLS will implement a change in the CPI's sample rotation procedures from a city-based to an item-based sequence. This ultimately will make it possible to update item samples in rapidly changing market segments more frequently than once every five years (at the cost of less frequent updates in more static market segments).
- The BLS FY 1998 budget request calls for data collection to support greater use of hedonic techniques that explicitly account for changes in the characteristics of items being purchased. (Even in the absence of such funding, the use of hedonic regression for quality adjustment likely will expand into product categories such as personal computers and televisions.) The requested resources also would support implementation of more aggressive product initiation procedures for identifying and beginning to price new goods promptly once they appear in the marketplace.
- Other potential intermediate-term changes include the direct pricing of health insurance policies and a leasing equivalence approach to pricing of automobile services, as recommended by the advisory commission. Both approaches have been evaluated by the BLS in the past and rejected as infeasible, but new developments in the leasing and medical care markets argue for their continued consideration.

Unfortunately, the ongoing controversies surrounding cost-of-living measurement and, more generally, appropriate federal indexation policy, have led much of the public to conclude that the CPI is somehow "broken." Although the BLS rejects that notion, it is evident that the expanding number of users of the CPI have objectives and priorities that sometimes can come into conflict. When this happens, the result can be an index that is less than optimal for certain purposes. One example mentioned above reflects the competing objectives of an index that is free of upper-level substitution bias (as might be desired, for example, for benefit indexation),

and of one that is not subject to lags or routine revision (for example, for indexing debt instruments). Some also have argued the need for specialized indexes for program beneficiaries or other population subgroups. It is, in fact, commonplace to observe that there is no single best measure of inflation. The BLS response to this situation has been to develop a "family of indexes" approach, including experimental measures designed to answer different questions from those answered by the CPI-U and CPI-W. This "family of indexes" now includes the CPI-U-XG, the CPI-E corresponding to the market basket of elderly consumers, and the experimental superlative measures, and under the BLS FY 1998 budget request will include a production-quality superlative measure beginning in 2002. As mentioned above, an experimental CES index is a likely addition to the group.

The BLS is engaged in numerous CPI program enhancements that have not been mentioned above. Some are part of the six-year CPI revision program now underway: conversion to computer-assisted data collection and a telephone-based POPS survey, improvements to the housing sample and estimator, and enhancements to the CEX survey processing system. In addition, the FY 1998 budget request, if approved, would support an expansion in the CEX sample, permitting more accurate expenditure weights and a more timely CPI market basket. The solutions to many CPI measurement issues, however, must await methodological breakthroughs in economics, or improved availability of data. Unfortunately, the techniques available for measuring the gains in consumer welfare from new products (and the losses from product disappearances) are in their infancy, and may never be adaptable for implementation in a large, ongoing price measurement program like the CPI. The increased use of scanner data in U.S. consumer markets offers broader opportunities, and the BLS has been engaged in a significant research effort to explore the many possible uses of these data, in identification of new products and outlets, sampling of items, and ultimately in the computation of the CPI itself.

In summary, the concluding statements of the BLS report to the House Budget Committee in April 1995 remain applicable today. The BLS is intensely aware of the sensitive nature of the

data it produces, and of the critical need for these data to be as accurate as possible, It will continue to investigate the measurement issues that it and others have identified, and will introduce corresponding improvements to the index as quickly as it can.

Appendix A. Technical Issues About Lower Level Substitution Bias

This appendix describes two technical problems with the commission's discussion of lower level substitution bias and formula bias. The first of these problems involves the commission's discussion of "time reversibility."[1] The commission describes this property as a "requirement or test for an index number...that the index should remain the same if the underlying prices undergo a reversal." Their example of this property, however, is incorrect. In their example, the quantity of beef is 1.0, and the price of beef starts at 1.0 in period 1, rises to 1.6 in period 2, and then falls back to 1.0 in period 3. The commission claims that in such a case the CPI would add the 60 percent increase between periods 1 and 2 to the 37.5 percent decrease between periods 2 and 3 to show a total increase of 22.5 percent between periods 1 and 3. Adding the percentage changes, however, is contrary to any reasonable procedure and is not an accurate description of current or past BLS methods. The ratio of the price of beef in period 2 to its price in period 1 is 1.6, and the ratio of the price in period 3 to the price in period 2 is 0.625. So in this case the CPI would multiply the relative changes ($1.6 \times 0.625 = 1$), correctly showing no change in price between periods 1 and 3. Thus it is inaccurate to attribute the bias shown in this example to the CPI.

A second problem is the commission's assertion that the geometric mean formula would eliminate lower level substitution bias. The commission states that the difference between a geometric means index and a Laspeyres index "is an estimate of the bias of the Laspeyres formula, since [Matthew] Shapiro and [David] Wilcox...have shown that the geometric mean provides an unbiased estimate of the underlying cost-of-living index."[2] This statement is surprising, because it is well known that the geometric mean index is unbiased only under restrictive conditions. The basis for the commission stated view appears to be as follows:

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[1] U.S. Senate, Committee on Finance, *Final Report of the Advisory Commission to Study the Consumer Price Index*. Print 104-72, 104 Cong., 2 sess. (Washington, D.C., Government Printing Office, 1996), p. 17.

[2] U.S. Senate, Committee on Finance, *Final Report*, p. 42. The article cited in this quotation is Matthew D. Shapiro and David W. Wilcox, "Mismeasurement in the Consumer Price Index: An Evaluation," in Ben S. Bernanke and Julio J. Rotemberg, eds., *NBER Macroeconomics Annual 1996*, (MIT Press, 1996).

> "Shapiro and Wilcox...have provided an elegant rationale for the geometric approach based on the correlation of relative prices over time. Provided that this correlation is small, a modification of the geometric mean is approximately unbiased for the underlying cost of living index, and this characterization does not require information about the underlying system of consumer's preferences" (U.S. Senate, Committee on Finance, *Final Report*, p. 19).

This statement mischaracterizes the discussion in Shapiro and Wilcox. That article made several important assumptions that are not mentioned by the commission, including assumptions about consumers' preferences. These assumptions are stated by Shapiro and Wilcox when they describe the results of BLS research:[3]

> "Several recent papers [by BLS authors]...have explored another alternative to the Laspeyres-based formula, namely the modified geometric means estimator...Under the same assumptions as we used above (CES utility, stationary distribution of relative prices, etc.), one can show that the modified geometric means estimator is approximately unbiased for the true cost-of-living index" (Shapiro and Wilcox, "Mismeasurement," p. 111).

The assumptions made by Shapiro and Wilcox are fairly restrictive. For example, the assumption of a stationary distribution of relative prices is an assumption that all of the prices in a stratum follow the same underlying trend. Prices in heterogeneous strata very likely violate this assumption because dissimilar goods may well follow different trends. Prices even in relatively

[3]The BLS authors cited by Shapiro and Wilcox are Brent R. Moulton, "Basic Components of the CPI: Estimation of Price Changes," *Monthly Labor Review*, 116, no. 12, December 1993; Marshall B. Reinsdorf and Brent R. Moulton, "The Construction of Basic Components of Cost-of-Living Indexes," in Timothy F. Bresnahan and Robert J. Gordon, eds., *The Economics of New Goods* (Chicago, University of Chicago Press, 1997); and Brent R. Moulton and Karin E. Smedley, "A Comparison of Estimators for Elementary Aggregates of the CPI," paper presented at Western Economic Association International conference, San Diego, CA, July 7, 1995 (Washington, D.C., Bureau of Labor Statistics).

homogeneous strata, such as tomatoes, can violate this assumption if some goods are produced with different technologies, such as hand-picked versus mechanically picked tomatoes.

Moreover, if all of these assumptions hold (stationarity, small correlation of relative prices over time, CES utility), the seasoning method now used to estimate the CPI component indexes also is unbiased. As Shapiro and Wilcox state, under their assumptions:

> "If ρ_{l-n} (the autocorrelation of the relative prices between periods l and n) is small, [the "seasoned" version of the CPI]...should provide quite an accurate estimate of the rate of increase in the true cost-of-living subindex, regardless of the elasticity of substitution" (Shapiro and Wilcox, "Mismeasurement," p. 110).

The fact that the growth rates of geometric means index and the seasoned index actually differ implies that an assumption, probably stationarity, is being violated. This weakens the commission's argument that the geometric means index necessarily approximates a true cost-of-living index and points to the importance of taking account of consumer substitution behavior. If relative prices are not stationary, then the geometric mean formula may still be the exact measure of the stratum cost-of-living subindex, but only if the elasticity of substitution equals one.[4] Alternatively, the seasoned Laspeyres formula may still be the exact measure of the stratum cost-of-living subindex, but only if the elasticity of substitution equals zero. The BLS intends to determine which of these assumptions provides the closest approximation, item category by item category.

[4] Shapiro and Wilcox, "Mismeasurement," fn. 22, p. 111.

Appendix B. Critique of Advisory Commission's Bias Estimates for Fresh Fruits and Vegetables and Motor Fuel[1]

Fresh fruits and vegetables.

The quote cited above [see section III] indicates that the advisory commission attributes a bias of 20 percent over the period 1967-96 due to increased seasonal availability and variety. It is reasonable to think that, to the extent that consumers value the increased seasonal availability of produce, they will consume more of it. Our analytical framework is to consider the "November strawberry" to be a new good, distinct from the "June strawberry," and measure the consumer surplus associated with the new good.[2]

Among the various methods that have been proposed for incorporating new goods in a cost-of-living index, Jerry Hausman's suggestion of calculating the consumer surplus from a linearized demand curve is particularly easy to apply to back of the envelope calculations.[3] Hausman's linearized method implies that the percentage bias of the price index from failure to incorporate the consumer surplus from a new good, n, is approximately

$$\text{bias} = -0.5 \times S_n / \delta_n \tag{1}$$

where S_n is the percentage expenditure share of the new good after introduction and δ_n is its price elasticity of demand. Thus the calculation of consumer surplus and bias can be inferred

[1] This appendix is an excerpt from a study by BLS researchers: Brent R. Moulton and Karin E. Moses, "Addressing the Quality Change Issue in the Consumer Price Index," forthcoming in *Brookings Papers on Economic Activity 1997:1* (Washington, D.C., Bureau of Labor Statistics, 1997).

[2] See W. Erwin Diewert, "The Treatment of Seasonality in a Cost-of-living Index," in W.E. Diewert and C. Montmarquette, eds., *Price Level Measurement: Proceedings from a Conference Sponsored by Statistics Canada* (Ottawa, Statistics Canada, 1983).

[3] See Jerry Hausman, "Cellular Telephone, New Products and the CPI," unpublished paper (Massachusetts Institute of Technology, 1997). Hausman refers to his linearized method as a "lower bound" on the consumer surplus, but it is unclear to us whether the conditions for the method to be a lower bound—a convex shaped demand curve—necessarily hold in all cases.

from information on the expenditure share, which is often readily available, and the elasticity of demand, which can be estimated or inferred from elasticity estimates for similar goods.[4]

New varieties or seasonal availability of fresh fruits and vegetables face many substitutes, not only from other fresh produce, but also from frozen fruits and vegetables. We assume a value of -1.0 for δ_n. Under these assumptions, equation 1 implies that the increased consumption of new seasonal items and varieties as a share of current consumption would need to be quite large—about 40 percent of 1996 expenditures—to be consistent with the advisory commission's estimated index bias of 20 percent.[5]

Table B1 presents U.S. Department of Agriculture data on changes in per capita consumption of fresh fruit from 1975 to 1995. The change in consumption is shown, somewhat unconventionally, as a percentage of 1995 consumption, because the shares in equation 1 refer to current period consumption. As the advisory commission observes, per capita consumption of many fruits has indeed increased substantially over this period: in particular, limes, cranberries, grapes, kiwifruit, mangos, papayas, and strawberries. Despite these large increases, however, most of these items continue to represent a small percentage of overall fruit consumption, so that the total increase in per capita fruit consumption as a share of 1995 consumption is only 14 percent (measured in pounds). The largest absolute increase in consumption of fruit is that for bananas. We are confident there was no important improvement in seasonal availability of bananas and that there were only minor increases in consumption of new varieties of bananas over this period. In addition, consumption of apples did not change significantly and consumption of oranges decreased. We wonder whether the use of apples for baking may have decreased during this period, which might mask a possible increase in the consumption of raw apples.

[4] If a new variety fully replaces an old one, the consumer surplus calculation should deduct the lost surplus of the disappearing variety from the surplus gained from the new variety.

[5] Ideally, one would examine monthly consumption data to isolate seasonal changes in consumption, but such data do not appear to be available.

We do not attempt to calculate the overall bias using equation 1 because doing so would require average price or expenditure data for each of the detailed categories, which we have not been able to assemble. As mentioned earlier, under Hausman's model and our earlier assumptions, to be consistent with the commission's bias estimate consumption of new varieties and seasonal items would need to increase by about 40 percent over thirty years, which annualizes to 25 percent over the twenty years for which we have data. If increased consumption of seasonal varieties was relatively unimportant for apples, bananas, and citrus fruits, which, according to the Consumer Expenditure Survey of the Bureau of Labor Statistics, together represent 61 percent of dollar expenditures on fresh fruit in 1995, it would be difficult for increased seasonal consumption of the other fruits to produce an estimated bias as large as the commission proposes.

Table B2 shows changes in consumption of vegetables from 1972 to 1995. Unlike the data for fruit, the data for vegetables show important increases in consumption for many items and thus appear, at first glance, to be consistent with the advisory commission's estimates of bias. Under the assumptions stated above, our consumer surplus calculations indicate that for the commission's estimate to hold, the growth in consumption over thirty years would need to be about 40 percent of current consumption, which annualizes to 29 percent over the twenty-three years for which we have consumption data. This is, in fact, very close to the overall increase over this period: 27 percent. We are skeptical, however, about concluding that the increase in consumption derives entirely from improved seasonal availability. A BLS food specialist, Bill Cook, has suggested that the increase in seasonal availability of fresh vegetables mostly occurred before 1985, as evidenced by a 1984 internal BLS study showing that 91 percent of the CPI price quotes for the "other fresh vegetables" category were by then available year round.[6] Table B2 shows, however, that almost half of the increase in consumption of fresh vegetables occurred

[6] Internal memorandum from William L. Weber to Dan Ginsburg, U.S. Bureau of Labor Statistics, May 25, 1984.

after 1985. Part of the increase appears to have been driven by shifts in preferences, perhaps as a response to improved knowledge about the health benefits of fresh vegetables.

Motor fuel

For the motor fuel category, the advisory commission attributes "a small upward bias of 0.25 percent per year to the CPI for ignoring the convenience and time-saving contribution of automatic credit-card readers built into gasoline pumps."[7] Because the commission applies this estimate over a ten-year period, the estimate of the cumulative bias from this source amounts to 2.5 percent.[8] Our approach to measuring the consumer surplus created by pay-at-the-pump credit card technology is to attempt to value the saving in time. Suppose that paying at the pump saves two minutes per fill-up, and that the customer's time is valued at $18 per hour (average total compensation per hour for all workers in private industry was $17.49 in 1996). Then the value of paying at the pump is 60 cents per fill-up. Assuming that ten gallons are purchased, the quality bias for the customer who pays at the pump is 6 cents per gallon, or roughly 4.5 percent of the cost of a gallon of gasoline.

Since this service is of value only to the customers who use it, one must next determine the approximate percentage of gasoline purchasers who use pay-at-the-pump technology. Although we have not found direct information on this percentage, the September 1996 issue of the trade journal *National Petroleum News* reports that 28 percent of the retail facilities operated by thirteen oil companies had installed pay-at-the-pump technology as of 1996.[9] Since many of

[7] U.S. Senate, Committee on Finance, *Final Report of the Advisory Commission to Study the Consumer Price Index.* Print 104-72. 104 Cong., 2 sess. (Washington, D.C., Government Printing Office, 1996), p. 36.

[8] We also note that the report does not address possible unmeasured decline in retail services, such as the introduction of fees for providing air for tires at some service stations. In addition, the advisory commission incorrectly assumes that the CPI does not make quality adjustments for air pollution mandates and, agreeing with this supposed BLS practice, makes no bias adjustment for the mandates itself. Since BLS does, in fact, make cost-based adjustments for motor fuel pollution mandates, the commission presumably should have counted these as downward bias (see U.S. Bureau of Labor Statistics, "Quality Adjustment for Gasoline," *CPI Detailed Report,* January 1995, p. 8).

[9] "Pay-at-the-Pump Shows Solid Growth in '90s," *National Petroleum News,* September 1996, p. 22.

the customers at these stations do not use credit cards, we attempt to find the percentage of gasoline customers who do so. We have not found published information, but an industry source has told us that roughly 35 percent of sales are made through credit cards.

A naive estimate of the proportion of sales using pay-at-the-pump technology would thus be 10 percent (28 percent × 35 percent). However, there are at least three reasons why this estimate is too low: first, pay-at-the-pump technology was doubtless first targeted at high-volume sites in areas with high credit card usage; second, the availability of the technology induces customers to make more use of credit cards; and third, the technology is spreading rapidly, so that even estimates published in September 1996 will understate current availability. Consequently we take 25 percent as our estimate of the percentage of customer sales made with pay-at-the-pump technology at the end of 1996. Under these assumptions, we calculate the cumulative index bias from neglecting the benefits of this technology as approximately 1.1 percent (4.5 percent × 25 percent), which is less than half of the advisory commission's estimate.

Table B1. Per Capita Consumption of Fresh Fruits, by Type, 1975-95
Units as indicated

Type of fruit	Pounds per capita			Change, 1975-95	
	1975	1985	1995	As percentage of 1995 consumption	In pounds
Citrus					
Oranges and temples	15.9	11.6	12.3	-29.6	-3.6
Tangerines and tangelos	2.6	1.5	2.0	-27.9	-0.6
Lemons	2.0	2.3	2.9	32.1	0.9
Limes	0.2	0.6	1.2	81.7	1.0
Grapefruit	8.4	5.5	6.0	-38.4	-2.3
Total	29.0	21.5	24.4	-18.9	-4.6
Noncitrus					
Apples	19.5	17.3	18.9	-3.0	-0.6
Apricots	0.1	0.2	0.1	20.0	0.0
Avocados	1.2	1.8	1.4	10.9	0.2
Bananas	17.6	23.5	27.4	35.6	9.8
Cherries	0.7	0.4	0.2	-187.5	-0.5
Cranberries	0.1	0.1	0.3	53.3	0.2
Grapes	3.6	6.8	7.6	52.7	4.0
Kiwifruit	...	0.1	0.5	...	...
Mangos	0.2	0.4	1.1	85.8	1.0
Peaches and Nectarines	5.0	5.5	5.4	8.5	0.5
Pears	2.7	2.8	3.4	19.4	0.7
Pineapples	1.0	1.5	1.9	46.6	0.9
Papayas	0.2	0.2	0.4	56.8	0.2
Plums and Prunes	1.3	1.4	0.9	-41.5	-0.4
Strawberries	1.8	3.0	3.8	52.1	2.0
Total	55.1	65.1	73.5	25.0	18.4
Total	84.1	86.5	97.9	14.1	13.8

Source: U.S. Department of Agriculture, Economic Research Service, *Fruit and Tree Nuts*, FTS-278, October 1996) (table F-29).

Table B2. Per Capita Consumption of Fresh Vegetables, by Type, 1972-95
Units as indicated

	Pounds per capita			Change 1972-95	
Type of vegetable	*1972*	*1985*	*1995*	*As a percentage of 1995 consumption*	*In pounds*
Asparagus	0.4	0.5	0.6	33.3	0.2
Broccoli	0.7	2.6	3.2	78.1	2.5
Carrots	6.5	6.5	10.1	35.6	3.6
Cauliflower	0.8	1.8	1.3	38.5	0.5
Celery	7.1	6.9	6.4	-10.9	-0.7
Sweet Corn	7.8	6.4	7.8	0.0	0.0
Bell Peppers	2.4	3.8	5.8	58.6	3.4
Onions	10.7	13.6	17.7	39.5	7.0
Tomatoes	12.1	14.9	16.6	27.1	4.5
Cabbage	8.5	8.8	9.1	6.6	0.6
Spinach	0.3	0.7	0.6	50.0	0.3
Cucumbers	3.0	4.4	5.6	46.4	2.6
Artichokes	0.4	0.7	0.4	0.0	0.0
Snap Beans	1.5	1.3	1.6	6.3	0.1
Eggplant	0.4	0.5	0.4	0.0	0.0
Escarole or endive	0.6	0.4	0.2	-200.0	-0.4
Garlic	0.4	1.1	2.1	81.0	1.7
Lettuce					
Head	22.4	23.7	21.6	-3.7	-0.8
Leaf or Romaine	...	3.3	6.0	...	...
Watermelon	12.3	13.5	15.9	22.6	3.6
Cantaloupe	7.0	8.5	9.9	29.3	2.9
Honeydews	1.0	2.1	2.4	58.3	1.4
All Others	0.8	0.8	0.7	-14.3	-0.1
Total	107.1	126.8	146.0	26.6	38.9

Source: U.S. Department of Agriculture, Economic Research Service, *Vegetables and Specialties: Situation and Outlook Yearbook*, VGS-269, July 1996 (table 14).

Appendix C. Examples of New Car Reliability/Durability Quality Adjustments in the CPI Since 1992

- Improved corrosion protection - body, electrical system, fuel tank, pump, shocks. brakes and cables
- Increased warranties
- Body side cladding
- Sealing improvements
- Stainless steel exhaust
- Longer life spark plugs - 100,000 mile life
- Improved steering gears
- Powertrain improvements
- Dextron III transmission fluid - 100,000 mile life
- Water pump front face - 150,000 mile life
- Battery saver
- Increased catalyst load - 100,000 mile life
- Rust resistant fuel injection -100,000 mile life
- Clearcoat paint
- sided galvanized steel body panels
- Serpentine drive belt

Table A.

Annual Average Unemployment Rates for the U.S., New York State, and New York City, Annual Averages 1968-96

Year	U.S.	New York State	New York City
1968	3.6	3.1	3.1
1969	3.5	3.3	3.6
1970	4.9	4.5	4.8
1971	5.9	6.6	6.7
1972	5.6	6.7	7.0
1973	4.9	5.4	6.0
1974	5.6	6.4	7.2
1975	8.5	9.5	10.6
1976	7.7	10.3	11.2
1977	7.1	9.1	10.0
1978	6.1	7.7	8.9
1979	5.8	7.1	8.7
1980	7.1	7.5	8.6
1981	7.6	7.6	9.0
1982	9.7	8.6	9.6
1983	9.6	8.6	9.4
1984	7.5	7.2	8.9
1985	7.2	6.5	8.1
1986	7.0	6.3	7.4
1987	6.2	4.9	5.7
1988	5.5	4.2	5.0
1989	5.3	5.1	6.9
1990	5.6	5.3	6.9
1991	6.8	7.3	8.7
1992	7.5	8.6	11.0
1993	6.9	7.8	10.4
1994	6.1	6.9	8.7
1995	5.6	6.3	8.2
1996	5.4	6.2	8.8

SOURCE: Bureau of Labor Statistics
Current Population Survey

Table B.

Annual Average Unemployment Rates for the 20 Largest Cities, 1990 and 1996

City	1990	1996
New York	6.9	8.8
Los Angeles	6.7	9.3
Chicago	8.4	6.7
Houston	6.1	6.4
Philadelphia	6.3	6.9
San Diego	4.8	5.4
Dallas	6.2	5.2
Phoenix	4.9	4.0
Detroit	14.3	9.1
San Antonio	7.9	4.9
San Jose	4.7	4.2
Indianapolis	3.8	3.7
San Francisco	3.8	4.7
Baltimore	8.2	8.1
Jacksonville	5.3	3.8
Columbus	3.9	3.4
Milwaukee	5.7	5.1
Memphis	5.4	5.3
Washington, DC	6.6	8.5
Boston	5.7	4.5

Population ranking is based on 1992 population.

SOURCE: Bureau of Labor Statistics
Local Area Unemployment Statistics

Table C.

Labor Force Participation Rates, Employment-Population Ratios, and Unemployment Rates by Sex, Age, Race, and Hispanic Origin for the U.S. and New York City, 1996 Annual Averages

Population Group	Labor Force Participation Rates		Employment-Population Ratio		Unemployment Rate	
	U.S.	N.Y.C.	U.S.	N.Y.C.	U.S.	N.Y.C.
Total	66.8	56.7	63.2	51.7	5.4	8.8
Men	74.9	66.4	70.9	60.4	5.4	9.0
Women	59.3	48.7	56.0	44.5	5.4	8.5
Both sexes, 16-19 years	52.3	25.0	43.5	17.8	16.7	29.0
White	67.2	55.7	64.1	51.6	4.7	7.4
Black	64.1	55.4	57.4	48.4	10.5	12.5
Hispanic origin	66.5	52.7	60.6	47.0	8.9	10.8

SOURCE: Bureau of Labor Statistics
Current Population Survey

Table D.

Unemployment Rates by Occupation for the U.S. and New York City, 1996 Annual Averages

Occupational Category	United States	New York City
Managerial and Professional Specialty		
Executive, Administrative & Managerial	2.4	3.2
Professional	2.3	4.5
Technical, Sales, & Administrative Support		
Technical and Related Support	2.8	5.6
Sales	5.2	9.5
Administrative Support (includes clerical)	4.2	8.9
Service Occupations	7.2	9.4
Precision Production, Craft, & Repair	5.5	11.0
Operators, Fabricators, & Laborers		
Machine Operators, Assemblers, & Inspectors	7.7	11.3
Transportation & Material Moving	5.2	6.3
Handlers, Equipment Cleaners, Helpers, & Laborers	11.1	16.7

NOTE: Occupational detail excludes persons with no previous work experience. Farming and fishing occupations are not shown separately.

SOURCE: Bureau of Labor Statistics
Current Population Survey

Table E.

Unemployment Rates by Industry for Nonagricultural Workers in the U.S. and New York City, 1996 Annual Averages

Industry	United States	New York City
Construction	10.1	17.2
Manufacturing		
Total	4.8	8.7
Durable Goods	4.5	10.4
Nondurable Goods	5.2	8.1
Transportation, Communications and Public Utilities	4.1	8.1
Trade	6.4	10.9
Finance, Insurance & Real Estate	2.7	5.0
Services	5.4	8.2
Government	2.8	4.6

NOTE: Industry detail excludes persons with no previous work experience.

SOURCE: Bureau of Labor Statistics
Current Population Survey

Table F.

Percent of Employed Persons in Occupations by Demographic Group, for the U.S. and New York City, 1996 Annual Averages

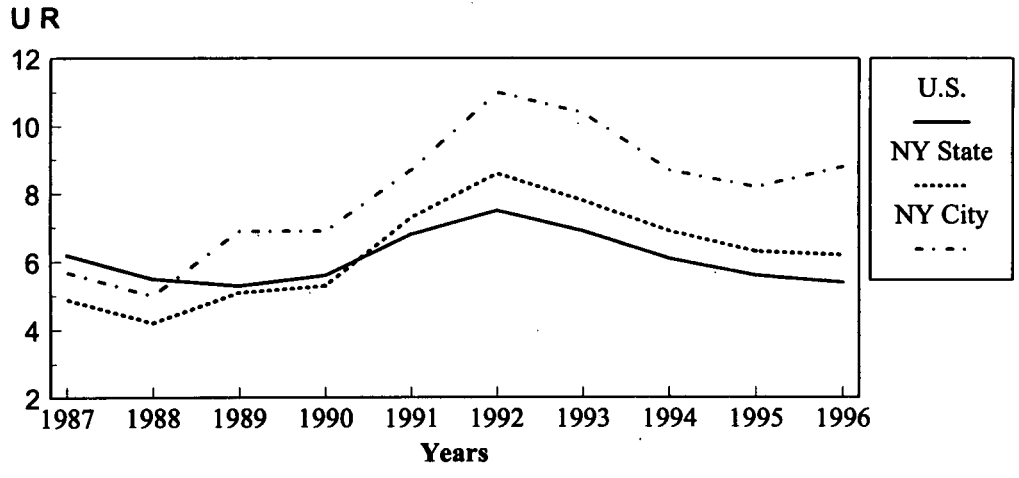
Occupational Category	New York City Percent of total			United States Percent of total		
	Women	Black	Hispanic origin	Women	Black	Hispanic origin
Total	47.1	27.2	22.7	46.2	10.7	9.2
Managerial and Professional Specialty						
Executive, Administrative & Managerial	43.2	16.3	11.5	43.8	6.9	4.8
Professional	57.0	20.2	9.7	53.3	7.9	4.3
Technical, Sales, & Administrative Support						
Technical and Related Support	48.6	24.3	20.0	52.5	9.4	6.3
Sales	41.5	18.0	17.4	49.5	7.9	7.0
Administrative Support (includes clerical)	70.1	35.0	23.7	79.1	12.5	8.3
Service Occupations	52.0	38.0	32.4	59.4	17.2	13.7
Precision Production, Craft, & Repair	7.8	28.8	26.9	9.0	7.9	11.0
Operators, Fabricators, & Laborers						
Machine Operators, Assemblers, & Inspectors	51.4	20.7	51.4	37.7	15.2	16.4
Transportation & Material Moving	2.1	39.4	24.5	9.5	14.6	10.3
Handlers, Equipment Cleaners, Helpers, & Laborers	9.8	28.4	37.3	19.3	16.4	15.2

NOTE: Occupational detail excludes persons with no previous work experience.
Total includes farming and fishing, not shown separately.

SOURCE: Bureau of Labor Statistics
Current Population Survey

Chart 1.

Annual Average Unemployment Rates for the U.S., New York, and New York City, 1987-96



Source: Bureau of Labor Statistics
Local Area Unemployment Statistics

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