

# **A New Perspective on the MCPI: A Modified and Complementary Measure**

Richard A. Sinclair<sup>1</sup>

## **Abstract**

Current medical price indices such as the MCPI and the GDP deflator contain several different biases, which create distortions and portray higher-than-actual levels of healthcare spending. This paper reviews several of the different biases that exist and describes the associated underlying problems. Moreover, it presents a new form of measurement. By adjusting the MCPI for median hourly wages and measuring the cost of medical services in terms of hours of work required to pay, I find that the real cost of certain medical services are in fact lower than other measures indicate. This form of measurement may serve as a complementary measure that can be used in congruence with other indices to more accurately capture medical costs.

**Keywords:** Medical Care Price Indices, Price Indices, Healthcare

---

<sup>1</sup> Sinclair3@ferris.edu

## **I. Introduction**

Rising healthcare costs have long been an area of concern within the United States, with an increasing share of GDP being devoted to healthcare almost every year since 1960. It is evident that the current growth of healthcare spending is unsustainable, with healthcare expenditures now accounting for nearly 20% of GDP. Between 1960 and 2013 healthcare spending increased from \$147 per person to \$9,255 per person, reflective of an 8.1% average annual increase. These numbers have even outpaced personal income growth, which grew at an annual average growth rate of 5.7%. When compared to GDP—which has only grown at 3.1% per year—between 1960 and 2013 healthcare has grown at an inflation-adjusted average annual rate of 5.5%, indicative of the chronic deficits that are being run to finance government provided healthcare. Alongside efforts to increase access to health care, technological advancements paired with advances in medicine have both played significant roles in the increased levels of spending. Moreover, healthy levels of economic growth, unhealthy lifestyles, an increase in the older population and the prevalence of diseases such as cancer, obesity and heart disease have also fueled higher levels of spending.

In regard to overall spending, the constant dominant areas have been hospital care (33% share), physician and clinical services (20% share) and prescription drugs (10% share). In 2013, 57% of healthcare spending was funded by households, businesses and other sources of private revenues, while 43% was covered by the government. This highlights a large shift from 1960 in which 77% of healthcare spending was funded by private sponsors, businesses and households, and only 23% by the government. This shift in public financing can be mainly attributed to the increase of access and coverage of Medicare and Medicaid through government policies such as the Affordable Care Act.

It is evident that the current levels of healthcare spending present significant economic policy interest which merits the discussion of how such healthcare costs are tabulated. The current consensus on medical care is that extremely high levels of inflation bolster spending. When determining how much of these increases are due to other factors such as technological advances, and how much are in fact inflation, we look to the measurement that captures medical

price inflation. The medical component of the CPI, known as the MCPI, displays the major index of medical care prices. The MCPI is broken down into seven sub-categories of commodities and nine sub-categories of services<sup>2</sup>. It has been widely recognized that the MCPI is subject to several measurement biases which likely create imprecisions in real medical costs. This subsequently begs the question if medical costs are actually increasing as much as the numbers seem to depict. This paper seeks to modify the MCPI by adjusting the index for real median hourly wages and calculating the price of medical services in terms of hours of work required to pay for services by the median wage earner. Doing this will help us better assess the changes seen in medical costs from the consumers perspective as we are effectively controlling for an income effect, which the MCPI cannot do.

## II. Literature Review

The current literature on the measurement biases of the MCPI spans both economic and public policy discussions. The most established problem with the MCPI is that it uses a fixed-weight index to measure inflation. This is inherently problematic as fixed-weight indices do not accurately reveal the change in the cost of living, which can create a considerable upward bias within estimates. The Bureau of Labor Statistics have attempted to fix this problem by factoring in quality adjusted improvements, however, infrequently revised price index weights and technological advances have simply outpaced these adjustments (Robert Grayboyes, 1994). Economists (Joseph Newhouse, 2001) have found that due to undeviating problems of accounting for improved productivity and quality within the nature of price indices resulting in upward biases, healthcare spending should have a separate deflator composed from a sample of disease-specific deflators. The deflator would be composed of random samples with probability proportional to spending for each given disease, while the weight of healthcare in the overall index would indicate the amount of healthcare spent in the relevant aggregate.

---

<sup>2</sup>Medical services include nursing home, dental, optometry, physician, hospital room, other inpatient, outpatient, other professional, and unpriced. While medical commodities include general medical equipment, convalescent equipment, prescription drugs, nonprescription drugs, first aid dressings, hearing aids and unpriced items.

Others (Robert Grayboyes, 1994) have also noted that the MCPI fails to account for quality changes and the addition of new products. The underlying logic is that price indices assume that individual's consumption baskets remain unchanged over time and provide a constant level of utility. Such assumptions are specifically problematic in the field of medicine as treatments and technology are constantly changing and evolving. By failing to adequately revise consumption baskets, the index is unable to account for substantial price reductions in new products. A similar, more common problem is seen in the case of generic drugs as they are not calculated and entered into the index until the weights are revised, by which time they are able to capture market share and lower prices—which when entered into the index, fails to reflect these price reductions. It is important to note that such issues with the MCPI can be improved or mitigated however, the MCPI is still unable to account for the income effect.

Another problem that exists within the index measurement is a statistical phenomenon known as substitution bias. The general consensus amongst economists is that when the price of a good increases in relation to other goods, individuals will tend to consume less of it. As the price of multiple goods change relative to one another, consumers spending patterns will shift. Thus, as the CPI uses a fixed-weight index, it is incapable of detecting the constant changes in spending patterns. This subsequently results in the index eventually placing too much weight on the price of the fastest rising goods. However, economists believe that such substitution biases are minute in most indices and are superseded by problems in measuring quality.

Other known problems include the use of list prices and sampling. All indices published by the Bureau of Labor Statistics use list prices rather than transaction prices in their index calculations. List prices are defined as the billed charge that stems from providers charge list. The problem with using list prices is that most patients usually pay a lower transaction cost due to discounts and the presence of insurance providers—who often pay lower rates to hospitals, doctors offices and clinics. Therefore, as transaction prices are usually substantially lower than the list prices, entering list prices into the index creates an upward bias in the estimates. Sampling can also create biases, as the high cost of collecting price data results in a limited number of transactions being included in the index. Thus, prices may not accurately reflect those paid by the majority of individuals.

Some economists (Wilensky and Rose, 1986) have suggested an alternative form of measurement that may more accurately reflect the changes in the price of medical care. The proposed alternative measures the change in medical output rather than the change in price. In this measurement, output is defined by either the entirety of the case, the episode, or on a per capita basis. Other methods put forth (Trajtenberg, 1990) include defining a good based on a set of characteristics demanded by consumers. This method prices the demanded characteristics and recombines them to define the price of the good based on constant-quality.

Given the various biases that exist within the MCPI it is likely that the increases in medical costs are overstated. However, this is not to say that costs are not increasing at a distressing rate. The healthcare market faces high barriers to entry which often result in very weak competitive pressures. The market is also heavily subsidized and regulated, which only serves to increase moral hazard. This transpires as the price of insurance premiums paid by employers are income tax-free, and as price plays a reduced role due to policies such as the Affordable Care Act, which assure that consumers are not exposed to the majority of expenses associated with their medical care decisions. This is distinctly seen in the case of Medicare beneficiaries who pay the same amount irrespective of where they obtain their services. Given the high levels of spending, a newly modified measurement of the MCPI presents an alternative explanation of why healthcare costs are so high.

### **III. Method**

#### **Using Hours Worked to Estimate the Real Prices Consumers Face**

When consumers spend their discretionary dollars, it is not the tangible, nominal dollars they are spending, but in actuality, their time. That is, the most seemingly accurate way to measure the real cost of living—the cost of goods and services—is through the hours and minutes spent working, as when we consume products and services we're virtually spending time. For instance, the price of a car in 1908 was \$850 which equated to 4696 hours of work, while in 1997 the price of a car was \$17,995 but only equated to 1365 hours of work (Federal Reserve Bank of Dallas, 1997). Moreover, when we account for the difference in the quality of

the car, purchasing the equivalent of a 1908 car would require less than 1365 hours of work. Following this logic, time can provide a constant metric that can be used to measure medical costs. Furthermore, when applying this framework to medical costs we may find that the real cost measured in hours spent working may not be increasing as much as the numbers seem to indicate.

There are currently no adjusted measures of the MCPI that account for the real cost of living through the use of hours. This paper measures medical costs by using the median hourly wages and the poverty threshold associated with the year in which the costs were captured. Time spent working—when accounted for changes in wage—allows us to compare the standard of living over time. As time passes by and inflation increases, the purchasing power of a dollar decreases, meaning that in money terms, the cost of living increases. Thus, the disadvantage of using money prices as a form of measurement is that it carries little weight apart from money wages—meaning that the significance of money prices is dependent on money wages. For instance, the price of a pair of boots in 1927 was \$2, which sounds phenomenal until we account for the average hourly pay of 14.8¢. Conversely, time can serve as the real currency of life, as the value of our time determines what we can acquire for its exchange.

When wages are converted to the currency of hours and minutes, it's found that most consumer products and services have in fact decreased in price. This is a direct result of the market process, which promotes competition, incentivizes innovation and rewards efficiency. As economies of scale begin to take hold, most new consumer products and services experience declining prices and improvements in quality, which give consumers more purchasing power.

Medical care however, does not quite fall into this category, as it now requires more hours of work to consume medical services and products than it did in the past. Unlike firms within other markets, firms within the healthcare market do not experience significant economies of scale due to lack of competition and are inherently bound to market failures—which makes lowering prices difficult. Furthermore, the possibility exists that our demand for high quality medical care is due to the fact that medical care may be considered a luxury good. However,

though the price of medical care has risen, it is important to acknowledge that significant changes in the quality and delivery of medical care have been developed within the past century.

It is widely recognized by economists that measurement problems due to the substitution effect persist in the MCPI. Due to constant fluctuations in price which shift consumer spending patterns, the MCPI fails to detect changes that ultimately end up placing too much weight on the price of the goods that rise fastest. However, in addition to the substitution effect, there may also be an income effect present when wages are converted into time. When compared to price, real average wages have almost the same purchasing power that they did forty years ago, however, when wages are converted into time we find that real purchasing power has in fact increased. Therefore, when time is used as a measurement for real income the value rises, and we can expect an increase in the demand for goods and services—which may be the case with medical care spending. This is precisely why indexes should recognize that income effects can play a role in long term comparisons and create biases.

## **IV. Data & Findings**

### **Medical Care Expenditures**

Effectively comparing and contrasting the change in medical care expenditures first required measuring the dollars spent on medical services on a per capita basis. Following this, per capita medical costs are converted into hours based on the median hourly wage of the year in which the costs were captured. The medical expenditures measured were hospital care, physician and clinical services, dental services, home health care, nursing home, prescription drugs and annual expenditures. Medical services were contrasted to 2015 through the years of 1960, 1970, 1980, 1990, 2000, 2005 and 2010. Changes were measured by times increased—being the amount of times spending or hours increased—relative to 2015. The results indicate that the dollars spent on most medical services (dollar expenditures<sup>3</sup>) have increased at a faster rate than the increases in hours required to work to pay for services. These results suggest that

---

<sup>3</sup> Dollar expenditures (figure.2) measures the amount of times the per capita nominal expenditures for medical services have increased in each time period relative to 2015.

measurement biases within the MCPI are likely overstating prices and that medical costs—when adjusted to the cost of living measured in hours—have not increased as much as once thought.

**Per Capita Dollar Expenditures**

<b>Year</b>	<b>1960</b>	<b>1970</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>
Hospital Care	\$49.81	\$132.62	\$443.71	\$1,003.21	\$1,472.36	\$2,062.27	\$2,658.91	\$3,227.73
Physician & Clinical Services	\$30.99	\$69.72	\$210.60	\$636.62	\$1,030.83	\$1,411.84	\$1,658.91	\$1,977.88
								\$366.04
Dental Services	\$11.07	\$22.92	\$59.16	\$127.00	\$220.77	\$294.42	\$339.48	
Home Health Care	\$0.55	\$0.98	\$10.60	\$50.48	\$114.81	\$164.81	\$229.55	\$276.64
Nursing Home Care	\$4.43	\$19.50	\$67.55	\$179.89	\$301.56	\$380.71	\$452.63	\$488.47
Prescription Drugs	\$14.94	\$26.82	\$52.98	\$161.46	\$429.48	\$694.75	\$817.98	\$1,011.21
Overall Annual Expenditures	\$111.79	\$272.55	\$844.59	\$2,158.65	\$3,569.81	\$5,008.80	\$6,157.45	\$7,347.98

Figure.1

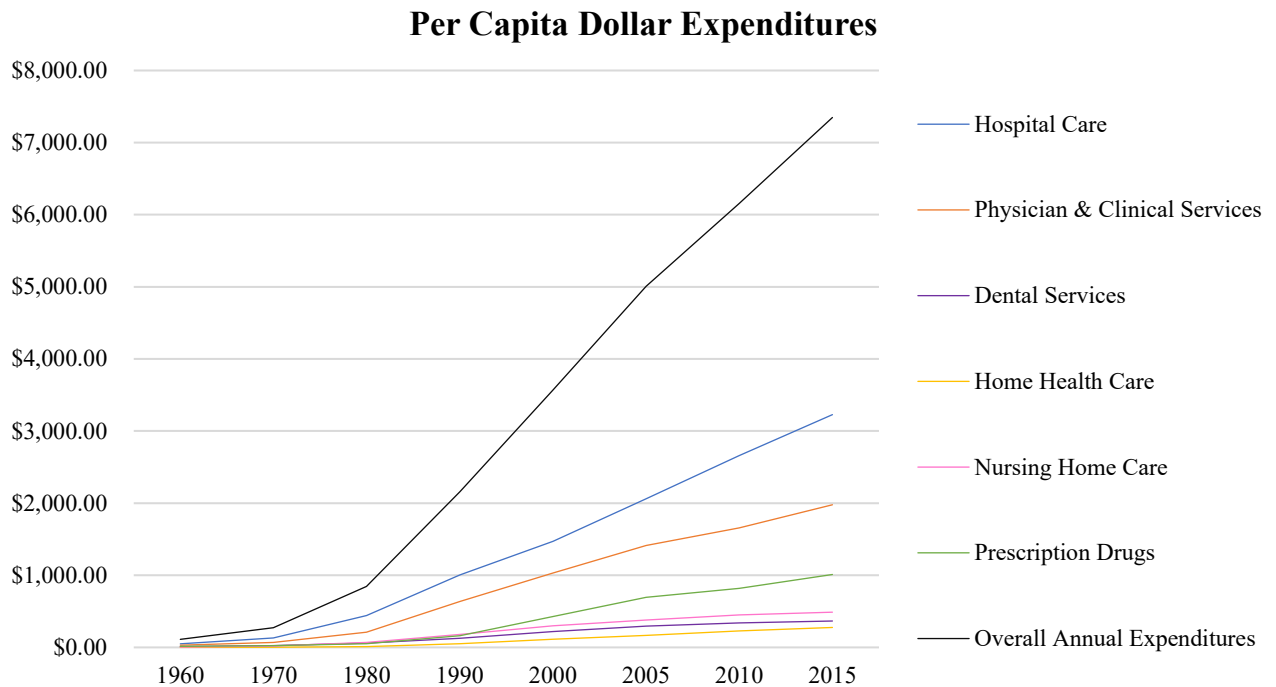




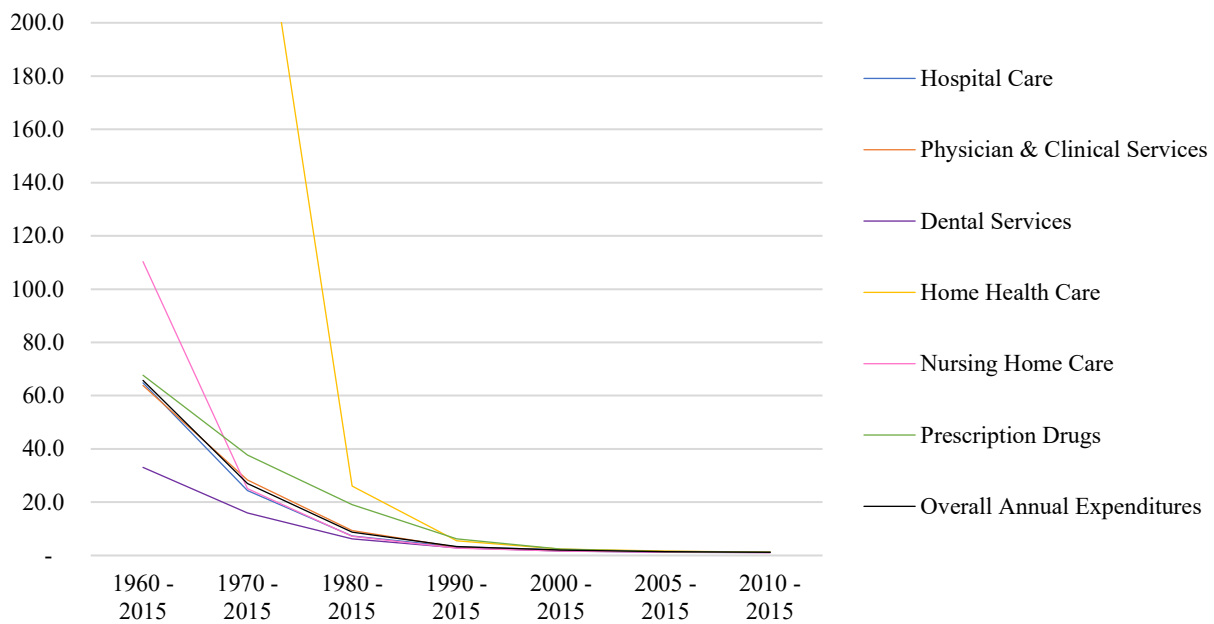
Figure .1b

**Dollar Expenditures (Times Increased)**

<b>Year</b>	<b>1960 - 2015</b>	<b>1970 - 2015</b>	<b>1980 - 2015</b>	<b>1990 - 2015</b>	<b>2000 - 2015</b>	<b>2005 - 2015</b>	<b>2010 - 2015</b>
Hospital Care	64.8	24.3	7.3	3.2	2.2	1.6	1.2
Physician & Clinical Services	63.8	28.4	9.4	3.1	1.9	1.4	1.2
Dental Services	33.1	16.0	6.2	2.9	1.7	1.2	1.1
Home Health Care	499.9	283.7	26.1	5.5	2.4	1.7	1.2
Nursing Home Care	110.3	25.0	7.2	2.7	1.6	1.3	1.1
Prescription Drugs	67.7	37.7	19.1	6.3	2.4	1.5	1.2
Overall Annual Expenditures	65.7	27.0	8.7	3.4	2.1	1.5	1.2

Figure.2

**Dollar Expenditures (Times Increased)**



### Hours Required to Pay for Services

When comparing the times dollar expenditures increased (figure.2) with the times hours required to pay for services increased (figure.4), the data suggests that the increases in the hours required to work to pay for services increased at a much more modest rate than dollar expenditures did. Between 1960-2015 hospital care expenditures increased by 64.8 times while the hours required to pay for medical services only increased 4.1 times. Likewise, physician and clinical services, dental services, home health care, nursing home care, prescription drugs and overall annual expenses increased at much lower rates. When examining the years 2000-2015 the trend begins to flatten out, with the times increased in hours required to pay for services and dollar expenditures both experiencing smaller, more identical marginal changes. However, it is not until 2010-2015 where the trend of times increased almost completely evens out—with the times increased in hours required to pay for services all increasing .1 times less than the times increased in dollar expenditures.

#### Hours Required to Pay for Services (Based on Yearly Median Wage)

<b>Year</b>	<b>1960</b>	<b>1970</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>
Hospital Care	38.6	41.1	67.9	97.3	102.4	126.7	142.5	159.6
Physician & Clinical Services	24.0	21.6	32.3	61.7	71.7	86.7	88.9	97.8
Dental Services	8.6	7.1	9.1	12.3	15.4	18.1	18.2	18.1
Home Health Care	0.4	0.3	1.6	4.9	8.0	10.1	12.3	13.7
Nursing Home Care	3.4	6.0	10.3	17.4	21.0	23.4	24.3	24.1
Prescription Drugs	11.6	8.3	8.1	15.7	29.9	42.7	43.8	50.0
Overall hours per person/annual expense	86.7	84.4	129.3	209.4	248.2	307.7	330.0	363.2

Figure.3

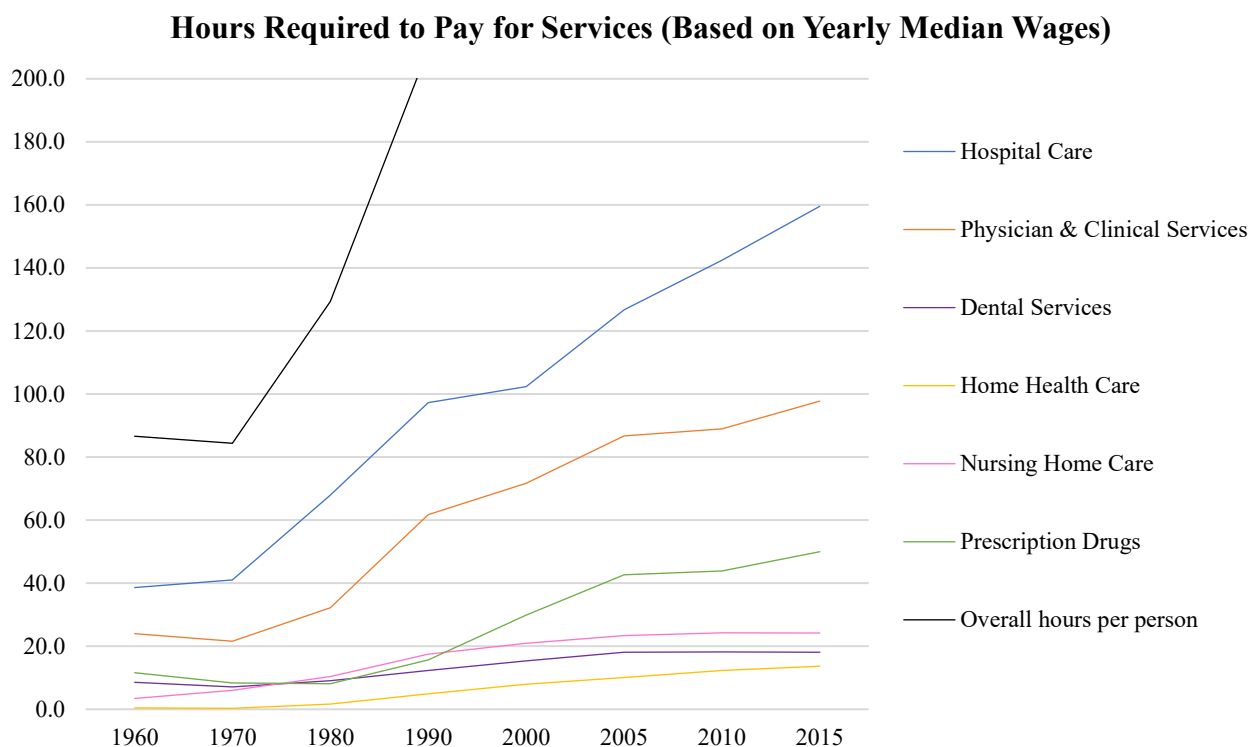


Figure .3b

### Hours Required to Pay for Services (Times increased)

Year	1960 - 2015	1970 - 2015	1980 - 2015	1990 - 2015	2000 - 2015	2005 - 2015	2010 - 2015
Hospital Care	4.1	3.9	2.3	1.6	1.6	1.3	1.1
Physician & Clinical Services	4.1	4.5	3.0	1.6	1.4	1.1	1.1
Dental Services	2.1	2.6	2.0	1.5	1.2	1.0	1.0
Home Health Care	31.9	45.3	8.4	2.8	1.7	1.4	1.1
Nursing Home Care	7.0	4.0	2.3	1.4	1.2	1.0	1.0
Prescription Drugs	4.3	6.0	6.2	3.2	1.7	1.2	1.1

Overall hours per person/annual expense      4.2      4.3      2.8      1.7      1.5      1.2      1.1

Figure.4

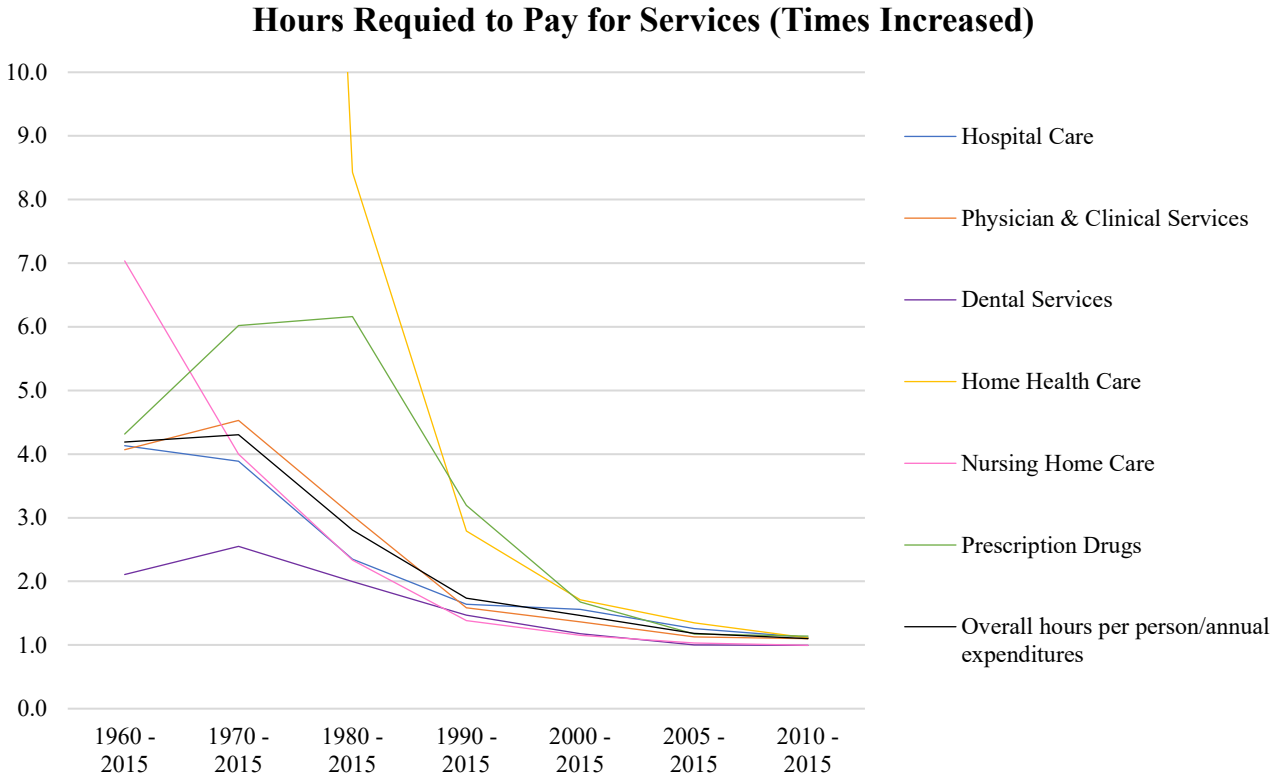


Figure.4b

### Real Medical Care Expenditure Growth

To get the most accurate measurement in the difference between times increased in hours required to pay for services and times increased in dollar expenditures, real growth for expenditures was calculated based on times increased. When converted into 2015 dollars, real growth for expenditures increased 8.0 times in 1960, 6.1 times in 1970, 2.9 times in 1980, 1.8 times in 1990, 1.4 times in 2000, 1.2 times in 2005 and 1.1 times in 2010. When compared to times increased in hours required to pay for services, real expenditure growth increased at a faster rate up until the year 2000, at which point the trend began to reverse with times increased in hours required to pay for services outpacing real expenditure growth in hospital care, home health care, prescription drugs and overall annual spending.



### Hours Required to Pay for Services—Poverty Threshold Adjusted

In order to gain a more comprehensive understanding of the data measured in hours required to pay for services, additional measurements were conducted based on the poverty threshold adjusted to an hourly wage. This was done by taking the individual poverty threshold for each respective year and measuring them based on a 52-week, 40-hour per week basis. These results showed strong evidence that some expenses in the MCPI are in fact overstated. The hours required to pay for services when adjusted to the poverty threshold increased at a lower rate for physician and clinical services, and dental services from 1960-2015 when compared to the real expenditure growth. From 1970-2015, compared to the 6.1 times increased in real expenditure growth, all medical services constructed on hours required to pay based on the poverty threshold (figure.7) increased at a lower rate—except for home health care and prescription drugs which increased 45.9 times and 6.1 times respectively.

#### Hours Required to Pay for Services (Based on Poverty Threshold)

<b>Year</b>	<b>1960</b>	<b>1970</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>
Hospital Care	69.5	141.2	220.3	313.7	348.4	430.1	496.6	555.7
Physician & Clinical Services	43.3	74.2	104.5	199.1	243.9	294.5	309.8	340.5
Dental Services	15.5	24.4	29.4	39.7	52.2	61.4	63.4	63.0
Home Health Care	0.8	1.0	5.3	15.8	27.2	34.4	42.9	47.6
Nursing Home Care	6.2	20.8	33.5	56.2	71.4	79.4	84.5	84.1
Prescription Drugs	20.9	28.5	26.3	50.5	101.6	144.9	152.8	174.0
Overall hours per person/annual expense	156.1	290.1	419.3	675	844.6	1044.7	1150	1265

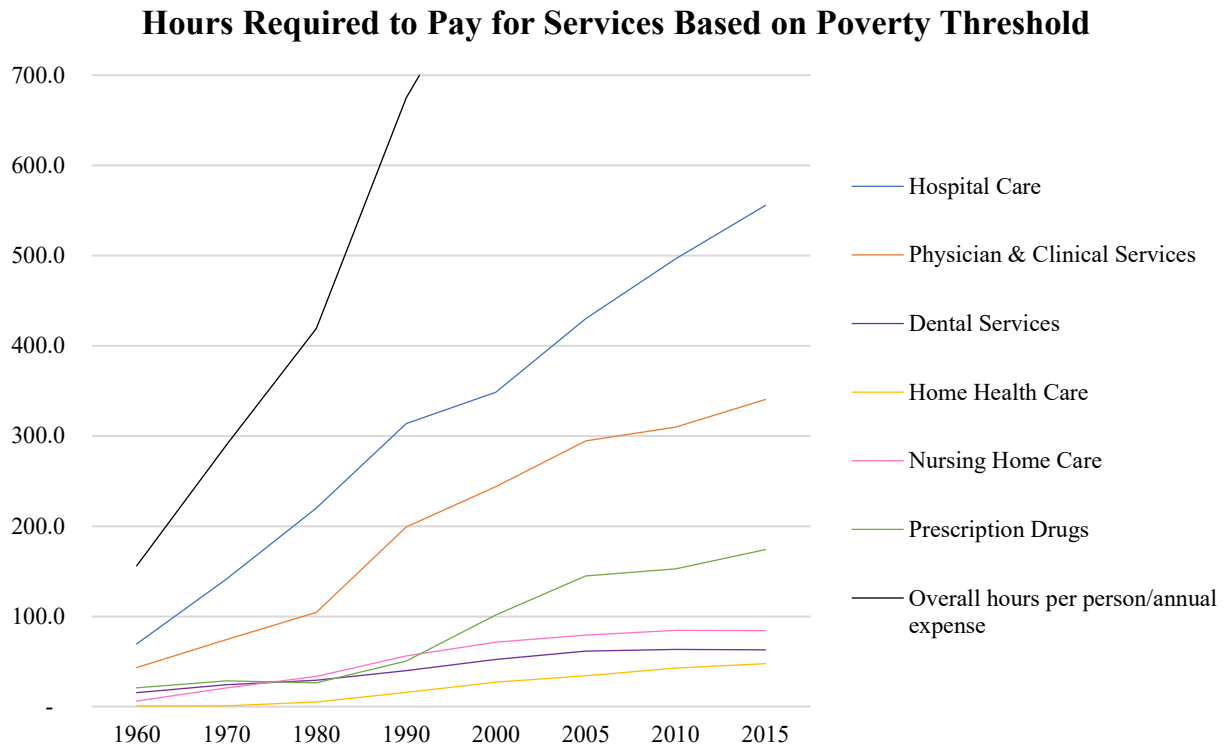


Figure.6b

### Hours Required to Pay for Services Based on Poverty Threshold (Times increased)

Year	1960 - 2015	1970 - 2015	1980 - 2015	1990 - 2015	2000 - 2015	2005 - 2015	2010 - 2015
Hospital Care	8.0	3.9	2.5	1.8	1.6	1.3	1.1
Physician & Clinical Services	7.9	4.6	3.3	1.7	1.4	1.2	1.1
Dental Services	4.1	2.6	2.1	1.6	1.2	1.0	1.0
Home Health Care	61.6	45.9	9.1	3.0	1.8	1.4	1.1
Nursing Home Care	13.6	4.1	2.5	1.5	1.2	1.1	1.0
Prescription Drugs	8.3	6.1	6.6	3.4	1.7	1.2	1.1

Overall hours per  
person/annual expense

8.1      4.4      3.0      1.9      1.5      1.2      1.1

Figure.7

### Hours Required to Pay for Services Based on Poverty Threshold (Times Increased)

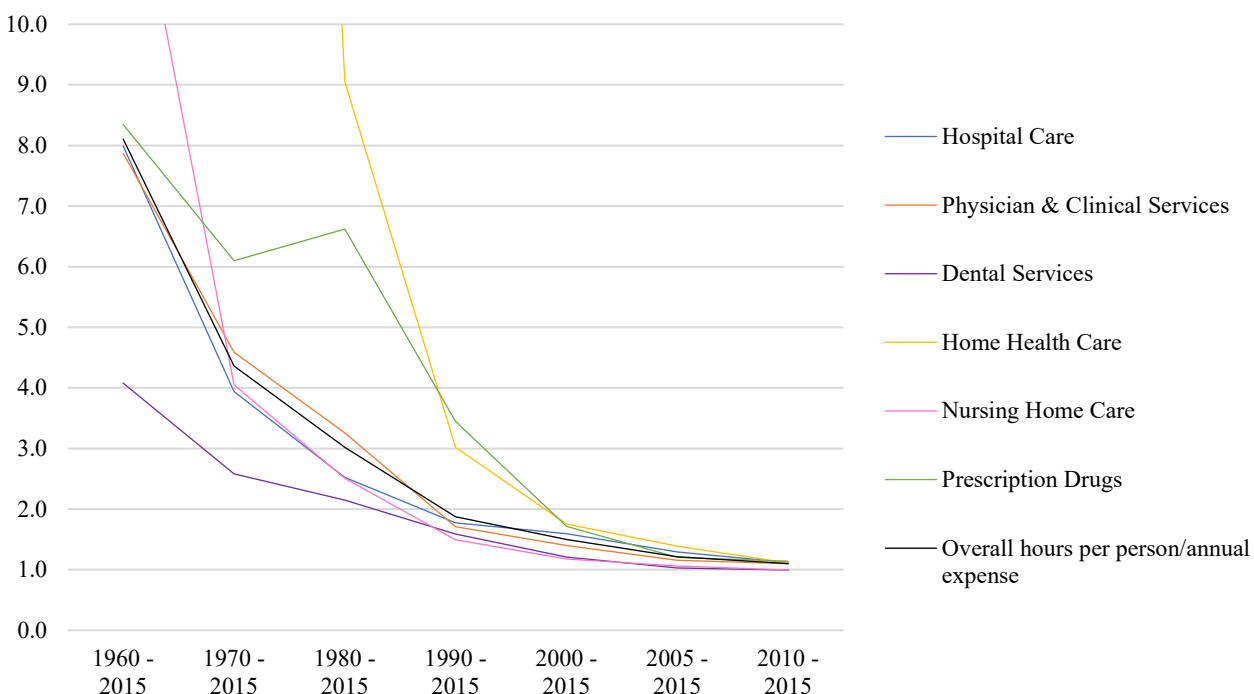


Figure.7b

Following this trend, from 1980-2015 hospital care, dental services and nursing home care increased at lower rates based on hours required to pay for services when compared to real expenditure growth. While from 1990-2015, physician and clinical services, nursing home care and dental services increased at a lower rate. In both the median wage and poverty threshold adjusted measurements of hours required to pay for services, all time periods from 1970 onwards experienced lower rates in both dental services and nursing home care than those seen in real expenditure growth. This evidence further bolsters the claim that upward biases in the MCPI exist and result in overstated expenses.



Objections to this modified measurement can be made on the grounds that it does not account for changes in the average hourly work week in each time period. Thus, although the hours required to pay for services may be the same, the time in which those hours can be accrued may differ. Therefore, solely measuring the hours required to pay for medical services may present an inaccurate time conception as it does not depict how long it takes to pay for services in actuality. Furthermore, it is important to note that using the median wage in this measurement will not change the fact that prices captured in the MCPI might not accurately reflect those paid by the majority of individuals. However, this measurement is in no way intended to serve as an ideal form of measurement, but is instead intended to present a new and relative form of measurement that can be used in congruence with future efforts to address measurement problems that persist within the index. Furthermore, this measurement shows that although in most instances the inflation seen in medical prices is outpacing wage inflation, it is not as severe as the numbers depict when we adjust our ability to pay for services into a constant standard such as time.

## **V. Conclusion**

This paper has discussed many known biases within the MCPI that lead to distortions within the index. Furthermore, it has presented a new and innovative way to measure medical costs through a constant standard. Measurements included were services and expenditures as stated by the MCPI. Due to the significance of medical services and the controversy surrounding healthcare costs it is evident that more research surrounding measurement problems of medical indices is needed. Implications of establishing a more reliable measurement include potential cost savings due to better recognition of spending patterns. Such savings could be realized through reductions in government healthcare budgets as well as Medicare and Medicaid. Future research surrounding this form of measurement should seek to establish the difference in the average weekly hours worked across different time periods. While research aimed at improving medical price indices should work to address the current irremediable problem of capturing quality changes in medical care.

## Work Cited

U.S. Department of Commerce, Bureau of Economic Analysis (BEA), Table 2.1: "Personal Income and Its Disposition."

Newhouse, Joseph. "Medical Care Price Indices: Problems and Opportunities / The Chung-Hua Lectures." *Academia Economic Papers*, March 2001. doi:10.3386/w8168.

Graboyes, Robert F., "Medical Care Price Indexes," *Federal Reserve Bank of Richmond Economic Quarterly* 80(4), Fall 1994, 69–89.

Newhouse, Joseph P., "Measuring Medical Prices and Understanding Their Effects," *The Journal of Health Administration Education* 7(1), Winter 1989, 19-26.

Trajtenberg, M., "Economic Analysis of Product Innovation: The Case of the CT Scanners," *Harvard Economic Studies* 160, Cambridge, MA: Harvard University Press, 1990.

Wilensky, Gail R. and Louis F. Rossiter, "Alternative Units of Payment for Physician Services: An Overview of the Issues," *Medical Care Review* 43, Spring 1986, 133–156.

*Time Well Spent: The Declining Real Cost of Living in America*. Dallas, TX: Federal Reserve Bank of Dallas, 1997.

DeSilver, Drew. "For Most Americans, Real Wages Have Barely Budgeted for Decades." Pew Research Center. August 07, 2018. Accessed December 08, 2018.