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EVALUATING LABOR MARKET IMPACTS OF SINGLE-PAYER HEALTHCARE IN THE UNITED STATES

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Abstract

This thesis evaluates the labor-market impacts of a particular single-payer healthcare proposal, the Medicare-for-All Act of 2017. We find that, using these assumptions as a starting point, such a proposal would lead to an overall welfare gain among the American populace of approximately .86%. Large welfare gains would be found in lower-income groups, while welfare losses would occur for higher income earners and particular sections of the population, such as administrative workers in private health insurance. The plan will require $32 Trillion of new funding over the next 10 years and will result in the elimination of Private Health Insurance in the United States. There will be a utility increase in aggregate for those earning under $100,000, approximately 65% of the population, and a utility decrease for incomes higher than that number. There will be an increase in take-home pay after taxes and health insurance for those earning $84,000 or less, approximately 58% of the population, and a utility decrease thereafter.

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I. Introduction

The United States Healthcare System has been a topic of great debate in political and economic circles in the last few years, and this debate does not seem to be going away. As the only one of the 33 OECD nations without a universal healthcare plan, the United States stands alone in the developed world with its current system. The U.S. system is a multi-payer system with government-run programs for the disabled, elderly, and the impoverished. The rest of the population can either purchase insurance on the private exchanges, go uninsured, or have their insurance provided by their employer. Employer-sponsored health insurance has tax advantages and risk pooling advantages and is therefore by far the most common type of private insurance. However, these private insurers frequently have high deductibles, co-pays, and co-insurance that result in high out-of-pocket spending, even for the insured. This has resulted in dissatisfaction with the current system, as the United States performs below average in many major health metrics when compared to comparable countries, despite spending double the OECD average on healthcare, and 25% more than any country in the world. Many agree that there is a problem, but what is the solution?

One proposal that has gained steam is Medicare-for-All. Medicare, a payroll-tax financed system, primarily is utilized by the elderly and has either no or very low out-of-pocket costs. The collective bargaining power of the United States government and without the need to negotiate prices with a private health insurer, Medicare patients frequently receive low-cost treatments despite being the highest-cost demographic in the country. This has caused many to advocate for an overhaul in our healthcare system that expands this service to all because it is cheap, covers almost all procedures, and there is already an established procedure in place. There have been

many analyses done on the health impacts and macroeconomic budget impacts of such a policy. However, there is a lack of analysis on how this will affect the labor market, which is undoubtedly an important consideration given that the healthcare sector is the largest of any in the United States. In this paper, I will evaluate how a Medicare-for-All proposal will affect the labor market supply and demand, and how individual income groups will be affected if this proposal goes through.

II. Literature Review

Financing the Medicare-for-All Act of 2017

To properly evaluate the effects of a single-payer healthcare proposal in the United States, the first step is to choose a particular plan, so that we can positively evaluate the impacts of such a proposal, rather than to speak about them normatively. I have therefore chosen the Medicare-For-All Act of 2017, which was introduced by Bernie Sanders. While this proposal did not come to fruition and would look very different in its final form if it ever does, it is a good representation of what this type of legislation would look like if it is eventually passed. Sanders' plan includes several financing options, but I will be focusing specifically on using a payroll tax as a means of financing. This is where the bulk of financing in his plan comes from, and by focusing on it specifically, I can more precisely measure the impact of the proposal, rather than by speculating on the ripple effects of a wealth or financial transaction tax (Sanders).

The most recent year with comprehensive data on the United States healthcare expenditure breakdown is 2018, which will be utilized as a basis for this analysis. This is also the first year used in the 10-year financing projections proposed for the Medicare-For-All Act of 2017. In 2018, the United States government was responsible for approximately 55% of all healthcare spending ("National Health Expenditures by Type and Source of Funds"). The Medicare-For-All Act of 2017 aims to cover 100% of all costs. The remaining 45% of the $3.65 Billion Expenditures was paid for by private insurers, out-of-pocket costs, and other non-government sources ("National Health Expenditures by Type and Source of Funds"). The Sanders plan aims to increase tax savings by $4.2 Trillion over the next 10 years by removing the preferential tax treatment of employer-sponsored healthcare plans that currently exists. The overall United States Healthcare spending is projected to be approximately $46.5 Trillion for the

10-year period ending in 2027 (“National Health Expenditure Projections 2019-2028”). The Sanders plan and the Centers for Medicare and Medicare Services both anticipate the private and public shares of this spending will remain stable. The goal of this paper is to evaluate the given proposal, so we will be operating under the belief that there will be $4.2 Trillion in Tax Savings. Additionally, the plan expects a decrease of $113 Billion annually in prescription drug spending, which, given the projected growth rate in prescription drug spending of 3.5%, would lead to cost savings of $1.33 Trillion over the next 10 years. (“National Health Expenditures by Type and Source of Funds”). Finally, the United States spends a large portion of its healthcare budget on Budget and Insurance-Related costs due to the complex multi-payer system we currently employ. Estimates from Sanders plan and studies done by firms suggest we could save $500 billion annually by going to single-payer (Gee, Emily and Topher Spiro). Given that this is growing at a rate consistent with overall healthcare spending, we would anticipate $6.4 Trillion in savings over 10 years. These figures can and have been disputed but, that is not the topic of this paper, and I will therefore be working under these assumptions. Given these figures, the Sanders Plan will require $13.7 Trillion in new funding over the next 10 years.

The $13.7 Trillion dollar gap is made up in Sanders’s plan through a variety of proposals, including a Wealth Tax, Wall Street Tax, and tax on offshore profits (Sanders). These are both politically contentious and potentially avoidable taxes and are therefore unlikely to be implemented and are difficult to evaluate. The bulk of the funding, however, comes from payroll taxes on employers and employees and a more progressive income tax. These are much more feasible, and the payroll tax would effectively replace the current employer and employee health insurance premiums. Sanders proposes a 7.5% and 4% payroll tax on employers and employees, respectively (Sanders). However, without the other taxes in his plan, these figures must be

higher. Sanders proposes a more progressive income tax of between 40-52% on those earning $250,000 or more, which would raise $1.8 Trillion over the next 10 years. The payroll would therefore need to cover an increase in revenue of approximately $11.9 Trillion. Based on CBO estimates of the tax receipts for increases in FICA, the payroll tax would have to be increased by approximately 17% between employer and employees to ensure that this proposal does not add to the budget deficit. The elimination of the employer and employee premiums, along with the new income and payroll taxes, will alter the Labor Supply curve, and, due to changes in disposable income, the Labor Demand curve as well. The payroll tax figures are higher than the ones proposed by Sanders because in order to properly evaluate the impacts of this policy, it is important to isolate the actions whose consequences will directly affect the Labor Market. Evaluating the impacts of a Wealth or Financial Transactions tax on the Labor Market goes beyond the scope of this paper.

Tax Burden of an Expanded Payroll Tax

The expected payroll tax that will be required is based on the CBO's compendium of policy options, which includes a payroll tax hike. While this requires some extrapolation, because this payroll tax increase is a substantially larger hike than the ones proposed by the CBO, the CBO reports indicate that the marginal tax receipts will remain relatively constant for each level of increase in the payroll tax. Any slight decrease in taxable base due to the increased taxation is also likely to be offset by the increase in the taxable base due to increased disposable income of lower-income groups (Congressional Budget Office).

The current payroll taxes paid by each income group are derived from the Joint Committee on Taxation staff estimates in their overview of the Federal Tax system. The payroll tax increase for each group is then proportional to the current tax that they are paying, as we

assume for the sake of this paper that the new taxes will be administered in the same way current payroll taxes are. The number of households in each group is then used to determine estimated per capita taxation for each income group (Dahl, Molly, et al 261, 2016).

Cost Savings from Elimination of Private Health Insurance

The Peterson-KFF Health System Tracker is used to obtain information about the breakdown of healthcare costs in the United States and is especially important for estimating the total employer and employee costs of health insurance. This is done by separating the insurance premiums from the taxation paid and determining the cost savings based on the elimination of insurance premiums (Kamal, Rabah).

To estimate the mean income and, as a result, the tax burden and insurance premium savings, Data from the 2020 U.S. Census was used. The Census provides breakdowns of income groups in ranges of $2,500, which makes it an especially useful tool to estimate the number of people in each income group and their average incomes. The Census also provides information about the percentage of people in each income group that utilized each kind of health insurance (Medicare, Medicaid, Employer, etc.) This allows us to more accurately estimate the health insurance savings for each income group. For example, while low-income groups will pay the least in new taxes, they will also see the least cost savings because people earning close to 0 income are much more likely to already be on government-provided health insurance plans than higher-income earners. This provides valuable information that helps us to estimate the net savings/net loss of each income group.

Employee and Employer Responses to Changes in Source of Funding

The own-wage labor elasticity of supply that I will be using is .33 for lower income levels. This is the figure obtained based on a study of the Intensive Margin of the elasticity of labor supply in the United States and is consistent with other literature on the subject. (Chetty, 2009).

On the flip side, the own-wage labor elasticity of labor demand is equally important, as we must evaluate the reactions of firms to the changes in compensation as well as the employees. The own-wage elasticity of labor demand that I will be using is -.3, which is consistent with other literature on the topic. (Lichter, 2014). These two figures will be the basis for analyzing how Employer and Employee preferences change with respect to hours worked as a result of this policy.

Utility of Health Insurance and Income

To properly assess the welfare implications of such a plan, we must first evaluate how workers value health insurance compared to wages. Most workers value health insurance in relation to their overall earnings. For example, a worker who earns $1,000 a year will be willing to pay very little for health insurance, as immediate needs such as shelter and food come first, while someone who earns $1,000,000 annually will place a very high value on health insurance, because the marginal utility of each dollar they earn is relatively low but being protected from catastrophic loss due to a medical emergency is very valuable. Therefore, our valuation of the utility of health insurance coverage varies with income, which will be useful in regression analysis. This aligns with studies that have been conducted on the matter, and I will be using a 2004 study of workers who began to receive employer-sponsored health insurance after

previously not having, and those workers who previously received employer-sponsored health insurance but lost their coverage. By evaluating these workers (who otherwise maintained the same job status), I can assess the value that is placed on these employer-sponsored plans. The results of this study suggest that employees are compensated for a lack of health insurance coverage with 10-11% higher wages (Miller, 2004). This will be utilized in the regression analysis as a barometer to measure the utility of having health insurance. Out of pocket premiums in the most recent Census Data were approximately 27.7% of overall healthcare costs, indicating that an individual would be willing to pay approximately 14.5% more for full coverage of all expenses (U.S. Census Bureau). This is the figured that will be used in the regression to determine the utility of health insurance.

To evaluate the utility changes due to this policy change, we first must establish a model by which to measure utility. To keep the model simple, I will simply be looking at income and whether an individual has health insurance as the variables. I will be using a 2016 study, "Testing the Homogeneous Marginal Utility of Income Assumption" that evaluates the marginal utility of income as the basis for the income portion of the utility function (Demuynck, 2016). I used the findings from this study and the most recent Census data to build out my own regression model.

Sensitivity Consideration

Existing literature on this topic is divided on the level of cost savings that would be seen by switching to an entirely government-run health insurance program. For this reason, it is important to acknowledge these differences. One study that was looked at to observe these differences was conducted by the Mercatus Center in 2018 (Blahous, 2018). This paper looks at and compares federal spending if costs savings are in line with estimates formed from Sanders' plan and others like it to a situation in which there are no cost savings whatsoever. It is unlikely that there would be no costs savings at all, but it is possible that these savings are less than imagined and it is an important factor to consider. The differences in Mercatus Center estimates amounts to $5.306 Billion over 10 years, a quite substantial figure. This would undoubtedly have large impacts on the welfare outcomes, as this would require substantially more funding in the form of increased taxation.

Important Considerations Beyond Model

Beyond the financing portion of the plan, the fundamental overhaul of the health insurance industry must be addressed. An estimated 1.06 million workers will be displaced under the Medicare-For-All proposal, because of the elimination of the private insurance industry (Pollin, Robert, et al, 2018). These jobs existed primarily in administrative roles, such as the Insurance and Billing Related fields that do not deal directly with providing healthcare services. Some of these jobs will likely be transitioned into government roles, as the increased quantity of people using government-run healthcare will require a larger labor force. However, a substantial portion will become frictionally unemployed, and begin looking for new jobs. This will cause a Labor Supply shock which must be considered. Although this will influence the Labor Market,

this is likely to require an entirely different policy approach, and for that reason, it lies outside the scope of this paper.

Another crucial aspect to evaluate in the Labor Market is employer-employee matching. The current system incentivizes workers to remain in their current jobs to maintain their health insurance, as buying without employer-sponsored pools can be extremely costly, while going without health insurance is extremely risky. This prevents labor from being as mobile as it would be in an efficient market, a concept known as “job-lock”. The risk-pooling benefits also prevents entrepreneurship and the creation of small businesses, because there is little incentive for insurance companies to offer good healthcare coverage to a small firm (Bivens, 2020). The increased mobility will lead to more efficient matching in the Labor Market, which will affect competition and productivity by reducing the frictions of job-switching. Although this aspect does not require a policy response, it would require much more detailed investigation into the preferences of the labor force and would require more data than I currently have available. I will therefore also not be directly addressing this impact, instead choosing to focus on the effects of changes in taxation and health insurance premiums.

III. Description of Data and Research Methodology

Elasticity of Labor Supply and Demand

Using the information gathered from the Literature Review process, I used an estimated Hicksian elasticity of .33 for the intensive margin of the own-wage elasticity of labor supply. Additionally, I have stratified the data by income to observe how the varied taxation policy will affect the labor supply of each group. It is important to note that there are differences in Labor Supply among different groups based on certain characteristics, such as income and gender. Chetty's research attempts to identify the labor supply of the Labor Force in aggregate, so these differences will not be directly observable. Later in this paper, I will discuss in more detail what these differences are and what the impact of these differences could mean for the labor force. The elasticity of Labor Demand in the United States is also a highly debated topic, but it is generally agreed to be negative and relatively small. There are several research papers using -.3 as an appropriate elasticity, including Lichter's 2014 analysis, and that is what I will be using for the purposes of this paper. Although overall healthcare-related spending increases with income, household spending on health insurance premiums and out-of-pocket costs are typically quite independent with respect to income. Given the average household size and the breakdown of expenditures on healthcare in the United States, eliminating these two costs, as the policy being evaluated does, would save the average American tax filer approximately $9,454 annually.

Changes in Household Income and Costs

The cost increases will come in the form of new taxation, using the payroll and income taxes discusses earlier. The image below shows the breakdown of taxes by income group for the year 2019, courtesy of the Joint Committee on Taxation. Applying the taxation from this policy will result in a tax increase for all groups in the coming years. The 17% payroll tax increase will

be applied in the same manner as current payroll taxes. Therefore, given the current 15.3% payroll tax imposed, the new tax will represent a 111% increase in employment taxes for all groups. Given available information from the Census Bureau, and the knowledge that we have about the elasticity of labor supply, I decided to group $200,000+ together, as it did not interfere with my conclusions and I believe made for more effective analysis.

Table A-6.–Distribution of Income and Taxes, and Average Tax Rates in 2019 (Projected)

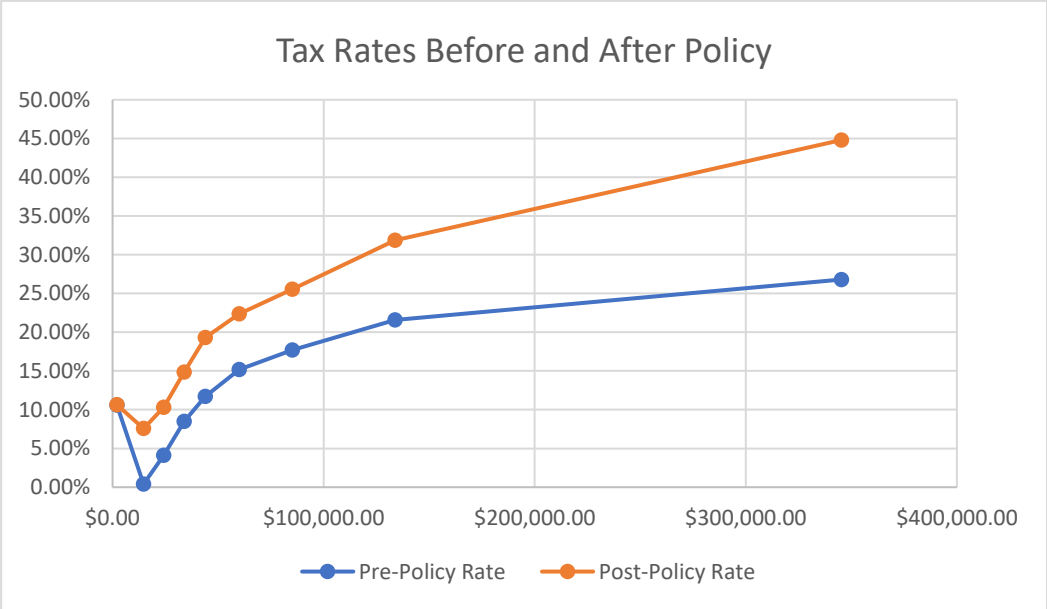
Income Category [1]	Number of Returns [2] (Thousands)	Share of Returns	Income ($ Millions)	Share of Income	Combined Income, Employment, and Excise Taxes Under Present Law [3]			Individual Income Taxes			Employment Taxes		
					$ Billions	Percent share	Average Tax Rate	$ Billions	Percent share	Average Tax Rate	$ Billions	Percent share	Average Tax Rate
Less than $10,000	17,173	9.9%	57,690	0.4%	2.2	0.1%	3.8%	-8.6	-0.6%	-14.9%	6.8	0.6%	11.8%
$10,000 to $20,000	17,566	10.1%	267,657	1.7%	-2.8	-0.1%	-1.0%	-38.6	-2.6%	-14.4%	29.2	2.4%	10.9%
$20,000 to $30,000	19,631	11.3%	489,231	3.1%	19.8	0.7%	4.0%	-34.3	-2.3%	-7.0%	45.1	3.8%	9.2%
$30,000 to $40,000	16,513	9.5%	575,313	3.7%	43.7	1.5%	7.6%	-16.9	-1.1%	-2.9%	50.8	4.3%	8.8%
$40,000 to $50,000	14,349	8.3%	644,389	4.1%	62.9	2.1%	9.8%	-3.9	-0.3%	-0.6%	56.5	4.7%	8.8%
$50,000 to $75,000	27,832	16.0%	1,708,410	10.9%	215.9	7.3%	12.6%	41.4	2.8%	2.4%	146.4	12.3%	8.6%
$75,000 to $100,000	17,251	9.9%	1,496,621	9.6%	226.1	7.6%	15.1%	73.7	4.9%	4.9%	127.2	10.7%	8.5%
$100,000 to $200,000	31,090	17.9%	4,294,090	27.5%	810.2	27.3%	18.9%	330.1	22.1%	7.7%	403.3	33.8%	9.4%
$200,000 to $500,000	10,290	5.9%	2,876,976	18.4%	678.9	22.9%	23.6%	381.7	25.5%	13.3%	239.8	20.1%	8.3%
$500,000 to $1,000,000	1,348	0.8%	902,823	5.8%	250.3	8.4%	27.7%	187.0	12.5%	20.7%	45.1	3.8%	5.0%
$1,000,000 and over	689	0.4%	2,290,307	14.7%	662.9	22.3%	28.9%	582.9	39.0%	25.4%	43.3	3.6%	1.9%
Total, All Taxpayers	173,732	100.0%	15,603,507	100.0%	2,970.1	100.0%	19.0%	1,494.6	100.0%	9.6%	1,193.6	100.0%	7.6%

[1] The income concept used to place tax returns into income categories is adjusted gross income (AGI) plus: (1) tax-exempt interest, (2) employer contributions for health plans and life insurance, (3) employer share of FICA tax, (4) worker's compensation, (5) nontaxable Social Security benefits, (6) insurance value of Medicare benefits, (7) alternative minimum tax preference items, (8) individual share of business taxes, and (9) excluded income of U.S. citizens living abroad. Categories are measured at 2019 levels.
[2] Includes nonfilers, excludes dependent filers and returns with negative income.
[3] Federal taxes are equal to individual income tax (including the outlay portion of refundable credits), employment tax (attributed to employees), excise taxes (attributed to consumers), and corporate income taxes. The estimates of Federal taxes are preliminary and subject to change. Individuals who are dependents of other taxpayers and taxpayers with negative income are excluded from the analysis. Does not include indirect effects.
[4] The average tax rate is equal to Federal taxes described in footnote [3] divided by income described in footnote [1].
Source: Joint Committee on Taxation staff estimates.

Given this information, I was able to find the projected tax increase for each tax filer based on their income group (Households in Thousands).

Income	Households	Current Per Household Tax	Tax Increase
Less than $10,000	17173	$396.0	$439.5
$10,000-$20,000	17566	$1,662.3	$1,845.2
$20,000-$30,000	19631	$2,297.4	$2,550.1
$30,000-$40,000	16513	$3,076.4	$3,414.8
$40,000-$50,000	14349	$3,937.6	$4,370.7
$50,000-$75,000	27832	$5,260.1	$5,838.7
$75,000-$100,000	17251	$7,373.5	$8,184.6
$100,000-$200,000	31090	$12,972.0	$14,398.9
$200,000+	12327	$26,624.48	$29,553.2

As expected, the higher income groups pay significantly more taxes, because the payroll tax is based on a percentage of income. Income taxes are unaffected by this portion of the analysis, which focuses on the payroll portion of taxation. It is also worth noting that the "Tax Increase" for certain groups will not actually result in them paying taxes but will result in a decrease in the subsidies and tax credits that they receive from the federal government. The households for which this will be the situation will include most people earning less than $10,000 and $10,000-$20,000, and some that are earning $20,000-$30,000, with relatively few in higher income groups experiencing this. The total tax rate paid by income group before and after the policy looks like this:

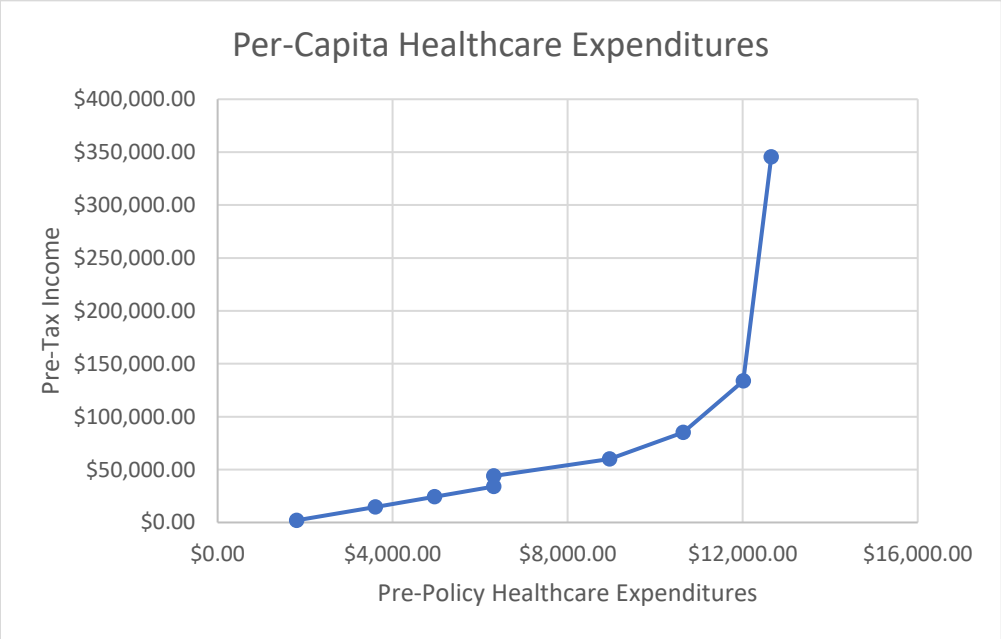


I next needed to evaluate the savings that each income group would receive due to the cost savings of this policy. The federal government is now covering all out-of-pocket and health insurance premiums, so those costs that were previously paid by the individuals and employers are no longer incurred. While these costs are relatively uniform for those that pay them regardless of income group, there are other important considerations. Chiefly, those in lower

income groups are disproportionately likely to be on Medicaid, Medicare, or otherwise government funded care. Therefore, they would not reap any of the benefits of cost reductions. I therefore compared the portion of those privately enrolled in each income group to evaluate what the per capita cost-savings would be.

Income	Households	Overall % Privately Enrolled	% Privately Enrolled	Per Capita HC Spending	Per Capita Healthcare Reduction
Less than $10,000	17173	68%	13%	$9,454.00	$1,807.38
$10,000-$20,000	17566	68%	26%	$9,454.00	$3,600.86
$20,000-$30,000	19631	68%	36%	$9,454.00	$4,956.40
$30,000-$40,000	16513	68%	45%	$9,454.00	$6,311.94
$40,000-$50,000	14349	68%	45%	$9,454.00	$6,311.94
$50,000-$75,000	27832	68%	64%	$9,454.00	$8,953.49
$75,000-$100,000	17251	68%	77%	$9,454.00	$10,635.75
$100,000-$200,000	31090	68%	86%	$9,454.00	$12,012.14
$200,000+	12327	68%	91%	$9,454.00	$12,651.68

As expected, the higher income groups see a bigger reduction in healthcare costs than lower income groups due to their comparatively high rates of enrollment in private insurance.



I next needed to evaluate the savings or costs that each income group would receive or incur due to the combined effects of this policy. When referring to “Disposable Income” in this

graph and in this paper, I will be referring to the post-tax, post-healthcare spending level of pay for each household. This is listed as the "initial change" because it is before labor market impacts are taken account. Due to the changes from this policy, however, workers and firms will change their preferences for wages and hours worked. This will cause the actual take-home pay to differ from the "Change in Disposable Income", a topic which will be addressed later in this paper.

Income	Average Pre-Tax Income	Average tax Rate	Average Post-Tax Income	Income Tax Increase	Initial Change in Disposable Income
Less than $10,000	$2,038.85	0.106	$1,822.73		75.04%
$10,000-$20,000	$14,715.82	0.004	$14,656.96		11.98%
$20,000-$30,000	$24,300.02	0.041	$23,303.72		10.33%
$30,000-$40,000	$33,887.86	0.085	$31,007.39		9.34%
$40,000-$50,000	$43,980.44	0.117	$38,834.73		5.00%
$50,000-$75,000	$60,056.09	0.152	$50,927.57		6.12%
$75,000-$100,000	$85,099.41	0.177	$70,036.82		3.50%
$100,000-$200,000	$133,873.78	0.216	$104,957.05		-2.27%
$200,000+	$345,331.70	0.268	$252,782.80	-6.950%	-13.64%

The Change in Income was derived by comparing the new taxation that will be imposed with the expected healthcare costs savings. The only group with an income tax increase is the $200,000+ group, due to Sanders' proposal to increase taxes on the highest earners making $250,000+ annually. Under this plan the marginal income tax rate would be 40 percent on income between $250,000 and $500,000, 45 percent on income between $500,000 and $2 million, 50 percent on income between $2 million and $10 million, and 52 percent on income above $10 million. My estimates of the income tax effect were based on the expectation of raising $1.8 Trillion from the policy over the next 10 years. We can see that this policy overall is redistributionist, with higher incomes seeing a net decrease in their incomes and lower incomes seeing a net increase in theirs.

We find a net increase in disposable income up until the $100,000-$200,000 bracket, at which point the trend reverses. Rather than being a flat cost, the healthcare costs to the individual now rise along with salary. Given that the Hicksian elasticity is positive, the substitution effect

dominates the income effect, and individuals are likely to substitute away from consumption towards leisure, by working less. This will cause the labor supply curve to shift left. However, the payroll tax is being split between the firm and the individual, and the distribution does not matter, as the tax incidence will fall entirely on the individual. Given that 68% of individuals are privately enrolled, the average annual health insurance premium cost to the firm is approximately $13,903. This means that, given the 17% increase in payroll tax, the firm is better off for all individuals making up to $81,782 and would be incentivized to hire more employees if they are willing to work below this salary. This is substantially higher than median income in the United States and would cause a rightward shift in Labor Demand. However, Labor Demand would decrease at the salary levels above this range, likely tapering off as the payroll tax is phased out for high earners.

One data point that sticks out is the large increase in the disposable income for the lowest income group. This figure is significantly different than the other income groups due to the high number of individuals on government-funded health insurance, as well as an exceptionally low starting income. The change in health insurance structure for this group would be especially beneficial, because the payroll tax burden on the firm will be relatively low due to the lower salaries, and the high health insurance premiums are no longer present. There would therefore be an even more pronounced increase in labor demand for this group in particular. When looking at the extensive margin, this group will benefit greatly because more firms will be willing to offer them their reservation wages absent high health insurance costs.

For the purposes of this paper, we will assume that the incidence of the health insurance premiums and payroll taxes fall entirely on the individual. The employer only cares about how much they are spending, not whether that spending goes to health insurance, taxation, or wages.

If we assume that the incidence of these factors is passed on to the workers, it is fair to assume that the benefits of eliminating one of these costs (health insurance) and the penalties of increase another (taxation) would be passed on to the employee as well. I therefore will focus on the Labor Supply elasticity when evaluating how hours worked changes among income groups.

Labor Market Implications

Income	Elasticity of LS	Elasticity of LD	Employee Cost Increase	Increase in Hours Supplied	% of Increase Reaped by Employees
Less than $10,000	0.33	0.3	-35.74%	24.76%	47.62%
$10,000-$20,000	0.33	0.3	-5.70%	3.95%	47.62%
$20,000-$30,000	0.33	0.3	-4.92%	3.41%	47.62%
$30,000-$40,000	0.33	0.3	-4.45%	3.08%	47.62%
$40,000-$50,000	0.33	0.3	-2.38%	1.65%	47.62%
$50,000-$75,000	0.33	0.3	-2.91%	2.02%	47.62%
$75,000-$100,000	0.33	0.3	-1.67%	1.15%	47.62%
$100,000-$200,000	0.33	0.3	1.08%	-0.75%	47.62%
$200,000+	0.33	0.3	6.49%	-4.50%	47.62%

The elimination of the health insurance costs means that lower income workers are now willing to supply more work, while the reverse is true for high-income workers. This means that low-income workers supply more hours of work, which lowers the wages that firms are willing to offer. In response, workers supply less hours, firms raise wages, and so on until equilibrium in reached. In order to determine the equilibrium effect, I used a Reimann Sum for an Alternating Geometric Series. This allowed me to see how the benefits would be broken down between employer and employee. Appendix C discusses in more detail how this was done and why this method was chosen. The workers reap slightly less than half of the benefits of the increase in disposable income (47.62%), because their labor supply (.33) is slightly more elastic than the firms' labor demand (-.3). The Riemann Sum is as follows:

$$\sum_{n=1}^{\infty} -(1)^{n+1}\left(\frac{LS}{LD}\right)^{n}$$

Additionally, there will be less friction in the labor market, as the "job-lock" resulting from the preferential treatment of employer-sponsored insurance will no longer exist. This will lead to more efficient matching in the labor market, which benefits both firms and employees.

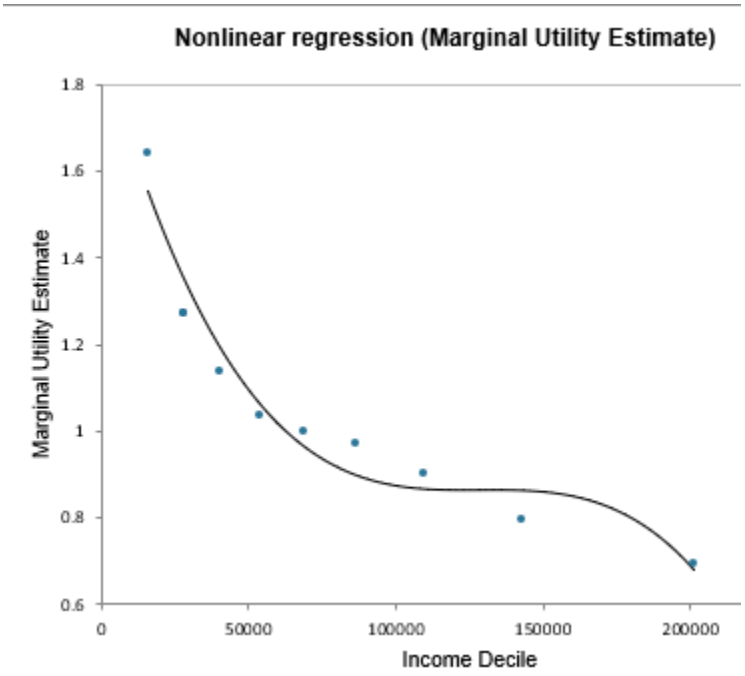
We can see that due to the increased labor supply for low- and middle-income groups, the employee costs decrease. This is because demand is unchanged, and the market equilibrium therefore results in a decreased equilibrium wage. The Scale Effect shows that employers will hire more workers because they now have more money to spend with lower wages. Additionally, they will hire more workers because they will substitute towards labor from capital as labor becomes relatively cheaper. This will result in productivity increases that could ripple through the economy in a positive way.

Regression Model for Welfare Outcomes

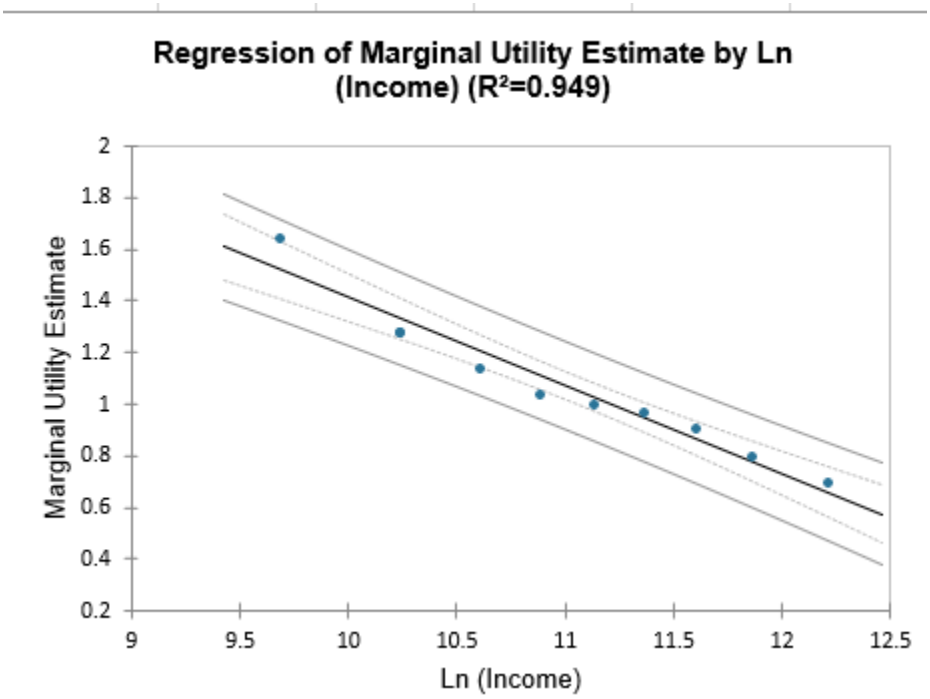
To evaluate the effects that this policy would have on the utility of each income group, I built a simple regression model. For the purposes of this model, the marginal utility of a dollar will be assumed to be 1 for the median income earner, and will vary based on the level of income, with marginal utility diminishing with wage increases. As discussed previously, I used the results of a study evaluating the marginal utility at different income levels as the basis for my own regression (Demuynck, 2016). I used a linear regression, regressing the marginal utility by income group on the natural log of income, as income growth is logarithmic in nature. The regression was statistically significant even at the 99% confidence level. The findings of the study and of my regression were consistent with existing literature on the topic, which is that Marginal Utility decreases as Income increases. I used the findings from my regression to find the marginal Utility, and then integrated this to get the predicted total utility at each income level. The results of my regression, where X is income, were as follows:

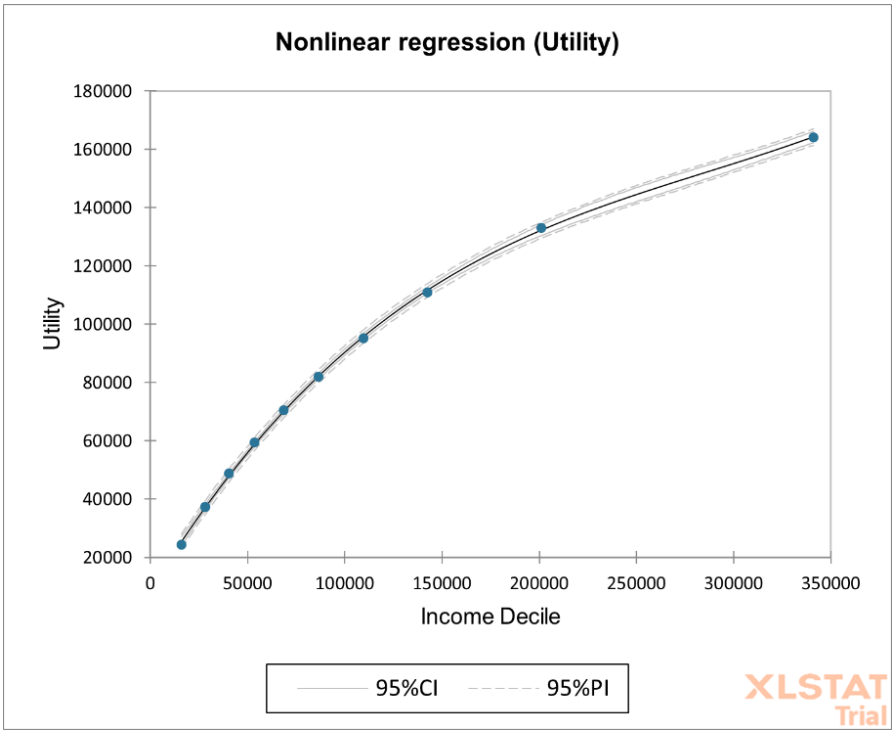
$$\boldsymbol{Marginal\ Utility} = \mathbf{4.81663100919447} - \mathbf{0.340281802105124} * \boldsymbol{Ln}(\boldsymbol{X})$$

$$\boldsymbol{Utility} = \mathbf{4.816631009194478} * \boldsymbol{X} - \mathbf{0.340281802105124} * (\boldsymbol{X} * \boldsymbol{Ln}(\boldsymbol{X}) - \boldsymbol{X})$$



The above graphic demonstrates how a polynomial regression compares Marginal Utility to income directly, and the shape of the regression line shows why a logarithmic growth model makes sense. One important caveat to this model is that the highest income group was the 90th quintile, which is just over $200,000. It can therefore not be extrapolated to very-high income earners, although it is likely still logarithmic in natured. Average income data was derived from the 2019 Census Report (U.S. Census Bureau), and the New income Data was determined by evaluating the % increase in Disposable income that was calculated from the initial analysis of the effect on different income groups. The integrated regression was then utilized to assess the Utility of each income group and the net effect. For the regression used in the Analysis (from which the utility function was extrapolated), the Marginal Utility was compared to Ln(Income).





As can be seen by the first graphic, this was an appropriate model that demonstrated a very high correlation between Ln(Income) and Marginal Utility, with an R^2 of .949. It was statistically significant at the 1% confidence level, with a p-value of less than .0001 and a t-value

of -11.35. By integrating the marginal utility regression, I was able to derive the total utility at each level, as shown by the second graphic. More information on this regression can be found in Appendix A.

Changes in Utility by Income Group

Using the CBO data collected, the analysis was stratified by income group. The net effect was an increase in income-related utility, with low-income groups benefitting the most, which is consistent with the previous findings. Overall income-related utility fell from prior to the policy, by a total of 1.94%. However, with total out-of-pocket healthcare spending being approximately $1,125 per capita in the United States ("National Health Expenditure Projections 2019-2028."), the post-tax post-health spending income decrease is approximately .51%.

Beginning Income	Ln(Income)	Beginning Utility	New Income	Ln (New Inc)	New Utility	Utility Increase
$1,822.73	7.51	4742.84	2208.63	7.70	5602.63	18.13%
$14,656.96	9.59	27741.25	15964.72	9.68	29752.15	7.25%
$23,303.72	10.06	40429.94	24949.37	10.12	42705.70	5.63%
$31,007.39	10.34	50781.58	32709.87	10.40	52974.83	4.32%
$38,834.73	10.57	60626.11	39623.43	10.59	61586.28	1.58%
$50,927.57	10.84	74806.70	52005.91	10.86	76019.87	1.62%
$70,036.82	11.16	95282.63	70092.65	11.16	95339.58	0.06%
$104,957.05	11.56	128342.59	100454.62	11.52	124335.73	-3.12%
$252,782.80	12.44	233497.98	210409.86	12.26	207494.11	-11.14%
Average		78656.51416	**Average**		77127.6245	-1.94%

The other aspect of the regression is the health insurance factor. As discussed in my review of "Estimating the Compensating Differential for Employer-Provided Health Insurance", employees tend to value full health insurance at approximately 14.5% of their income. I utilized

Census data to determine what percent of each income group was completely uninsured. This represents the group that would see a full 14.5% increase in their utilities based on the policy.

Additionally, there are a substantial amount of out-of-pocket costs with most private-health insurance plans, (about 27% of all costs). Therefore, under this policy, these individuals (who primarily have employer-sponsored health insurance), would see a net increase in utility of 2.37% from having their costs entirely covered. I again utilized most recent Census data to determine who was shouldering most of the burden of these out-of-pocket costs to determine how much their utilities would increase. This resulted in an overall utility increase of 3.03%, about 75% of which came from increases in insurance coverage rather than the uninsured being newly covered. This indicated that, in terms of total cost, being underinsured or under covered is a bigger problem than being completely uninsured.

Income	% Uninsured	Utility Gain (Uninsured)	% Increase	Utility Gain (Already Insured)	% Increase
Less than $10,000	0.131	41.95289104	1.90%	22.88138727	0.41%
$10,000-$20,000	0.131	303.249822	1.90%	165.3944805	0.56%
$20,000-$30,000	0.131	473.9133772	1.90%	258.4755245	0.61%
$30,000-$40,000	0.128	607.0951962	1.86%	594.011248	1.12%
$40,000-$50,000	0.128	735.4107698	1.86%	719.5613997	1.17%
$50,000-$75,000	0.075	565.5642709	1.09%	1591.380845	2.09%
$75,000-$100,000	0.063	640.296361	0.91%	2301.842638	2.41%
$100,000-$200,000	0.034	495.2412933	0.49%	3564.130038	2.87%
$200,000+	0.027	823.7545911	0.39%	7658.918804	3.69%
		508.1	0.66%	1828.833967	2.37%

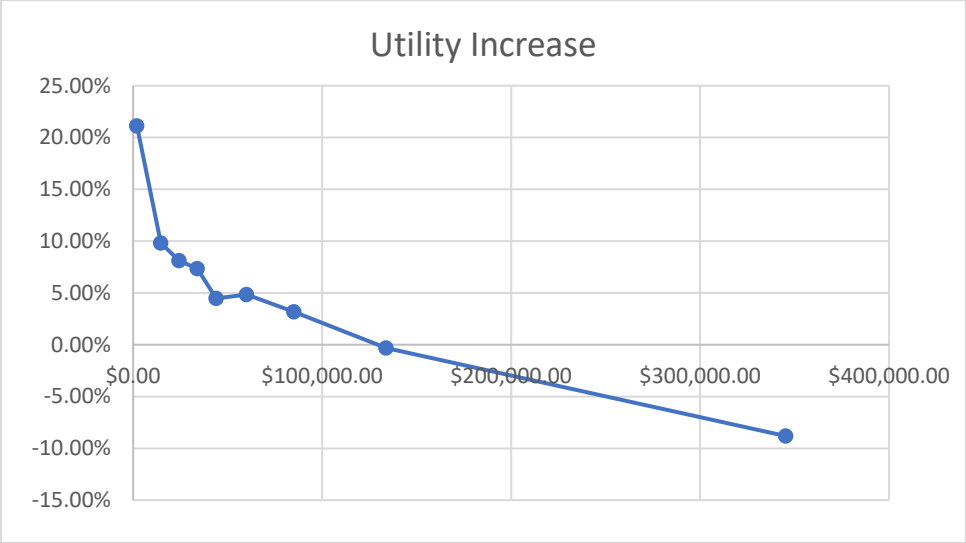
The overall health insurance-related portion of the utility increased by 26.42% after the policy. This makes sense, as no household has worse healthcare than before, but some previously uninsured households no longer are, and many households that previously faced out-of-pockets costs have seen them eliminated. Lower-income groups reaped most of the benefits of no longer being uninsured due to higher rates of not being insured at all. However, upper income groups

reaped more benefits from the elimination of out-of-pocket costs and deductibles because they frequently have private health insurance and place a higher value on being insured.

In total, the per capita utility increased by .86%. This was a simple regression model that only incorporated two factors: health insurance status and income. Although there are undoubtedly other factors present when evaluating utility, these variables would not likely have a greater impact on the regression as wages and healthcare are always given a positive value and are typically valued very similarly across individuals.

Income		Utility Increase
Less than $10,000		21.12%
$10,000-$20,000		9.81%
$20,000-$30,000		8.10%
$30,000-$40,000		7.33%
$40,000-$50,000		4.48%
$50,000-$75,000		4.84%
$75,000-$100,000		3.19%
$100,000-$200,000		-0.30%
$200,000+		-8.81%
	Welfare Gain	0.86%

As expected, we see higher welfare gains among the lowest income groups, with the trend reversing at the highest income groups. The highest income group sees such a sharp decline in their utility because, along with the progressive nature of this policy from replacing premiums with a payroll tax, they are also experiencing an additional income tax on income higher than $250,000.



The point at which Utility starts to decrease is right at around approximately $100,000, while Income-Related Utility begins to become negative at approximately $84,000. Given the Census data that I used earlier in this analysis, approximately 65% of American Households will be better off due to this plan, while approximately 58% will have higher take-home pay after Taxes and Health Insurance Premiums.

It is also useful to point out that this situation is not necessarily accurate for everyone in these income groups. As discussed previously, individuals are willing to give up some of their earnings in exchange for health insurance. This is, on average, around 14.5% for full healthcare coverage. The compensating wage differential is different for every individual, though, and could be more or less than this figure. Although these utility figures are accurate in aggregate,

individual risk preferences differ, so certain individuals may see a benefit despite their overall income group having a decreased utility, and vice versa. There is an expected benefit to this policy for individuals earning up to $100,000. However, for those earning below this figure but above $84,000 (the point at which take-home begins to decrease), there may be a utility decrease if they are especially risk-loving. That is, they do not value consumption-smoothing and risk-aversion highly and would prefer cash in their pockets. On the other hand, individuals that are especially risk-averse and earn over $100,000 annually may see a utility increase, despite the expected outcomes for their income groups. This is because they value the increased certainty over consumption and avoidance of potential spikes in health-related costs more than cash in their pockets.

From an extensive margin standpoint, we would expect more individuals to enter the workforce at lower income levels because the total utility available by working has increased, while we would expect the opposite to be true at high-income levels. However, individual preferences will also come into play here. Especially risk-averse individuals at lower income levels may choose to exit the workforce despite the overall utility increase from working for their income groups if one of their primary reasons for working was to obtain employer-sponsored health insurance. We would expect an increase in retirements at the highest levels of income as take-home pay decreases, and especially risk-loving individuals may choose to retire despite a perceived welfare increase if they fall in the previously discussed $84,000-$100,000 bracket.

Another aspect to consider is that Labor Preferences do not only vary with respect to income. Although this analysis focuses on different income groups, there are differences relevant in other areas, such as gender. The 2009 Chetty Paper used for Labor Supply looks at Labor Supply in aggregate. Therefore, the overall implications of changes in hours supplied is generally

accurate but says little about how they are distributed. For example, women tend to supply labor more elastically than men. Therefore, we would expect lower-income women to increase their hours by more than lower-income men, while we would expect higher-income women to decrease their hours by more than higher-income men. The Chetty paper also does not stratify the labor supply by income. Some studies suggest that the U.S. labor supply curve is backward-bending, meaning that higher income earners supply their labor more inelastically. If this is true, this paper would overestimate the degree to which they reduce their hours and, as a result, their taxes paid and utility level.

Political Considerations

This policy, like any other, would be subject to the typical United States legislative process. This means that it will almost certainly look different in its final form. However, it is useful to evaluate the feasibility of the plan when doing this analysis. The Median Voter Theorem states that a policy that is favorable to the Median, or 50^{th} percentile voter, is likely to be passed. While rather simplistic and relying on many assumptions, it is still a useful tool for evaluating proposals. Given that this proposal is welfare-improving for 65% of the population, it would have a good chance of being implemented. It is also designed to be budget-neutral, which aligns with my analysis. My analysis shows that this policy will increase tax revenues by approximately $380 Billion more annually than necessary for this plan. However, this is because it incorporates the additional tax revenue that was previously deducted for employer-sponsored health insurance plans. This savings expected from this portion of the plan are approximately $4.2 Trillion over 10 years (Sanders). Given that the economy, and the tax base as a result, is expected to grow over the next decade, this policy would likely come out close to budget neutral.

If policy makers wanted to juice the economy, they could phase in this payroll tax increases for low-income earners, who have a high propensity to spend and could boost Aggregate Demand. If they were especially considered with the political viability of this plan, they could structure it to reduce the tax burden on the $75,000-$125,000 demographic, where the net welfare change starts to flip from positive to negative, to gain more support.

Addressing Alternative Assumptions

It is important to note that this analysis did not include the displaced healthcare administrators due to the program. One of the primary benefits of the switch from multi-payer to single-payer healthcare is increased simplicity, and one of the primary factors enabling an increase in health insurance coverage without lowering incomes is the elimination of Billing and Insurance Related costs. However, eliminating them will result in approximately 1.06 million workers being displaced from their jobs (Pollin, Robert et al., 2018). This figure comes after factoring in that some of these workers will be retained to help administer the now government-funded system. If this policy or a similar one is implemented, there will undoubtedly be a robust program developed to support this transition. Even if there was not, the addition of these individuals to the labor force would likely result in job matchings that were previously unavailable in the labor market. However, in a worst-case scenario analysis, all of these approximately 1 million workers would remain unemployed. The average worker in this sector makes about $39,000 annually, and it would be worthwhile to evaluate the utility effects of these workers remaining unemployed. With about 157 million people currently employed in the United States according to the Census, this would represent an increase in unemployment of about .67%. Given the income group that they are a part of this would result in a welfare loss of about .41% per capita, keeping overall welfare gain at .51%.

As discussed in the Literature Review, this paper only discusses one specific proposal which is based on certain assumptions that are disputed by other papers. This will be further addressed in the Research Shortcomings section, but it is also worth looking at what might occur if these initial assumptions are incorrect. While this policy is welfare-increasing, if the starting conditions were different, the outcome may be different. Some existing literature on the topic disputes several assumptions, with the most prominent ones being the Prescription Drug Savings from a government-negotiated process and the administrative cost savings. Therefore, I ran a quick analysis on how sensitive the model is to difference in these costs. Any additional costs would be funded entirely through a payroll tax increase.

Using the assumptions of the Mercatus study from 2018, if these costs were in fact $5.306 trillion higher than anticipated, there would be a net welfare loss of .34%. However, the issues with evaluating a displaced labor force of administrative workers would no longer exist, because if administrative costs remain the same, there would be no need to lay off these workers. A similar analysis of a welfare-neutral situation estimates that the policy would be neither welfare-increasing or welfare-decreasing if costs were underestimated by approximately 11.5%, or about $3.7 Trillion over 10 years. This is possible because of the increased utility from greater healthcare coverage, in addition to the redistributive nature of the policy. Even though the total income to individuals may decrease, lower-income individuals would receive a greater share of this pie, and their higher marginal utilities would increase overall welfare. However, as will be discussed in the Research Shortcomings section, if analysis from this model showed a truly welfare-neutral situation, it likely would result in a welfare loss due to the way in which health insurance utility.

This sensitivity analysis indicates that there would be a welfare gain in most cases, as long as cost savings are at least 31% of the savings estimates from the initial plan. This is likely a safe assumption to make given the drastically lower administrative costs of Medicare/Medicaid in comparison to private insurers.

IV. Shortcomings and Conclusions

Research Shortcomings

There are several shortcomings that are important to address in order to properly contextualize this paper. The first is that my research simply looks at one policy proposal, and it is one of many. There is disagreement about how such a policy should be implemented, and the choice of how to tax such a policy will have a great impact on the degree to which the labor market and different income groups are affected. Beyond the actual intricacies of implementing a policy, there is a great deal of dispute among academic communities about the outcomes of implementing this exact policy. The degree of cost-saving that will be present from eliminating preferential tax treatment of employer-sponsored health insurance, from giving the U.S. government power to bargain for prescription drugs, and from eliminating the current multi-payer system are greatly contested. There are many that do not believe that Medicare will be nearly as successful if implemented on a large scale. My research simply looks at one proposal, a proposal that is on the more optimistic or ambitious end of the ones that currently exist in academia. If a few of these assumptions are incorrect, the welfare impacts could look substantially different.

Another potential shortcoming is the simplicity of the regression model. Since we are only evaluating changes in health insurance and income, control variables likely would not greatly change the regression equation. We are evaluating the same group before and after the policy, so there is not likely to be large changes in these control variables. However, the regression equation may be useful for evaluating these changes, but should not be seen as an appropriate measure of the level of utility experienced across all facets of life, which is subjective and cannot be precisely boiled down to one number.

This analysis also relies on some assumptions about the elasticity of labor supply and labor demand, which are figures that are disputed in existing research, such as that the labor supply curve is not backward-bending. I tried to ensure that I utilized figures that were not too far from the consensus opinion, but there truly is no consensus at this time, and the elasticities vary based on time, place, economic conditions, and many other factors. There are also knock-on effects of the policy that I did not go into great depth in analyzing. This includes the large displaced health insurance workforce that will be introduced into the labor market. They could be immediately snapped up by employers eager to utilize their skills that were not available before, or they could depress wages by competing for the same jobs that are already in demand. There is no overhaul on this scale that can really be compared to accurately predict the outcome of such a scenario. Similar things can be said about the decoupling of health insurance and employment. This situation has been the way of life in the United States for the better part of a century, and the effects of changing that dynamic are difficult to predict. More efficient employer-employee matching should arise as people are not locked into their jobs for health insurance benefits, which should also increase entrepreneurship and risk-taking. However, the degree of job-lock in the economy is not precisely known, and this decoupling could result in some people retiring or taking time off.

In this model, we assumed that worker preferences for varying levels of insurance remains constant, because it was exceedingly difficult to find precise estimates of the marginal insurance preferences. However, much like the income regression model seen in this paper, the marginal utility of insurance is also likely decreasing. Most consumers get more utility by going from no insurance to some insurance than they do from being partially insured to fully insured. This is because insurance is often meant to protect from catastrophic loss (which could result in near-zero utility), and the prevention of this situation is more valuable than having a different provider cover

some lower costs procedures. For this reason, our model likely overestimates the utility that full health insurance provides, because it overestimates the marginal utility of the last piece of coverage provided by the insurance.

If disposable income among lower income groups increases, their propensity to spend will likely result in increased Aggregate Demand, which will increase labor demand in a way that is not accounted for in the analysis. On the other hand, if the increased velocity of money is not met by increased supply, inflation could set in, which would result in an entirely different set of Macroeconomic circumstances.

Research Conclusions

If this policy is effectively implemented as it is laid out in the proposal, it will be an net benefit to society. All income groups will see a benefit from increased health insurance by no longer paying out-of-pocket costs. The highest income groups will see a net decrease in their utilities, as the increase in healthcare coverage and elimination of health insurance premiums is not enough to offset their increased taxation as a result of the policy. However, lower- and middle-class Americans will benefit from the increased coverage in conjunction with decreased net healthcare expenses caused by the elimination of healthcare costs that exceeded the new payroll taxes that they are forced to pay.

Lower- and middle-income individuals will also increase their labor supply, as the health insurance premiums required to hire them are now eliminated and no longer a consideration for employers, and payroll taxes do not exceed this cost until the middle-upper income levels. The lowered costs of hiring/firing will enable employers to supply more goods, and the increases in disposable income among low-income earners will increase demand for goods, two factors that will contribute to economic growth.

As mentioned, high-income earners are one group that does not benefit, but the biggest loser in this scenario are the approximately 1.6 million health insurance administrative workers that are newly unemployed. About 35% of them will likely be transitioned into government roles to help administer Medicare, but the rest could see a sharp decline in utility, losing all their wages and being left with a skillset that may be ill-equipped in a new labor paradigm that does not include the health insurance industry.

However, this proposal can be accomplished in a budget-neutral capacity and is an overall net benefit to society. It is redistributive due to its taxes on higher earners and resulting decreased welfare, with the benefits accruing to lower earners whose marginal utility of income is higher, increasing the overall utility of society.

Even in an analysis of the sensitivity of the model to assumptions, the welfare impact was at worst slightly negative. Even if the degree of cost savings present in this plan are an overestimate, they are likely to be present to some degree and would result in a welfare-positive policy.

V. Recommendations for Future Research

As mentioned, my analysis is very narrow and does not deal with all the fallout of the Medicare-For-All Act of 2017. This means that there are still several areas that would and should be researched to expand our knowledge on the topic. One potential avenue for further research is evaluating a more incremental plan, such as a Medicare Opt-in, that is not as extreme as the plan I evaluated and may be more likely to be adopted by Congress in the short-to-medium term. Another avenue is evaluating a similar proposal with a different set of assumptions. As I mentioned, the financing assumptions of this plan were on the optimistic side, and it would be useful to evaluate the labor market in the event of worst-case outcome or somewhere in between. Although I discussed this to a degree, a paper which focuses on this research would also be useful.

Several other important areas to study go beyond the confines of this paper. One important area for research is the potentially 1 million unemployed health insurance administrative workers. Academic research on the job placement programs that have been proposed would make for a fuller discussion on the effects of this policy. The effects of de-coupling insurance from employment on job mobility, employee-employer matching, and rates of entrepreneurship will be important changes in the event of the adoption of this policy and analyzing the consequences of these topics would be a good starting point for new literature. Additionally, this paper focuses more on the effects on employees of this proposal. A paper focusing on the productivity changes that occur to employers from the changes in de-coupling insurance, as well as the Scale and Income effects of changes in Labor Supply, would also be useful. Finally, the changes in income among different income groups will lead to changes in consumer spending and investment, and Aggregate Demand as a result. It

would be useful to analyze how these changes affect Unemployment, Inflation, and GDP growth in the economy at large.

VI. Bibliography

Bivens, Josh. “Fundamental Health Reform like ‘Medicare for All’ Would Help the Labor Market.” *Economic Policy Institute*, Economic Policy Institute, 2020, www.epi.org/publication/medicare-for-all-would-help-the-labor-market/.

Blahous, Charles. “The Costs of a National Single-Payer Healthcare System.” *SSRN Electronic Journal*, 2018, doi:10.2139/ssrn.3232864.

Chetty, Raj. “Bounds on Elasticities with Optimization Frictions: A Synthesis of Micro and Macro Evidence on Labor Supply.” *National Bureau of Economic Research*, Dec. 2009, doi:10.3386/w15616.

Dahl, Molly, et al. United States, Congress, Congressional Budget Office. *Options for Reducing the Deficit: 2019 to 2028*, Government Printing Office, 2016, pp. 261–261.

Demuynck, Thomas. “Testing the Homogeneous Marginal Utility of Income Assumption.” *Econometric Reviews*, vol. 37, no. 10, 2016, pp. 1120–1136., doi:10.1080/07474938.2016.1222235.

Gee, Emily, and Topher Spiro. “Excess Administrative Costs Burden the U.S. Health Care System.” *Center for American Progress*, 2020.

Kamal, Rabah. “How Has U.S. Spending on Healthcare Changed over Time?” *Peterson-KFF Health System Tracker*, 23 Dec. 2020, www.healthsystemtracker.org/chart-collection/u-s-spending-healthcare-changed-time/.

Lichter, Andreas, et al. “The Own-Wage Elasticity of Labor Demand: A Meta-Regression Analysis.” *SSRN Electronic Journal*, Feb. 2014, doi:10.2139/ssrn.2407944.

Miller, Richard D. “Estimating the Compensating Differential for Employer-Provided Health Insurance.” *International Journal of Health Care Finance and Economics,* 2004, doi:10.1023/b:ihfe.0000019259.74756.65.

“National Health Expenditures by Type and Source of Funds.” *Centers for Medicare and Medicaid Services,* 2020, www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.

“National Health Expenditure Projections 2019-2028.” *Centers for Medicare and Medicaid Services,* 2020, www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.

“Overview of the Federal Tax System as In Effect for 2019.” *Joint Committee on Taxation,* 20 Mar. 2019, pp. 36–36.

Pollin, Robert, et al. “Economic Analysis of Medicare for All.” *Political Economy Research Institute,* 30 Nov. 2018.

Sanders, Bernard. “Options to Finance Medicare for All.” *Bernie Sanders US Senator for Vermont,* 2020, www.sanders.senate.gov/

U.S. Census Bureau, Current Population Survey, 2020 Annual Social and Economic Supplement (CPS ASEC).

Appendix A

Marginal Utility Estimate vs Ln(Income) Regression

T-Scores, Confidence Intervals, and Beta Values

Model parameters (Marginal Utility Estimate):

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	4.817	0.332	14.489	**<0.0001**	4.031	5.603
Ln (Income)	-0.340	0.030	-11.355	**<0.0001**	-0.411	-0.269

Equation of the model (Marginal Utility Estimate):

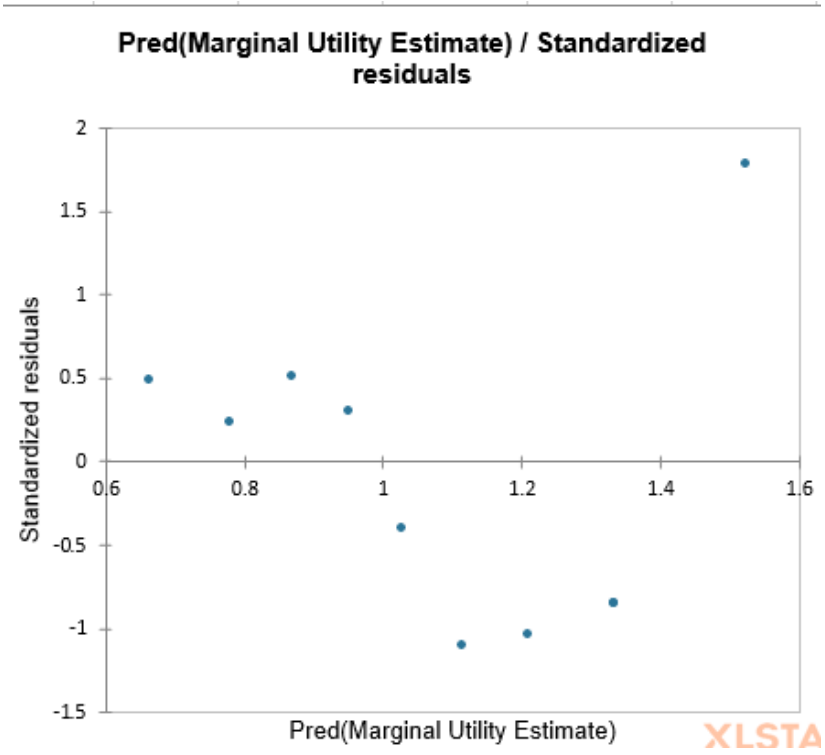
Marginal Utility Estimate = 4.81663100919447-0.340281802105124*Ln (Income)

Estimates, Confidence Intervals and Residuals for Each Data Point

Predictions and residuals (Marginal Utility Estimate):

Observation	Weight	Ln (Income)	Marginal Utility Estimate	Pred(Marginal Utility Estimate)	Residual	Std. residual	Std. dev. on pred. (Mean)	Lower bound 95% (Mean)	Upper bound 95% (Mean)	Std. dev. on pred. (Observation)	Lower bound 95% (Observation)	Upper bound 95% (Observation)
Obs1	1	9.682	1.644	1.522	0.122	1.789	0.047	1.410	1.634	0.083	1.326	1.718
Obs2	1	10.243	1.274	1.331	-0.057	-0.842	0.034	1.252	1.411	0.076	1.151	1.511
Obs3	1	10.607	1.137	1.207	-0.070	-1.029	0.027	1.144	1.270	0.073	1.034	1.380
Obs4	1	10.887	1.037	1.112	-0.075	-1.097	0.023	1.057	1.167	0.072	0.941	1.282
Obs5	1	11.138	1.000	1.027	-0.027	-0.392	0.023	0.973	1.081	0.072	0.857	1.197
Obs6	1	11.368	0.970	0.948	0.021	0.311	0.024	0.891	1.006	0.072	0.777	1.120
Obs7	1	11.606	0.903	0.867	0.035	0.517	0.028	0.802	0.933	0.074	0.693	1.042
Obs8	1	11.867	0.795	0.778	0.017	0.244	0.033	0.700	0.857	0.076	0.599	0.958
Obs9	1	12.212	0.695	0.661	0.034	0.500	0.041	0.564	0.758	0.080	0.473	0.849

Residual Plot



Appendix B

Glossary of Terms

Utility/Welfare: The level of value (i.e., happiness/satisfaction) that an individual assigns to a certain activity or outcome

Own-Wage Labor Elasticity of Supply: The effect of a change in wages on an individual's willingness to work. I.E. The % change in the amount of labor supplied by an individual given a 1% increase in Real Wages.

Own-Wage Labor Elasticity of Demand: The effect of a change in wages on a firm's willingness to hire. I.E. The % change in the amount of labor demand by a firm given a 1% increase in Real Wages.

Extensive Margin: Measures how many people work under given circumstances

Intensive Margin: Measures the amount/duration of work done by those that are employed under given circumstances

Compensating Wage Differential: How much (in earnings/wages) a worker is willing to give up to receive a benefit or how much they must be compensated to do some activity or undergo some change that they value negatively

Appendix C

Riemann Sum for Labor Demand/Labor Supply

When evaluating the Labor Supply/Demand impacts of this policy, we saw that workers began to work more at lower income levels. Given a 1% increase in pay, they worked .3% more hours. However, as the labor supply increased, the demand for labor decreased. Therefore, firms were not willing to offer the same wages. These lower wages decreased labor hours supplied, which increased wages, in a continuous cycle until equilibrium was reach. I observed that this cycle resembled an alternating geometric series and used a Riemann Sum to compute it. With a LS of .33 and LD of -.3, a wage increase of 10% results in a 3.3% increase in hours worked (10*.33), followed by a decrease in wages by 9.9% (-.3*3.3), which results in hours worked decreasing, and a subsequent increase in wages and therefore hours worked. This process continues, approaching the limit approximated by this Riemann Sum:

$$\sum_{n=1}^{\infty} -(1)^{n+1}\left(\frac{LS}{LD}\right)^{n} = \frac{1}{1-\frac{LS}{LD}} = \frac{1}{1-\frac{.33}{-.3}} = .4762$$

This 47.62% figure represents the portion of every dollar that is newly available (on low income levels) or that is a new cost (on high income levels) for wages as a result of this policy that is given to/absorbed by the worker. This figure is slightly below 50% because the Labor Supply used in this model is slightly more elastic than the Labor Demand used.

Academic Vita

Noel P. Sheridan Jr

Education

Pennsylvania State University, State College, PA — September 2017 to May 2021

- Smeal School of Business - Finance Major
- College of Liberal Arts - Economics Major, Spanish Minor
- **IES Study Abroad –** Spent semester in Madrid, Spain taking courses in Spanish as part of immersive language program

Saint Joseph's Preparatory High School, Philadelphia, PA — September 2013 to May 2017

National AP Scholar; National Merit Commended Student; National Honor Society; Ignatian Scholar

Activities and Honors

Scholar, Schreyer Honors College

- Scholarship recipient accepted into honors college representing top 2 percent of students at Penn State University based on academics and leadership. Partake in rigorous curriculum with more challenging honors classes and smaller class sizes taught by honors faculty.
- Currently writing a thesis paper on the Healthcare System in the United States from an Economics Perspective

Vice President of Finance/Treasurer, Alpha Gamma Rho Fraternity

- Became a member of the Alpha Gamma Rho fraternity in Spring 2018 and was elected VP of Finance/Treasurer in Fall 2018
- Served as Treasurer for the 2019 calendar year; responsibilities included collecting dues, paying bills, alumni liaison
- Worked in conjunction with Alumni to create a budget for each semester that includes all activities related to the fraternity
- Managed a $500,000 annual budget, inherited a $30,000 debt which I paid down in its entirety during my term
- Determined annual rent for all in-house members, as well as dues, meal plan pricing, and all discretionary spending
- Managed to decrease rent by approximately $1600/member annually ($55,000 total) for all in house members while maintaining a surplus
- Implemented a tiered dues system by class year to increase collectability of dues and decrease disaffiliations
- Awarded the Modliszewski Scholarship for integrity and commitment to ideals of AGR

Member, Sapphire Leadership Academic Program

- Program representing top 5% of Smeal College of Business incoming class to develop leadership skills, critical thinking abilities, and experience professional development opportunities
- Engaged in community service, business seminars, recruiting and networking events
- Took smaller classes geared towards management and leadership with peers that increased student interaction

Ki'netik Fitness – Semester Project

- Worked with Ki'netik Fitness, a State College gym recently purchased by two personal trainers, to create a full business plan
- Met at least once a week to discuss the owners' goals and vision and to gain more information about the company
- Created a comprehensive 100-page business plan focusing on over a dozen different facets of the Business
- Evaluated Financial Statements and potential expansion and exit possibilities, including various valuations for the company

Professional Experience

Landscaper - Dwyer Landscaping — May 2020 to August 2020

- Completed landscaping work on houses and local businesses, such as mulching, weeding, removal of bushes and trees
- Worked directly with owner and his customers to determine personal lawncare needs and preferences

Power Business Intelligence - Quaker Valley Foods, Philadelphia, PA — May 2020 to July 2020

- Utilized Microsoft Power Business Intelligence to prepare reports for IT Department and Upper Management
- Organized data to make it more accessible, created adjustable graphics to display data based on product, client, sales rep, etc.

Floating Teller - Firstrust Bank, Philadelphia, PA — May 2018 to August 2019

- Traditional Bank Teller duties, majority required interacting with customers and immediate processing of transactions.
- Spent time at various branches in the Philadelphia Metro area, floating between branches and adapting to their procedures
- Used various computer programs, including InterACT, Synergy, and SalesForce
- Was personally responsible for up to $12,000 at any given time and handled cash transactions in excess of $10,000
- Handled personal deposits, business deposits, transfers and cashier's checks - at times in excess of $100,000

Skills and Interests

Spanish – Proficient in reading, writing, speaking and listening
Microsoft Office – extensive Excel, Word and PowerPoint
Athletics – soccer, basketball, fitness