

**THE SOCIO-ECONOMIC IMPLICATIONS OF AUTOMATION: NIT AND UBI AS
ALTERNATIVE POLICY RESPONSES**

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ABSTRACT

The Socio-Economic Implications of Automation: NIT and UBI as Alternative Policy Responses

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This paper will be written to address the economic and social implications of imminent automation and operate under the assumption that automation will cause catastrophic unemployment rates. Therefore, there is a search for an economic policy that would help alleviate subsequent unemployment externalities such as higher suicide rates and a shrinking population. Two policies, the Negative Income Tax and a Universal Basic Income, have risen to prominence as ways of reducing poverty. A Negative Income Tax is a modification of the tax bracket first popularized by Milton Friedman and gives those under the poverty line a rising incentive to work more hours while providing a bit of spare income. A Universal Basic Income is a policy that ensures everyone in a set population receives a financial benefit of equal degree in a given period, a proposal that has been tossed around by scholars as far back as Sir Thomas More and his Utopia. Both are variants of the concept of a Basic Income Guarantee, a policy in which those with financial insecurity have the assurance of a living income. In this paper, I will examine both policies in reference to their effects on the unemployed and underemployed, in hopes that such results will show us what policy will perform best in an increasingly automated

world. Based on data initially collected and my preemptive literature review, I expect that a Negative Income Tax will show better results in the short term, while a Universal Basic Income will be a solution for a more extreme economy. It is my hope that these findings will help prepare policymakers and scholars of political economy as the global community steps forward into a world dominated by automation.

DEDICATION

To my mom and dad, who have always remained my biggest inspiration and unwavering supporters.

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The data analyzed for The Socio-Economic Implications of Automation: UBI and NIT as Alternative Policy Responses were provided by numerous scholarly articles found in the works cited section. The analyses depicted in The Socio-Economic Implications of Automation: UBI and NIT as Alternative Policy Responses were conducted in part by numerous institutions and research teams found in the works cited section and were published in years found in the works cited section.

All other work conducted for the thesis was completed by the student independently.

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INTRODUCTION

This paper will be written to address the economic and social implications of imminent automation. I rest on the first premise that as Artificial Intelligence advances, its increased ubiquity will result in political instability following unequalled unemployment rates, until the human workforce is reduced to merely the abstract. Given this possibility, a wide range of scholars have debated what the best economic policy would be that would help alleviate the hardship that a subsequent wave of unemployment would cause. Two of the more prominent of these policy proposals that my project will be focusing on are a Universal Basic Income and a Negative Income Tax.

How do the economic proposals of Universal Basic Income (UBI) and Negative Income Tax (NIT) affect tax revenue and unemployment rates? I am asking this question under the presupposition that the rising tide of automation will eventually come to dominate the economy, leaving millions of jobs in jeopardy. UBI and NIT are two economic proposals that have been proposed and implemented to ensure that this market upheaval will result in as little chaos as possible. Previous research focused on one or the other and I will be attempting to compare the two against each other. Both proposals have merit and I will be looking to see which conditions are appropriate for one or the other. One aim of this project is to establish what conditions in particular environments make UBI or NIT the most appropriate course of action. Based on data initially collected and my preemptive literature review, I expect that Negative Income Tax will show better results in the short term, while a Universal Basic Income will be a solution for a more extreme economy.

Universal Basic Income is a policy which provides, “a universal income paid on an individual rather than household or means-tested basis” (Painter and Thoung 6). The idea would be to provide a standard living wage to everyone in the case that automation displaces an unprecedented amount of jobs. Worries about the policy include high tax costs, reduced work incentives, and lower wages for workers (Clark and Kavanagh 402). Its one key variable is the amount of money each person receives.

Negative Income Tax is a policy where, “the government provides a certain level of benefits...but then gradually withdraws those benefits as earned income rises” (Moffitt 1). First introduced by Milton Friedman, the policy would theoretically replace all other social security benefits. It isn't without its criticisms as the debate that it could lead to a decrease in work productivity and participation continues (Widerquist). It has a certain amount of variables, the two key ones being the base at which the positive income tax ends and the negative income tax begins, and the marginal rate that the government gives back to recipients. This leads to a certain amount of flexibility that can be adjusted in situations of economic uncertainty, much like interest rates in the central banks.

To briefly illustrate an example of how UBI and NIT might have different consequences, a study from 2006 showed that an effective NIT would have cost the 2002 American government \$826 billion while UBI would have doubled that at \$1.69 trillion (Harvey). The costs are high but so too is the cost of unemployment. For example, with the advent of self-driving cars, the prospect of 1.5 million unemployed truck drivers by 2030 is increasingly worrisome (Strawn 63). I believe that a negative income tax will be beneficial while unemployment is still manageable and that as unemployment rises, a UBI will eventually be necessary.

In order to bring greater clarity to the conditions that are critical to the success or failure of either approach, I will be looking at some similar policies as well as ones that closely mimic the proposed ones above. This will be an in-depth approach to the fundamental issue of automation, measured through certain quantitative economic metrics in an empirical manner.

Section I will examine an explanation and history of terms and policies. After this, Section II will closely compare the results from any studies done on the redistributive policies and specifically how they affect productivity, the individual, tax revenue, and unemployment. Section III will be a break-down and analysis of the policies and findings from Section II. Finally, Section IV will look further into what policy would produce the highest productivity, tax revenue, and employment percentage and provide a possible explanation for the reasons why.

1. AUTOMATION AND POSSIBLE POLICY RESPONSE

Concept Definitions

First, I will introduce a certain amount of terms and their backgrounds, beginning with the reason this research is taking place, Artificial Intelligence. Artificial Intelligence actually has several names to describe its progress and abilities. The first, “Narrow AI,” is used to describe an algorithm capable of accomplishing specified tasks (Goertzel 1). Its goals are usually focused on making a complex task easier or more manageable for human input with examples ranging from the algorithm that presents a personalized YouTube to the voice of Siri in the iPhone. The type of AI seen in popular science fiction like WALL-E and 2001: A Space Odyssey is more commonly known as Artificial General Intelligence (AGI) and describes a system of algorithms that can use human-like neurological and cognitive functions to achieve a wide range of complex tasks (Goertzel 2). A third level of Artificial Intelligence involves a term known as the “singularity,” in which human intelligence is surpassed and inorganic systems become the dominant force of nature. The singularity would logically follow closely to the advent of AGI, given that AGI describes a very human-like program that would be able to quickly advance given any machine’s increased speed of computation compared to a human.

Technological forecasts predict varying impacts of AI on employment and the broad consensus is that a labor market will be cast into disarray (Acemoglu and Restrepo 1). With AI replacing certain processes in jobs or eliminating those jobs altogether, unemployment and underemployment will spike. This is where redistributive economic proposals arise.

In addition to AI, the two other main concepts in this paper are Universal Basic Income and Negative Income Tax. The basis of both a Universal Basic Income (UBI) and a Negative

Income Tax (NIT) is known as a Basic Income Guarantee (BIG), in which taxpayers with zero income would receive a certain amount of government money (Harvey 2). This Basic Income Guarantee is made to ensure that poverty is kept at bay and those with low or no wages can still survive. In a Universal Basic Income, the BIG is capped at a certain level for all individuals, regardless of income reported. A Negative Income Tax, on the other hand, would build upon the BIG with additional dollars that would decrease as reported income increased. Most UBI and NIT models are built with the idea in mind that the modern welfare state would be abolished nearly entirely to be replaced by the new UBI or NIT. These two economic policy alternatives have been the focus of much scholarly debate, especially in recent years.

A Brief History

The idea of a Universal Basic Income has notably been around much longer than the NIT, given that, “in 1516, in his political treatise *Utopia*, Sir Thomas More discussed a guaranteed income as a way to stop petty theft” (Trilling). Thomas Paine suggested a variant of it in his writings. The idea behind it is that one would receive a wage to live off of regardless of employment. It has one singular output variable: its level of money distributed to recipients. Input variables include mostly different metrics of taxes, such as the nature of the tax and the extent of its burden, since the government would be providing this welfare and it would need to finance it somehow.

Milton Friedman was the initial champion of NIT, arguing in 1968 that the American welfare system focused on giving a BIG and alleviating the issue of poverty, yet it did not properly account for a utility-maximizing individual. The main drawback of these welfare programs was that they, “[withdrew] \$1 of benefits for every \$1 earned” (Moffitt 121). Given that the marginal benefit of earning an additional dollar was 0, any rational individual would opt

instead to sit along the outer edges, at either zero hours worked or wherever the safety net ended, ensuring that marginal utility was maximized. Friedman, in acknowledgement of this issue, proposed an idea in which a BIG was offered while giving proper incentive to earn more. His theoretical solution would be to withdraw perhaps only \$0.50 of benefits from every \$1 earned rather than a full dollar. He envisioned a system in which one could manipulate the amount of money it took to qualify for such a benefits program while also changing how much was given back to the individual by the government. In such a scenario, a government entity could adjust for certain economic measures as needed. In its most simplified form, the NIT has three basic input variables, 1) the income of the individual, 2) the maximum coverage rate, or how many dollars an individual can earn before the state stops providing assistance, and 3) the percentage rate of money that the government gives back at the end of each period to the individual. The singular output variable is the amount of money an individual covered by the policy receives at the end of the period.

Criticisms of Both Policies

Negative Income Tax faces its biggest criticism in the claim that US studies from the 1970s have shown it to decrease the amount of labor produced, which is counterintuitive to its purpose (Widerquist). However, the studies were designed to interpret the side effects of an NIT, vastly unprepared to answer any questions regarding the market and how it would respond (Widerquist). There are not enough studies in America and in recent times to conclusively determine what would happen if a Negative Income Tax was introduced on a statewide or nationwide level. That is why we will be looking at other welfare policies and microeconomic concepts to try to isolate different variables and how they affect the market.

One of the most common criticisms of UBI is its relative cost to NIT to achieve the same redistributive effect. A research article done from Rutgers University talks about how, “government expenditures required to fund the NIT modeled in this paper would have been approximately \$826 billion in 2002, compared to the \$1.69 trillion increase required to fund an equivalent UBI” (Harvey 2). While UBI is much simpler to use in a society, given that it requires no extensive infrastructure or administration to implement, the issue would lie in its inability to adapt to the changing economy as easily, considering it has only one output variable. However, the idea has yet to be tried on a large-scale level. While the debate about UBI has previously focused on the concept of its ethical virtues concerning the idea of merit, recent debate has focused on this as a debate of real-world policy. It is for this reason that we are soon likely to see empirical evidence from the early stages of experimentation. In the following section, I will examine and discuss the connections between the (a) impact of automation and (b) the subsequent impact of either UBI or NIT in addressing the consequences of automation.

Automation and Socioeconomic Consequences: UBI vs. NIT as Policy Responses

Artificial Intelligence and robotics have already begun to take jobs. So far, this process has been mostly defined by a gradual replacement of repetitive monotony in the workplace, allowing employees and workers to enjoy more complex and fulfilling labor. However, many have lost jobs in this wave of automation and not been able to get them back. Evidence is found in the fact that just the state of Ohio, “lost between 671,000 and 718,000 jobs between 1967 and 2014 based on automation alone” (Shkurti and Stewart 8). This describes a greater, less noticeable trend noted by the fact that, “As production met automation and moved overseas, the broader citizenry enjoyed cheaper products while large sectors of the workforce were left with a loss of livelihood” (Sterling). However, the trend became much more apparent with the recent

election of Donald Trump in 2016, made possible by the sweeping wave of dispossessed blue-collar workers in the Rust Belt. The candidate promised that the unemployed and underpaid would soon receive their high-wage jobs back. Similarly, political populists have ridden a wave of concern about threatened livelihoods.

The future will not be as kind to labor as it has in the past. An estimate in the AI community of those who believe that automation will take more jobs than it creates is given by a study that finds, “around 47 percent of total US employment is in the high risk category,” (Frey and Osborne 44). This category is denoted by the expectation that such jobs will be automated within two decades. Another study by McKinsey Global Institute cites a USA Today article that predicts, “Automation could destroy as many as 73 million U.S. jobs by 2030” (Davidson). These figures would have untold economic, social, and political consequences. An example of one possible response can be found in the suffering economy of pre-Nazi Germany, in which desperate citizens turned to a political extreme to alleviate financial woes. Political demagogues and societal unrest are some of the more prominent issues that rising unemployment would cause.

Among these issues, it is also undisputed that unemployment negatively correlates with mental health. A meta-analytical study was done to find the actual effects of unemployment on mental health and found that, “the average number of persons with psychological problems among the unemployed was 34%, compared to 16% among employed individuals” (Paul, Moser). There are a series of variables that exacerbate the issue, such as how long the unemployment lasts, demographics of the individual, and what industry they work in. The same study concludes by saying, “unemployment is a severe risk for public mental health that must be fought with all possible means” (Paul and Moser). The next question is if the health effects of

this imminent unemployment epidemic can be lessened by a redistributive welfare system. The Journal of Epidemiology and Community Health conducted a study to learn more about this, looking in depth at 23 European nations with varying welfare state models, and found that there was indeed a, “[variation] by welfare state regime, suggesting that levels of social protection may indeed have a moderating influence” (Bambra and Eikemo). This conclusion supports the idea that long-term suffering mental health is not only caused by a lack of productivity but also by the inability to provide for the basic needs of an individual or his or her family. We can therefore move forward knowing that while a rising unemployment will correlate with suffering mental health, this negative externality can be considerably reduced with an effective redistribute income policy.

Not surprisingly, there are some that view AI as a net positive for employment and the economy. There are several possible responses to this point of view. In addressing one of the main counterpoints used by those who say AI will actually create more jobs than it takes away, I reference evolution. Humans are at the top of the food chain. With this prosperity amongst nature, we have evolved to create a society built upon complex and interdependent labor. In comparison to other animals, “the human neocortex is...less densely packed per volume with neurons, but much more highly interconnected, which suggests that humans may have a greater ability to integrate information across modalities than other primates do” (Flinn et al. 28). Put simply, we are intellectual beings with an increased capacity to adapt. Every Industrial Revolution has been a successful venture in creating stronger and faster sources of energy and communication. Yet we have never been the strongest or fastest in the animal kingdom. Horses were methods of travel that carried us faster than our own feet. Bulls were sources of energy to plow the fields. However, we have never had a revolution in artificial intellect. This coming

Automation Revolution will be a strike against human evolution itself. We will be creating machines that enhance and then overtake our cognitive prowess. The resulting question at the end of this is: What exactly makes us special, or worthy of labor, in a world of AI?

That question is more complex and philosophical than the question I seek to answer: what policy proposal should be used to decrease the amount of civil unrest and suffering societal health caused by automation-induced unemployment?

2. COMPARING THE POLICIES

This section will serve as a reference to existing studies and experiments on the implementation of varying Basic Income Guarantees. I will begin by reviewing the North American experiments on the Negative Income Tax. I will then look into policies that mimic a Universal Basic Income. Afterwards, I will touch on a policy that bears stark resemblance to the Negative Income Tax, the Earned Income Tax Credit. Following these reviews, I will analyze the conclusions of them and how they apply to an automated world. My aim in this section is to thoroughly weigh existing uses and critiques of these policies. This will allow for a closer look at what variables and methods were potentially missed in these studies.

Negative Income Tax

The concept of a Negative Income Tax is not new, and in fact, has been tried in experiments before. This section will serve as a brief review for five studies, four from the US and one from Canada. These studies are a direct result of economist Milton Friedman and his far-reaching research and hypotheses, which have influenced both continuing debates and legitimate policies in the realm of taxation and welfare. From 1968 to 1972, the first experiment was held in New Jersey and Pennsylvania. It fielded any applicants that were making below 150% of the poverty line (Widerquist). The other four experiments took place in Iowa and North Carolina, Seattle and Denver, Indiana, and Winnipeg and Manitoba. Each experiment tested out different levels of guaranteed income, marginal tax rate, and other participant characteristics.

The first experiment in New Jersey and Pennsylvania started out with 1216 subjects and over its three year duration sunk to 983. The second experiment from Iowa and North Carolina functioned as a rural alternative to the first experiment that took place in the low income suburbs.

This experiment started out with 809 subjects and finished with 729. These first two experiments mirrored each other in many ways, differing in that the NJ/PA treatment group received the benefit for three years while the IA/NC treatment group received theirs for only two years. The experiment from Seattle and Denver was by far the largest of the five, taking in 4,800 subjects of which were, “black, white, and Latino, families with at least one dependent and incomes below \$11,000 for single-parent families and below \$13,000 for two parent families” (Widerquist). This experiment was also unique in its length, which was originally set to 6 years, then lengthened to 20 for a smaller treatment group, then ended prematurely after 9 years. This meant that the small treatment group operated as if the benefits would last for another decade. While this would not help determining long term economic effects, it would help show certain long term behaviors by the subjects. The experiment in Gary, Indiana focused mainly on African American families and despite lasting only 3 years, sustained a drop-out rate of nearly 50%. The last North American experiment came from Winnipeg and Manitoba, Canada, right as public interest in the Negative Income Tax was beginning to wane. The experiments, while expensive and performed on a large scale, were all focused on different small and specific subsets of the population.

The major concern from these studies was that hours worked seemed to decrease enough to label it as an effect of the NIT. The experiments varied widely by location and demographics, “yet despite the wide range of treatments and evaluation methodologies, the results are remarkably consistent” (Robins 567). They found that married men decreased labor/year by around 2 weeks, with women decreasing by around 3 weeks. This shifted the labor supply curve to the left, which in turn produced a marginally smaller tax base to draw from. The biggest issue that economists worry about in this scenario is that this would represent an aggregate decrease in

the entirety of the labor market if such a policy was implemented (Widerquist). This would mean that the policy inherently collapses as fewer and fewer dollars return to the government.

However, in such a scenario of automation unemployment, the tax base is already in jeopardy. As unemployment rises, average income would decrease and the tax base would shrink. Experiments have not been done to gauge how a community in crisis would respond to the policy, which is what the NIT in this paper is written for.

The first critique of these studies is how few there are, followed closely by the fact that it's been over five decades since they began. In total, there were less than 9000 participants spread over five different regions and two nations. Along with that, the several levels of guaranteed income and marginal tax rate used, "reduced the numbers of subjects receiving each type of treatment, and therefore reduced the statistical reliability of the results for each" (Widerquist).

Second, the experiments were conducted with a certain goal: to find a policy to eliminate poverty. This paper seeks to find a policy to lessen the harmful effects of automation unemployment. The two differing scenarios, while similar, still contain certain variables in which a rational agent would act differently. How then are we able to concretely define both the effects and side-effects of such a policy?

Another criticism of the supply shift worry is that, "the experiments measured the supply response to an NIT, but they were incapable of measuring the demand response" (Widerquist). Therefore, no accurate conclusion can be thoroughly reached on the equilibrium market supply and demand.

Once again, the best word to describe these studies is insufficient, not in the sense that the experiments were not thoroughly done with conclusive results, but rather that they depict a

different time with different subjects. More applicants and studies across a wider range of controlled environments would help measure the actual results in a more efficient manner. One possible improvement to these studies would be further consideration on the effect of labor supply, paired with observation on the effect of demand. In an increasingly automated workforce, does supply of labor matter? Would it follow the same behavioral patterns? At the time of these experiments, laborers were not facing the prospect of never working again due to technological advancement. Perhaps, in a future scenario, the desperation for work would balance out the decreased supply of labor effect found in these experiments.

Universal Basic Income

Alaska

A Universal Basic Income is similarly unknown in the modern world and is just now emerging from theory into real world examples. A pioneer in such example is the State of Alaska, of which has implemented a UBI to nearly all of its residents since 1982.

The plan, called a Permanent Fund dividend (PFD), “is essentially universal, individual, non-conditional, uniform, regular, and provided in cash” (Goldsmith). It draws upon royalties from the state’s heavy oil exports and helps ensure residents of the state stave off poverty. In this way, it sets an example for other potential UBI’s, in that a state or government must first find a way to fund such an expensive venture. The UBI changes year-to-year, based entirely off of the royalty profits of the oil industry from the previous five years. Thus, when oil production goes up, the pooled fund for the UBI grows and it guarantees a higher dividend over the next five years (Goldsmith). An obvious drawback is found in the fact that if oil collapses, so too will the fund, further exacerbating an already suffering populace that depends so much on the oil industry jobs. In a future implementation, money for a redistributive policy would likely be found in the

AI industry itself, which for now centers its American sphere in Silicon Valley. Still, Alaska owes a large portion of this policy's success to the fact that it has such a small population to receive the benefits of oil's massive export power. Finding a large enough industry to support any larger populations proves difficult.

An interesting equalizer worth noting is the fact that the dividend is taxable as personal income. This ensures that a larger percentage of it is kept among the lower brackets of income in comparison to the upper. It is therefore slightly similar to a NIT in its mission to apportion dividends in a more efficient manner to lower income communities.

At the beginning of this paper I said I would be doing my best to measure any economic results from studies. The first impression is that, "because almost everyone in the state receives the dividend, it is difficult to construct statistical analyses that allow researchers to isolate the effects of the dividend from all the other factors simultaneously impacting behavior" (Goldsmith). As with an experiment, a control group is needed. This is difficult in a state in which everyone receives the benefit to a relatively similar degree. It is especially difficult to compare to other states, all of which have unique economies built on different industries or at least in different geographical locations, of which lend heavily to the influence of any major market. However, the same paper goes on to say that the policy added an estimated, "10 thousand additional jobs, 15 to 20 thousand additional residents (drawn to the state because of the jobs), and \$1.5 billion in additional personal income" (Goldsmith). So, using this analysis, it appears as if the dividend results in a positive stabilizer for the Alaskan economy. Of course, it would be extremely beneficial to have more data collected on the policy, which would essentially require a time machine to go back and accurately measure certain economic metrics.

This brings us to Finland, the most recent case of a UBI variant and one in which shows great promise in regards to scientific analysis.

Finland

The government of Finland set about recently on experimenting with a UBI, “to study the effects of the basic income on the employment and income” (Kangus et al. 9). This is the newest addition to the group of scattered experiments and shows promise in its ability to more accurately and efficiently assess redistributive policies. The experiment hosts a control group and treatment group to measure out the specific effects of the policy. In preparing the experiment, they used random sampling to ensure the only variable was the UBI itself. To achieve the greatest degree of efficacy of random sampling, more subjects must be used in an experiment. However, “the size of the treatment group in the basic income experiment was set at only 2,000 persons” (Kangus et al. 14). There are a certain number of obstacles in the way of these experiments, one such being that each subject in the experiment represents a large dollar amount. Measuring how money affects behaviors is an expensive demonstration.

An initial report was done in 2019 that gave updates on what the policy had done in the previous year. It showed that, “the experiment did not have any effect on employment status during the first year of the experiment” (Kangus et al. 9). This offers optimism that the policy would not result in more employees quitting or their work performance declining in such a way that would lead to being fired.

The Finnish experiment is also valuable in that it measures psychological values for those in a control and test group. This enables us to simulate the effect that the policy would have in a highly automated world. Regarding general satisfaction with life and measured on a scale of 1 to 10, “In the test group the average value for satisfaction with life was 7.32 and in the control

group 6.76” (Kangus et al. 18). One of the main worries concerning health side effects with unemployment or low wages due to underemployment is satisfaction with life as lower averages in this department lead to drug abuse and suicide. The paper also talks about confidence, this time asking the subjects if they were confidence in their financial future and measuring the percentage of those that responded “yes.” The results once again favored the policy and, “indicate that the level of confidence in one’s own future is considerably higher in the test group than in the control group that did not receive a basic income” (Kangus et al. 20).

The Finnish experiment is one that bears great optimism. Yet it should also be noted that the Finnish population is much closer to that of Alaska than the entirety of the United States. Redistributive policies with such massive reach are cheaper in smaller numbers.

Earned Income Tax Credit

United States

The Earned Income Tax Credit (EITC) is worth noting here, given that it’s a variant of the NIT, proposed originally as a way to block passage of a NIT bill. By offering a refundable tax credit, it enables recipients to receive more tax benefits than their established tax burden. It’s become one of the least controversial policies under the welfare umbrella, “with expansions authorized by both Democratic and Republican congresses and under each of the last five presidents” (Nichols and Rothstein 138). This policy merits its own section in this paper due to its close resemblance to a NIT. By looking at how it affects labor participation and overall poverty, we can perhaps predict how an NIT would behave. Due to the fact that it’s an implemented policy already, this paper won’t review it in the aspect of expansion or implementation, but rather as a review to shed more light on NIT characteristics and effects.

The EITC differs greatly from the NIT in that it requires recipients to hold a job to qualify for benefits. This bars benefits from demographics like single mothers who can't hold a job. The policy is recommended by researchers to be paired with a raise in the minimum wage as a complement to the fight against poverty (Nichols and Rothstein 204). Policies like this focus on helping the underemployed, not the unemployed. However, their emphases on ensuring recipients are employed keeps bipartisan support strong.

The paper's conclusion touches on this fact, saying, "During an exceptionally weak job market, expanding the size of the EITC is less attractive as people induced to enter the labor market are more likely to move into unemployment rather than employment" (Nichols and Rothstein 207). Given that this paper is written under the assumption that we will face an extremely weak labor market as automation begins its unemployment march, this policy could prove ineffective in fighting such externalities.

Labor Supply Effects

Additional income affects the recipient's leisure to work ratio, causing both a rise or fall in total income as well as a rise or fall in hours worked. These changes are mapped out by a combination of the *substitution effect* and the *income effect*. The substitution effect deals with the marginal benefit of working more or less hours while the income effect deals with the ability of an individual to achieve a target level of income through more or less hours. In the case of an NIT, "both its income and substitution effects operate to reduce work effort" (Browning 278). The magnitude of the income and substitution effect and subsequent reduction in hours worked is determined by two of the variables in an NIT.

The first variable is the marginal tax rate, that being any number between 0 and 1. Should this rate be higher, for example around 0.7, an individual would receive 70% of the difference

between the cutoff rate of the policy and their own income. In this situation, the individual's inclination to work less is heightened by the fact that for every hour they work, their marginal earnings are actually 30% of their hourly wage. By not working that hour, they could receive 70% of that wage for free, offering a higher incentive to spend more hours on leisure rather than labor. This is the substitution effect of the policy and the main reason why the marginal tax rate should be lower, perhaps around 0.3, so that an individual's incentive to work fewer hours is not raised.

The second variable is the maximum coverage rate, where the negative income tax ends and the positive income tax begins. This variable is important because it dictates both how much individuals on the policy can receive. To provide assistance to a larger base of the impoverished, one would want to set the maximum coverage rate high. However, this ensures a higher BIG and brings into conflict the income effect, which works to reduce labor hours. A recipient with a higher BIG still has the same target income. They would spend fewer hours on labor and more on leisure. For this reason, one would want to ensure the maximum coverage rate is not as high, once again to reduce the disincentive for labor.

Looking back at the NIT experiments of the 1970's, most subjects showcased that, "the average estimated substitution and income effects are in accordance with theory, which predicts that the substitution effect will be positive and that the income effect will be negative" (Robins 579). This showed an underlying strength to the studies, that despite their wide variation in types of methodologies and demographics, results for labor supply effects were similar in each.

3. THE TAKEAWAYS

Current State of Welfare in America

The United States, being predominantly fiscally conservative as opposed to the rest of industrialized nations, has a welfare state that focuses mainly on nudging the impoverished further into the labor force. In such unprecedented automated times, this reliance on rugged individualism could prove detrimental to the lower class. The Earned Income Tax Credit makes up the most popular wing of welfare, yet it is wholly unprepared to support a new wave of unemployed.

Lack of Data

While we are able to measure out certain hypothetical results of an NIT, the magnitude of many effects were unknown due to the lack of experimentation. Despite the grand NIT experiments, no states or nations actually adopted this policy. This is opposed to UBI, which has plenty of data from Alaska as well as new data and analysis from European countries which are slowly testing the waters of UBI. Additionally, these NIT experiments were done nearly five decades ago under a different global and economic environment.

Issues of Experimentation

The most glaring issue of mass experimentation is the cost of implementation. Assuming anything over 1000 participants, each participant receiving between \$500 and \$1500 a month, experiments could quickly become multi-million dollar investments chasing conclusions that could be made more cheaply. Despite this cost, the alternative is to jump headfirst through trial by fire and implement it officially. Such an effect could be disastrous and end up hurting more

than helping. It would be wise to ensure that all side effects and externalities are known before the government attempts to implement such a wide-reaching policy.

NIT Evaluation

The Negative Income Tax proves uniquely resistant to the externalities of automation unemployment due to several factors. First, offering the benefits to those without incomes, as opposed to the EITC which requires a job, helps consolidate unemployment benefits with an EITC variant. The streamlining of this process will simplify the bureaucracy needed for this imminent issue. Additionally, it will help the population that needs benefits the most, the recently unemployed.

Second, the labor supply reaction of a Negative Income Tax is adjustable, allowing quick updates based on labor responses. This will prove important in an economy liable to volatility.

The NIT still finds its greatest issue in the fact that it reduces hours worked. This issue could defeat the entire policy and end up crippling an economy. Ensuring a steady labor supply should be the highest priority of anyone trying to ensure the NIT's success.

UBI Evaluation

Both the Alaskan policy and Finnish experiment seem successful. Alaska enjoys an increase of jobs and population. Finland reports higher mental health and confidence without a decrease in employment. Alaska's decision to make the UBI benefits taxable gives it the ability to mimic a NIT. This ensures the communities that need more of the benefits than high income communities receive it. Finland's experiment is young and for now seems optimistic. Only through more time will we be able to decipher if this can be transitioned into a long term solution.

There still remains the issue of the cost. Giving benefits to every single citizen is nearly impossible to fund continuously. Alaska has done this by using royalties from the oil industry. Oil is not an industry that has the capability to move state to state or nation to nation. Yet how would policymakers ensure other industries stay, should they choose to heavily tax them? Take for instance, the tech industry, which some of suggested taxing to ensure a UBI. How would they keep that industry from simply moving to places with cheaper taxes? The cost of a UBI still remains its biggest issue.

However, every policy has its issues. The main takeaway from any research into policies is that there is always give-and-take and no policy is complete without its own sacrifices. If automation actually does end up taking millions of jobs and raising under/unemployment rates, such sacrifices might be necessary.

4. THE PROPOSAL

This section will serve as the proposal of the entire paper. In it, I will explain a new set of studies that must be done to ensure the most accurate results of such a policy.

Intent of the Policy

First, this policy will not be used to eliminate normal poverty, as is stated in the previous experiments, studies, and implementations of a BIG. Instead, it will be used to ensure that those displaced by automation will be able to maintain a living income.

Settings

The experiment must be done in a setting in which automation has already taken jobs, implying that the test subjects of the experiment will closely reflect the behavior of future peoples displaced by automation. One such location is, in general terms, the American Rust Belt, of which has already faced the brunt of the blue collar unemployment storm. This will simulate a scenario in which automation has taken jobs and left workers behind. The resulting conclusions from such an experiment should give conclusive data on what a BIG policy would actually do. Especially pressing is the question on how large the income and substitution effects will actually be. Does long term joblessness reduce these effects? Does the threat of long term joblessness do so as well? Measuring the magnitude of these effects is imperative to implementing a national policy.

Methodology and Hypothetical Experimentations

A major reason that previous BIG experiments were so inconclusive was their variability. Each experiment had a different type of policy with different amounts of money distributed under different environments and different time periods. Regarding time periods, many were

done decades ago. A modern experiment is required. It would also require more standardized results with more control over separate variables. If an experiment is done, it needs more controlling variables to ensure the cause and effect of said policy. With so many differing variables over so many experiments, no decisive conclusion can be made and many, if not more, questions remain.

UBI vs. NIT

This subsection is related to methodology, yet requires its own subsection due to the fact that this is the crux of the paper itself: should UBI or NIT be used? In a controlled experiment, a UBI and NIT would both be incorporated alongside a control group in the same area with the same amount of people and as many related variables being the same as possible. In this manner, we can do away with any international comparisons and focus on which policy performs better in an environment under the most relevant conditions.

Aside from that inquiry is the idea that the policies are not competing, nor are they mutually exclusive in the long run. A comprehensive policy plan focused on alleviating unemployment externalities would utilize both at different periods on the timeline.

Evolving Policy

After the experiments are done we will have the mechanisms and understanding necessary for the implementation of policy. Upon the completion of this paper, I propose that upon the first signs of automation unemployment increasing, we change the Earned Income Tax credit to mimic a Negative Income Tax, so as to ensure unemployed individuals receive benefits as well. From there, a Universal Basic Income can be phased in, covering larger populations of unemployed. These three main policies will be used interchangeably throughout the era of automation, providing options for the state to employ against externalities. It is important to note

that their implementation must be temporary, able to be changed in the case that unemployment goes up or down in a substantial manner. A UBI is inefficient against smaller unemployment, and trying to use it instead of a better-suited NIT would further exacerbate the problem.

An experiment, while expensive, is necessary to ensure the proper implementation when the time comes. With such large

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