A Universal Basic Income for Chicago

Simulating a supplementary UBI's effects on the labor market, income distribution, and quality of life

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ABSTRACT

We simulate the effects of a $500 per month Universal Basic Income (UBI) on the income distribution of Chicago. We generate a representative distribution of 10,000 Chicago incomes, then simulate the UBI transfer, a progressive income tax scheme to fund it, and the resulting decreases in labor supply. We find that our proposal leaves the poorest 78.8% of Chicago wealthier than before, and the poorest third will each see their incomes increase by at least 15%. We compare the UBI to three popularly-proposed alternative welfare policies. Finally, we combine observations about social conditions in Chicago with existing evidence from past UBI experiments to make qualitative predictions about the possible effects of UBI on quality-of-life outcomes such as mental health, nutrition, gender equality, hospitalization, and education.

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MISSION STATEMENT

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I. Introduction

Advances in technology, shifts in demography, and globalization are altering the nature of work. A fundamentally changing labor market has pushed innovative welfare policy tools into mainstream conversation. One of the most popularly proposed tools across the US is the Universal Basic Income (UBI), an unconditional cash transfer in equal amounts to all individuals.

The UBI has risen to a prominence in policy discourse at multiple levels of US government. In February 2019, the Stockton Economic Empowerment Demonstration (SEED), began an 18-month pilot program distributing monthly $500 transfers to each of Stockton, CA's citizens.[1] In Chicago, City Council and the Chicago Resilient Families Task Force are working on a trial UBI,[2] and candidates for city offices have made UBI central to their platforms. UBI has even been championed by 2020 candidates for US President.

To understand the movement from the perspective of one of its leaders, we interviewed Natalie Foster, Co-Chair of the Economic Security Project, which funded SEED. She emphasized that the motivations behind an unconditional transfer are both economic — addressing poverty, unemployment, and the insufficiency of public provisions — and non-economic — supporting freedom and dignity for citizens of a system in which an individual's position in the social structure is determined by economic success.

To understand how a UBI might affect the incomes of Chicagoans, we propose a system in Section II: a $500 monthly cash transfer and a hypothetical progressive income tax scheme to fund it. We interpolate over Census data to generate a representative distribution of 10,000 Chicago incomes, then simulate the effects of the UBI considering the transfer, the change in tax rate, and the resulting decreases in labor supply. We find that our proposal leaves the poorest 78.8% of Chicago wealthier than before, and the poorest third will each see their incomes increase by at least 15%.

There has to date been no published research working with Chicago-level data to simulate the effects of a UBI on the Chicago labor market. At a time when the City Council and the Chicago Resilient Families Task Force are working on a trial UBI for Chicago, and candidates for city offices are making UBI central to their platforms, such analysis is more important than ever.

In Section III, we compare UBI to some of its most popular alternatives and discuss the arguments for and against them as related to UBI. We consider the Earned Income Tax Credit (EITC), a negative income tax (NIT), and a job guarantee. Finally, in Section IV we draw on Bucur (2015)'s work modeling quality of life to conduct a review of the literature analyzing how UBI may contribute to outcomes other than just income.

[1] Martin-West, Baker (2018)
[2] Nettles (2019)

II. Chicago UBI Simulation

In order to investigate the effect of UBI on both labor market income and net-of-transfers income in Chicago, we identify the following:

(1) The approximate income distribution of the city of Chicago,
(2) The initial effect of UBI on net-of-transfers income (total benefit amount minus total increase in taxation),
(3) The major factors which influence labor market incentives,
(4) The cumulative effect on the labor market.

First, we identify the income distribution of the city of Chicago. Because the Census Bureau only provides data in the form of income brackets (see Table 1), we use those brackets to construct an approximate income distribution function, then use that function to generate a sample of 10,000 representative labor income values.

Table 1. Chicago labor income distribution

Subject	Total		Percent	
	Estimate	Margin of Error	Estimate	Margin of Error
Population 16 years and over with earnings	1,439,842	+/-5,026	1,439,842	+/-5,026
Median earnings (dollars)	34,420	+/-377	(X)	(X)
FULL-TIME, YEAR-ROUND WORKERS WITH EARNINGS	938,607	+/-5,600	938,607	+/-5,600
$1 to $9,999 or loss	13,775	+/-756	1.5%	+/-0.1
$10,000 to $14,999	28,414	+/-1,300	3.0%	+/-0.1
$15,000 to $24,999	124,645	+/-2,788	13.3%	+/-0.3
$25,000 to $34,999	141,434	+/-2,961	15.1%	+/-0.3
$35,000 to $49,999	165,690	+/-2,770	17.7%	+/-0.3
$50,000 to $64,999	141,837	+/-2,973	15.1%	+/-0.3
$65,000 to $74,999	63,937	+/-1,559	6.8%	+/-0.2
$75,000 to $99,999	109,487	+/-2,718	11.7%	+/-0.3
$100,000 or more	149,388	+/-2,576	15.9%	+/-0.3

Source: Labor Market Earnings Distribution for Chicago (U.S. Census Bureau, 2018)

Second, we identify the effect of UBI on net-of-transfers income. We assume the following policy design: a federal UBI benefit of $500 monthly per adult, financed through increases in progressive taxation for upper income brackets. Thus, for adults below the minimum taxable threshold, the initial effect of UBI on net-of-transfers income is $6000 annually, while for adults above this threshold, the effect will vary based on their place in the income distribution and their corresponding tax rate.

Third, we identify the major factors which influence labor market incentives. In the context of government transfer spending, two major factors influence labor-market incentives on the individual (microeconomic) level: the *income effect* and the *substitution effect*.[3] The income effect concerns the incentive or disincentive to work created by an increase in unconditional government transfer spending. Most estimates suggest a modest but negative coefficient for the elasticity of labor supply with respect to government transfer income,[4] implying that receiving additional government benefits

[3] Marinescu (2017)
[4] *Ibid.*

will modestly reduce the incentive to work. The substitution effect, in this context, concerns the incentive or disincentive to work created by an increase in implicit or explicit taxation. Implicit taxation is generally a problem with means-tested welfare programs — as workers earn more, these programs are aggressively phased out, amounting to a de-facto tax on higher earnings (for example, if a worker's earnings increase by $1000 but federal benefits phase out by $300, she faces an implicit tax rate of 30%). This is not a concern with UBI, however, as our proposed model does not phase out with respect to income. By contrast, explicit taxation is a very real concern associated with UBI, as UBI is financed by higher progressive tax rates, which have the potential to disincentivize work (as the return to additional work is constrained by higher tax rates).

A final means by which UBI could affect the labor market is via the medium- to long-run *macroeconomic* effects — while UBI, in theory, does not affect GDP in the short-run (merely redistributing money from certain individuals to others), its distributional effects may influence GDP over time, as individuals in different income brackets have varying marginal propensities to spend or save. These differences can influence aggregate demand and output in the macroeconomy, in turn affecting the labor market as a whole (via job creation, wages, etc.) Nikiforos, *et al.* (2017) constructs an analysis suggesting that the higher marginal propensity to consume of prospective UBI recipients will result in an increase in total consumption economy-wide. Using the Keynesian Levy model to evaluate the effect of UBI over the medium-term, the study concludes that UBI has a modest, positive effect on GDP, wages, and job-creation, suggesting that redistribution in this case is a more allocatively efficient outcome. Their Levy model makes the following assumptions:

(1) the economy is not currently operating near maximum output
(2) unconditional cash transfers do not significantly reduce labor supply, and
(3) increasing progressive taxes does not significantly change household behavior.[5]

As (1) is widely accepted, and our analysis in the rest of this section defends (2) and (3), we can safely conclude that the longer-term macroeconomic effects of a UBI are mildly positive, and focus on the microeconomic income and substitution effects.

To evaluate the effect of UBI on labor income, we propose the following model:

$$L_{1i} = L_{0i} + \varepsilon_I \Delta B + \varepsilon_S(\Delta T_b \cdot Y_{0i})$$
$$Y_{1i} = (1 - \Delta T_b)L_{1i} + \Delta B$$

Where L_{1i} denotes post-UBI labor income for individual i, L_{0i} denotes pre-UBI labor income, ε_I denotes the elasticity of income, ε_S denotes the elasticity of substitution, ΔB denotes the annual UBI benefit, and ΔT_b denotes the increase in effective tax rate for a member of bracket b. Using empirical observations from the literature on the elasticities of income and substitution, as well as our constructed tax scheme, we are able to estimate the increase or decrease in labor income (in USD) for any given individual in Chicago.

To estimate the effect of UBI on the labor market with greater confidence, we utilize a range of income and substitution elasticities to project both optimal and suboptimal (conservative) scenarios for Chicago's labor market. For elasticity of labor supply with respect to government transfer income (e_i), we bound our estimates by -0.06 and -0.10, suggesting that each $1 increase in unconditional transfer income would reduce labor market earnings by $0.06 and $0.10. We choose

[5] Nikiforos et al. 2017

these values based on an empirical investigation of similarly-designed Negative Income Tax (NIT) experiments in the US, which finds that e_i varies between -0.06 and -0.10 depending on the demographic group studied.[6] For elasticity of substitution with respect to effective tax rates (e_s), we bound our estimates by -0.0008 and -0.0017, suggesting that each 1% increase in effective tax rates would reduce one's labor earnings by between 0.08% and 0.17%. Once again, we derive these values from the empirical study of the NIT — we take the average of Robins (1985)'s finding that each 10% increase in effective taxation will induce a 0.8% to 1.7% reduction in labor earnings, varying based on income and demographic factors.

Nikiforos *et al.* (2017) proposes a new national income tax scheme to finance their US-wide UBI of $6,000. We find that, when applied to Chicago's income distribution, their changes result in revenues of more than $6,000 per person, so we propose a modified version of their scheme; we slightly reduce the tax increase on each bracket to make our proposal approximately revenue-neutral, after accounting for projected decreases in labor supply. Both proposals are depicted in Table 2.

Table 2. Proposed change in average tax rate by income bracket

Source	Q1	Q2	Q3	Q4	P81-90	P91-95	P96-99	P100
Nikiforos *et al.* (2017)	0%	0%	0%	+5%	+11%	+13%	+16%	+26%
Chicago revenue-neutral	0%	0%	0%	+4%	+8%	+11%	+14%	+23%

Note: "Q" refers to income quintiles ("Q1" is the lowest quintile, etc.); "P" refers to income percentiles ("P81-90" is the 81st-to-90th percentiles, etc.)

Using these values and our simulated income distribution for the city of Chicago, we estimate the labor market effects of our UBI scheme. The *ex ante* mean income is $80,565.50; taking the optimal substitution and income elasticities yields a mean income of $79,711.47 (1.1% lower), and taking suboptimal substitution and income elasticities yields $78,915.68 (2.0% lower). To be conservative, we proceed assuming the suboptimal elasticities, keeping in mind that actual reductions in labor income may be less severe.

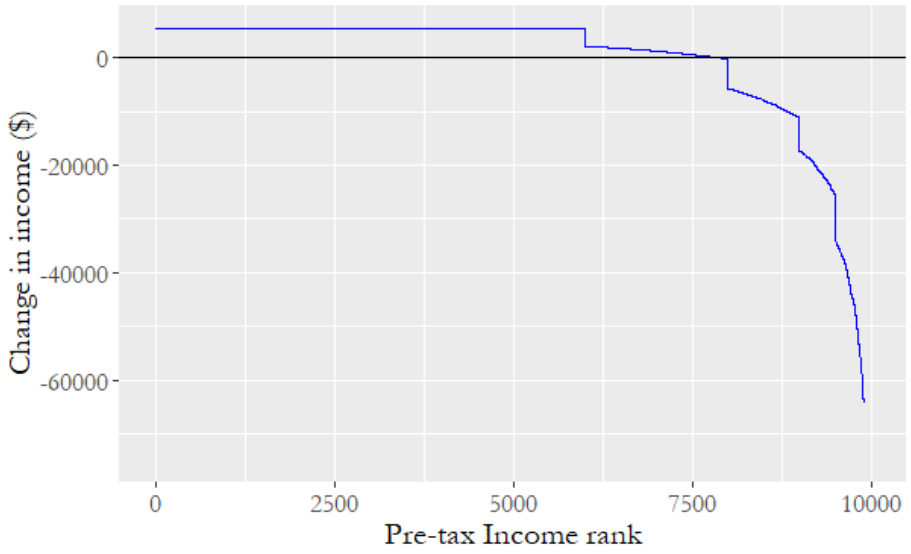
Taking the simulated income distribution, the proposed new tax scheme, and the exogenous income and substitution elasticities, we calculate the change in income for each point along the distribution.

Figure 1. visualizes the effects of our proposed UBI scheme on the incomes of Chicagoans (recalling that we compressed the income distribution into a representative simulation of 10,000 incomes).[7] UBI leaves the poorest 78.8% of Chicagoans wealthier than before, and the wealthiest 22.2% worse off.

[6] Robins (1985)

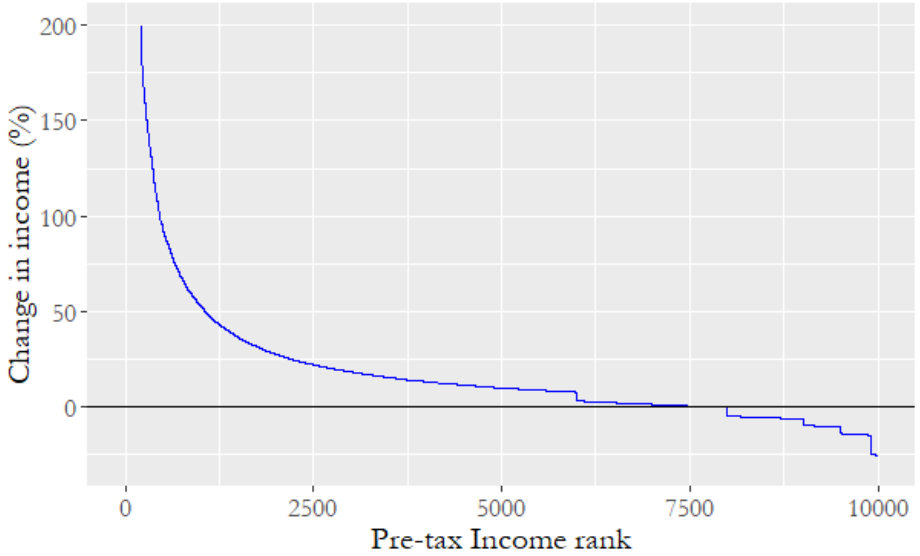
[7] In order to preserve visibility, the y-axis of Figure 1 is truncated to not show income changes for the wealthiest 1%, whose incomes decrease on average by $152,402.20. In Figure 2, income changes for the poorest 2.03% are truncated for similar reasons.

Figure 1. Change in income by pre-tax income rank



To understand the magnitude of these income changes on each individual, we can consider change in income as a percentage of pre-UBI income, shown in Figure 2.

Figure 2. Change in income (%) by pre-tax income rank



We can see that each of the poorest 10% of Chicagoans will face an income increase of at least 50%, and the poorest third will see increases of at least 15%. Chicagoans outside the top 10% will see their incomes decreased by up to 6%; while the top 10% will see decreases between 9 and 25%.

We can also examine how each decile's income changes on average as a result of the policy, as shown in Table 3. The average member of the poorest decile has her income almost doubled by the UBI; and even members of the fifth decile have their incomes increased by over 10% on average. The only two deciles that are worse off on average are the 9th and 10th.

Table 3. UBI effects on income by decile

Decile	Mean Pre-UBI Income ($)	Mean Post-UBI Income	Change ($)	Change (%)
1	5554.11	10954.11	5400	97.23
2	14821.9	20221.9	5400	36.43
3	24406.61	29806.61	5400	22.13
4	34918.03	40318.03	5400	15.46
5	47036.91	52436.91	5400	11.48
6	61324.7	66724.7	5400	8.81
7	78598.92	80365.87	1766.95	2.25
8	104142.34	104720.8	578.47	0.56
9	146465.35	138363.55	-8101.8	-5.53
10	288386.1	245048.29	-43337.81	-15.03

To summarize, a UBI in the amount of $500 monthly, financed through the system of progressive taxes outlined in Table 3, is expected to reduce the labor supplied by the median Chicago worker by $600.00 (1.1%), and increase the welfare of the median Chicago worker by $5400.00 (10.0%). One possible explanation for UBI's relatively modest effect on labor supply is the lack of an implicit substitution effect. That is, means-tested welfare programs generally phase out with increases in income, amounting to de-facto increases in tax rates which, by means of the substitution effect, disincentivize work significantly (e.g., if a $1,000 increase in income results in a $500 decrease in combined SNAP and TANF benefits, the result is an implicit tax rate of 50%). Given our findings, we are encouraged by the potential of UBI — if policymakers' principal goal is increasing disposable income for working families, we contend that UBI is effective.

Some limitations of our findings follow. The most significant is migration; municipal UBIs have been criticized on the grounds that they will encourage wealthier citizens (i.e. those worse off as a result of the policy) to move out. If a substantial number of Chicago's wealthiest citizens left the tax base to avoid their new tax increases, our subsidy would no longer be revenue-neutral.

Second, our analysis does not differentiate among demographic groups (gender, ethnicity, etc.). As Robins (1985) indicates, income and substitution elasticities vary by gender and other demographic considerations, and thus, it is possible that UBI may adversely affect certain groups due to social constraints on labor force participation. That said, given that we find only modest effects on the labor market, we do not expect such adverse variation.

Third, our analysis does not consider non-economic factors associated with UBI. That is, UBI may have certain psychological effects that disincentivize or incentivize work, resulting in unexpected values for e_i. For example, the framing of UBI as "universal" and/or as a work *alternative* rather than a work *supplement* may impact labor supply in a way this paper cannot predict. Future analysis should take these framing effects into consideration, such that policy interventions are well-designed to minimize UBI's distortionary impact.

III. UBI and Its Alternatives

Some of the most popular welfare reform policies proposed as alternatives (or sometimes complements) to a UBI include the negative income tax, the Earned Income Tax Credit, and the job guarantee. In this section, we discuss the arguments for and against these policies as compared to UBI.

Negative Income Tax (NIT)

A negative income tax is simply a change in the income tax bracket mapping such that individuals or families with the lowest incomes, instead of paying small or no income taxes, end up receiving a certain amount of money from the government in place of an income tax. Of the three alternatives we discuss, NIT is most similar to UBI in design; in fact, it can be constructed in theory to have the exact same financial implications on a given population. Consider the tax scheme we propose in Section II; the lowest three quintiles (whose taxes do not change) could receive a $6,000 NIT, and everyone whose taxes do change could have their taxes rates change by the exact amount such that their taxes due (positive or negative) are equal to what they would have been in the UBI scheme.

If UBI and NIT can be financially equivalent, why prefer a UBI? Natalie Foster answers "the idea is that it's simple." With UBI, a check is regularly disbursed to all citizens in the same amount; UBI means that citizens who do not currently pay income taxes (especially relevant in a municipal environment) do not have to go through the process of filing to receive the payment, eliminating another bureaucratic barrier between citizens and the transfer.

Earned Income Tax Credit (EITC)

EITC is a tax credit that refunds a low-income individual according to a fixed percentage of his income. At a certain income level, the fixed percentage becomes a fixed amount, then eventually begins to decline with income until it reaches zero. The levels vary with household size, but as currently implemented within our federal income tax scheme, an individual with one child receives a 34% percent credit until the credit reaches $3,461.20 (at an income of $10,180), the credit stays at $3,461.20 until the individual is earning $18,660, then phases out at -15.98% until the it is $0 when the individual earns $40,320.[8]

EITC is constructed to incentivize labor from low-income people, and empirical analysis tends to suggest that it achieves that goal.[9] UBI proponents argue that EITC leaves out people that don't work — whether because they can't find a job, they are occupied by non-paying activities, they have a health problem or a disability, they simply don't want to work, or any other reason — and that those individuals deserve welfare. UBI proponents accept that the policy decreases incentives to work, but acknowledge that there is value in providing cash to low-income individuals and allowing them the freedom to choose how they adjust their distribution of activities.

Job Guarantee

In recent years, the Job Guarantee has emerged as an alternative to UBI. A Job Guarantee ensures each citizen employment at a certain wage, rather than a fixed income. The Job Guarantee is likely to produce many results comparable to the UBI, yet at a significantly reduced cost.

[8] The Tax Policy Center's *Briefing Book* page on EITC provides more details.
[9] See, for example, Meyer and Rosenbaum (2000)

During the high-unemployment decade of 1978-1988 (the official rate in the U.S. was at an average of 7 percent), the gross cost of the Job Guarantee would have been approximately $1.187 trillion, or an average of $118.7 billion a year, in 2006 dollars[10]. This does not include savings from other welfare and unemployment benefit programs. Accounting for these reductions, the net cost of the program would have been approximately $21.78 billion, again in 2006 dollars[11].

While such a program would not have the same redistributive effect on the economy, and would not serve as a replacement for all traditional forms of welfare benefits, we consider it to be a serious potential alternative to the Basic Income due to its similar social effects, generated at a far lower net cost.

The primary differences between UBI and the Job Guarantee lie in their target and scope. The Basic Income attempts to broadly target the issue of income insecurity, while the Job Guarantee targets what its proponents argue to be the more broad, fundamental issue: unemployment.[12] Targeting unemployment rather than income insecurity as a whole provides firm macroeconomic benefits; by acting as a flexible, employer-of-last-resort, the government and its Job Guarantee program can act as an automatic fiscal stabilizer within the economy, protecting against both unemployment and inflation during periods of economic stress.[13]

Although the Job Guarantee is, due to its small size, unable to redistribute income to the same extent as a UBI policy, it still may provide strong, secondary benefits to private sector workers. By removing the threat of unemployment and hence creating upward pressure on wages economy-wide, income distribution can be improved significantly without requiring the raising of additional tax revenue[14]. In contrast, the UBI policy, regardless of its implementation structure, would be unable to flexibly adapt to dynamic macroeconomic circumstances due to its universal nature, leaving persistent unemployment and the associated negative social costs unsolved. Both Mitchell and Watts (2004), and Harvey (2006a) argue separately that the Universal Basic Income overlooks the social benefits of employment, i.e. participating as an active and integrated member of economic society. Other macroeconomic concerns regarding the UBI include long-term wage reductions due to the presence of an implicit subsidy and the potential for an inflationary bias to exist.[15]

Thus, while we focus our analysis primarily on the social and economic effects of a Basic Income Guarantee implemented as a Universal Basic Income, it is crucial to consider the opportunity costs of such a program as well. Alternative policies such as the Job Guarantee may provide equal or greater benefits for a significantly lower cost; tackling the problem from the angle of unemployment may prove more worthwhile, especially given the "well-documented" negative effects of unemployment on physical and mental health, crime, and poverty, as well as the important effect of employment on wages[16].

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[10] Harvey (2006b)
[11] *Ibid.*
[12] See Mitchell and Watts (2004)
[13] *Ibid.*
[14] Mitchell and Watts (2004)
[15] *Ibid.*
[16] Harvey (2006b)

IV. UBI Impacts on Quality of Life

Quality-of-life (QoL) is a broad term used to refer to the general well-being of individuals, the measurement of which is highly varied across the spectrum of current academic analyses. Yet, common variables in most estimates include standard of living, health, family life, education, and housing location and quality, which provide a useful image of an individual's QoL.[17]

QoL in Chicago is a topic worth investigating. Much research has suggested a causal relationship between concentrated poverty and adverse individual outcomes, facilitated by racial segregation, subcultures of violence, social dynamics, family disruption, residential instability, and low-quality housing. Thus, QoL varies significantly between neighborhoods, especially in historically segregated cities such as Chicago, a historically segregated city. Higher rates of poverty, violence, crime, and unemployment are concentrated among neighborhoods predominantly inhabited by racial minorities, creating egregious and long-enduring disparities which must be addressed.[18]

The establishment of a Universal Basic Income (UBI) aims to increase QoL by improving the outcomes for a variety of variables. It has been theorized to impact health outcomes, social cohesion, parenting strategies, criminal activity, and school attendance. We attempt to show how the introduction of a UBI could potentially change QoL, with reference to Bucur (2015)'s quality of life model. The model leans on the popular Human Development Index (HDI), with special attention to variables such as health, family life, gross national income and gross domestic product, gender equality, and political freedom.

In this section, we review the existing evidence on the effects of past UBI and other cash transfer programs on five key contributors to quality of life: mental health, gender equality, nutrition, hospitalization, and education.

Mental Health

Mental health describes a broad set of QoL drivers, including the frequency and severity of emotional, behavioral, and substance abuse disorders. In 2016 in Chicago, both behavioral and emotional health hospitalizations were twice as high among African American residents as among white residents, and increased in proportion with economic hardship.[19] Behavioral disorders have been associated with aggression and violence, especially among children.[20] Thus, ameliorating behavioral mental health symptoms across Chicago could not only improve general QoL, but particularly could improve neighborhood safety, school environments, and gun violence in the most underserved communities.

Existing evidence suggests that alleviation of poverty via unconditional cash-transfers improves behavioral mental health. These improvements are likely to occur in symptoms of conduct and oppositional disorders, which can also positively impact other variables, such as family life and school attendance. Additionally, reduction in physician claims and hospital separations for mental health diagnoses could positively impact hospital admission rates and GDP, assuming a reduction in government spending on subsidized healthcare. Costello, *et al.* (2003) studies a natural experiment of

[17] Brown, *et al.* (2004)
[18] Sampson. (2003)
[19] Pillai, *et al.* (2017)
[20] Turgay, et al. (2004)

an income supplement affecting a Native American community, finding that the rate of psychiatric symptoms among children who were moved above the poverty line by the supplement decreased until it was the same as the rate among children who had always lived above the poverty line. Forget (2011)'s study of the Canadian MINCOME experiment found that supplemental income recipients experienced lower rates of hospitalization and fewer physician claims, particularly for mental health incidents or diagnoses, than non-recipients.

Overall, the current literature suggests that an introduction of UBI is likely to positively impact mental health specifically in the realm of behavioral disorder. Through increased parental supervision, it is probable that childhood conduct and oppositional disorder symptoms will reduce, with spillover effects increasing quality of family life. Additionally, the frequency of mental health diagnoses is likely to decrease, indicated by a reduction in mental health hospital separations and physician claims. As this would reduce the burden on federally subsidized healthcare, GDP could also be positively impacted**.**

Gender Equality

In 2016, 23% of children in the U.S. were living with single mothers.[21] A 2013 *Chicago Tribune* opinion piece claims that 51% of Chicago's children live in single-parent households,[22] meaning that approximately 41% of Chicago children live with single mothers.[23] Poverty rates in such families are as high as 40%,[24] so more than 16% of Chicago children live in a single-mother household below the poverty line. Consider a single mother with two children: to live below the poverty line, she must make less than $21,330 per year,[25] meaning that a $12,000 UBI would increase her income by at least 56%. Clearly, a massive number of impoverished mothers and their children could be made significantly better off via the introduction of a UBI transfer.

Studies of past UBI pilot programs have yielded quantitative evidence that such programs contribute to gender equality. SEWA Bharat (2014)'s study of the Madhya Pradesh Unconditional Cash Transfers Project included a survey of recipients, which found that "women's status had increased due to the basic income relative to men."[26] Marinescu (2017) finds that the Mothers' Pension program, which raised mothers' incomes 30%, caused their children to increase completed schooling by as much as one year.[27]

Nutrition

Margellos-Anast, Shah, and Whitman (2008) studies six Chicago communities to find that four of them had childhood obesity rates exceeding 40%; for context, the U.S. average is 16.8%. Adams, *et al.* (2018) reports on a finding that over 50% of adults and 33% of children in Illinois were overweight or obese in 2009. Obesity has repeatedly been linked to poverty in the United States. For example, Levine (2011) finds that "counties with poverty rates of >35% have obesity rates 145% higher than wealthy counties." The study attributes poor communities' higher obesity rates to their lack of access to fresh food, increased rates of sedentariness, and increased prevalence of diabetes,

[21] U.S. Census Bureau (2016)
[22] "When families struggle" (2013)
[23] Author's calculations: Wolf (2019) reports that 80.4% of single parents are mothers.
[24] "When families struggle" (2013)
[25] See the "Federal Poverty Level Guidelines and Chart" on thebalance.com
[26] SEWA Bharat (2014)
[27] Marinescu (2017)

among other factors. Rogers, *et al.* (2015) studies Massachusetts school districts to find that a 1% increase in a district's portion of low-income students correlated significantly with a 1.17% increase in overweight/obese rates. A UBI transfer could help citizens of poor communities achieve healthier weights by affording healthier foods and having more time to cook and exercise.

Much of the research evaluating UBI programs' abilities to improve nutrition comes from rural areas in developing nations, where the problem faced by most people is being underweight due to lack of sufficient food. Haarmann and Haarmann (2015) studies the impacts of 2014 emergency cash grant (ECG) program in Namibia, similar in implementation to a UBI, but with a main focus on alleviating food insecurity. Before the program, 63% of respondents experienced daily or weekly food insecurity, and after, 77% experienced none at all.[28] Meal quality improved as well; recipients went from eating no meat, fruit, or vegetables before the program, to a majority eating those foods once or twice a month after. Downes and Lansley (2018) studies the UBI experiment in India's State of Madhya Pradesh, finding that over the course of the experiment, the fraction of children at a normal weight for their age improved 49% for pilot villages, and only 21% for control villages. Additionally, recipients in the Kenyan pilot also reported a marked increase in food security.[29] Although these studies may not be directly applicable to projections for UBI effects in an urban, developed setting like Chicago, it is promising that they consistently find that UBI-style programs improve nutritional outcomes for their recipients.

The handful of U.S. studies on UBI programs' nutritional impacts have been positive as well. The rural negative income tax experiments carried out in Iowa and North Carolina in 1970-72 showed better quality of nutritional intake.[30] In a similar experiment in Gary, Indiana, it was found that there were lower numbers of babies born with low birth weights, a condition which can lead to higher infant mortality rates which are often associated with poor maternal nutrition.[31] In the Alaska pilot, there were few observed findings pertaining to nutrition, other than an increased movement away from non-perishables.[32] Sperandio, Rodrigues, Francheshini, and Priore (2017)'s study of the Brazil's *Bolsa Familia* cash transfer program finds that recipient children were 4.2% less likely to be overweight or obese than non-recipient children. One exception to the general finding that cash transfers positively affect nutrition is Canada's MINCOME experiment; Forget (2011)'s analysis found no significant differences in number of underweight newborns or prenatal deaths, two outcomes hypothesized to decrease due to improved maternal nutrition from the transfers. The paper suggests a few reasons why no effects were observed: that Canada's universal healthcase meant no woman was without prenatal care, that all the recipients lived in areas with lower rates of malnutrition due to subsistence farming and support from small-town social organizations.[33]

[28] Haarmann and Haarmann (2015)
[29] *Ibid.*
[30] Marinescu (2017)
[31] Salkind and Haskins (1982)
[32] Marinescu (2017)
[33] Forget (2011)

Hospitalization

In Chicago, preventable hospitalizations affect people of color and low-income groups in overwhelming disproportion. While the average annual rate of hospitalizations in 2016 was 193 (per 10,000 residents) across the entire city, the rates across demographic groups varied greatly. Individuals with "low" economic hardship were hospitalized at 109 per 10,000; people of "medium" economic hardship had a 34% higher rate, and people of "high" hardship had a 135% higher rate.[34] Hospitalization is racially disparate as well: compared to the rate for white residents (107 per 10,000), the rate for Hispanic or Latino residents was 45% higher, and the rate for African Americans was 174% higher.[35]

There are compelling theoretical arguments that increased income for the poor could substantially decrease the need for hospitalizations. In the United States, the lowest income brackets have the highest rates of coronary heart disease, stroke, diabetes, among many other diseases.[36] Wealth can improve health via a variety of factors, such as ability to afford healthcare, neighborhood conditions, quality of nutrition, access to paid leave, and tendency to avoid occupational hazards. The scarce research done on hospitalizations directly finds that UBI's effects are significant. Forget (2011)'s study of MINCOME recipients finds that they experienced 192.3 (per 10,000 residents) fewer hospitalizations at the end of the program than before; representing about a 10% decrease. Decreases mainly came from mental health and work-related injury hospitalizations.[37]

A reduction in hospitalization rates has many implications beyond merely health. As nearly all health conditions (including chronic illnesses, low birth weights, and shorter life expectancies) disproportionately affect the lowest income brackets, the amount of government healthcare spending is also highest for these groups. A UBI creating better health among the would consequently reduce the economic burden on tax-payers. This effect would be especially strong for employers of low-income workers, as better health outcomes would reduce health care costs and increase employee productivity. A healthier population, decreased disparity among disease distribution, and conservation of public health resources could all stem from a UBI.

Education

Chicago Public Schools (CPS), despite substantially improving aggregate educational outcomes in the past two decades,[38] is still failing to appropriately educate many of its poor and minority students. In 2013, CPS closed 50 schools due to consistent low-enrollment trends. Out of these 50 schools, 42 had over 75% black students.[39] The pattern of closures is widely seen as a result of the city's reluctance to integrate schools, particularly on the south and west sides, and a funding focus on high-performing selective enrollment schools.[40] As a result, while Chicago is home to some of the top performing public schools in the state, 2018 saw school enrollment fell to a historic low, with 10,000 fewer students than the year before. Most of these losses were in underfunded south and west side schools.[41]

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[34] Author's calculations from the "Preventable Hospitalizations" page on the *Chicago Health Atlas* website
[35] *Ibid.*
[36] Angel, *et al.* (2017)
[37] Forget (2011)
[38] See the Chicago Public Schools website's "Annual CPS School Ratings" page for 2018
[39] Jankov and Caref (2017)
[40] *Ibid.*
[41] Perez (2018)

UBIs and other similar programs have been found to have significant positive effects on education outcomes, and particularly on enrollment and dropout statistics. Attendance, grades, and test scores are higher for children whose families are receiving a negative income tax.[42] The Mothers' Pension, a program that increased mothers' incomes by 30 percent in Illinois in 1911, resulted in an additional year of schooling for the sons of the participants.[43] The MINCOME program observed substantial increases in 11th-to-12th grade retention rates across the entire recipient community.[44] Additionally, reports from the Namibia, Kenya, and India experiments also reported significant gains in education.[45]

V. Conclusion

The nature of work is changing, and our welfare system should be reinforced to reflect that change. A Universal Basic Income (UBI) has been the target of popular debate in the search for reform, and has been tried in the US as well as countries across the world including Italy, Kenya, Finland, Denmark, India, Canada, Namibia. Discussion among City-level officials in Chicago has created the need for analysis of how a UBI in Chicago might affect the welfare of its citizens.

Our simulation of a Chicago UBI specifies a scheme that would leave the poorest 78.8% of Chicagoans wealthier than before. More precisely, the poorest tenth of Chicagoans would see their incomes rise by at least 50% each, and the poorest third would see at least a 15% boost. Chicagoans outside of the top 10% of incomes will experience income decreases of a maximum of 6%; top 10% will see decreases between 9 and 25%. The analysis incorporates conservative estimates of the labor elasticities of income and substitution to understand how individuals will change their labor supply in response to an income shock.

Our analysis of quality-of-life combines evidence from past UBI experiments and problems facing Chicago to demonstrate that a theoretical UBI has positive effects with respect to mental health, the role of women in the workforce, single parenting, hospitalization rates, nutrition and education. These factors are considered within the context of UBI's impacts on poverty.

Finally, our research also reveals that learning lessons from past UBI pilots is challenging because of a lack of informative impact assessment reports following these pilots, rendering some of these experiments unhelpful guides for future policy. The lack of detailed assessments not only proves to be a challenge for the future, but also obscures whether problems or underwhelming results observed during these experiments are due to implementation or political coordination issues, or to legitimate concerns about financing and labor market effects.

[42] Marinescu (2017)
[43] *Ibid.*
[44] Forget (2011)
[45] Haarmann and Haarmann (2015)

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Appendix: R Code

```
library(knitr)
library(ggplot2)
library(extrafont)
```

```
## Registering fonts with R
```

```
data = read.csv("ubi_data.csv", fileEncoding="UTF-8-BOM")[,c(1:2)]
```

```
#define tax brackets
data$deltaTax = 0
data$deltaTax[1:6000] = 0
data$deltaTax[6001:8000] = 4
data$deltaTax[8001:9000] = 8
data$deltaTax[9001:9500] = 11
data$deltaTax[9501:9900] = 14
data$deltaTax[9901:10000] = 23

#define elasticities
SE_O = -.0008
SE_S = -.0017
IE_O = -.06
IE_S = -.1
benefit = 6000

#identify labor supply across 4 elasticity scenarios
L_OSOI = data$Income + IE_O*benefit + SE_O*data$deltaTax*data$Income
L_OSSI = data$Income + IE_S*benefit + SE_O*data$deltaTax*data$Income
L_SSOI = data$Income + IE_O*benefit + SE_S*data$deltaTax*data$Income
L_SSSI = data$Income + IE_S*benefit + SE_S*data$deltaTax*data$Income

#mean income in each scenario
c(mean(data$Income), mean(L_OSOI), mean(L_OSSI), mean(L_SSOI), mean(L_SSSI))
```

```
## [1] 80565.50 79711.47 79471.47 79155.68 78915.68
```

```
#generate new tax, final income, and change in final income ($, %)
data$Y_lab = L_SSSI
data$newtax = data$Y_lab*(data$deltaTax/100)
data$Y_tot = data$Y_lab - data$newtax + data$Benefit
data$deltaY = data$Y_tot - data$Income
data$deltaYpct = 100*data$deltaY/data$Income

#show that program is revenue-neutral
sum(data$newtax - data$Benefit) / 10000
```

```
## [1] 19.60384
```

```
#generate deciles chart
decile = seq(1,10)
deciles = data.frame(decile)
for (i in 1:10) {
  deciles$pre_ubi[i] = mean(data$Income[(i*1000-999):(i*1000)])
  deciles$post_ubi[i] = mean(data$Y_tot[(i*1000-999):(i*1000)])
  deciles$change[i] = deciles$post_ubi[i] - deciles$pre_ubi[i]
```

```
  deciles$change_pct[i] = 100*deciles$change[i]/deciles$pre_ubi[i]
}
deciles = round(deciles, 2)
kable(deciles)
write.csv(deciles, "deciles.csv")
```

```
#generate Figures 1 and 2
ggplot(data = data, aes(x = c(1:10000), y = (deltaY))) +
  geom_line(color = "blue") + geom_hline(yintercept=0) +
  xlim(0, 10000) + ylim(-75000,6000) +
  ylab("Change in income ($)") + xlab("Pre-tax Income rank") +
  theme(text = element_text(size = 16, family = "Garamond"))

ggplot(data = data, aes(x = c(1:10000), y = (deltaYpct))) +
  geom_line(color = "blue") + geom_hline(yintercept=0) +
  xlim(0, 10000) + ylim(-30,200) +
  ylab("Change in income (%)") + xlab("Pre-tax Income rank") +
  theme(text = element_text(size = 16, family = "Garamond"))
```