The Cost of Basic Income:

Back-of-the-Envelope Calculations

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Abstract

This article shows how the cost of Universal Basic Income (UBI) is often misunderstood and greatly exaggerated. It then presents simple, "back-of-the-envelope" estimates of the net cost of a UBI set at about the official poverty line: $12,000 per adult and $6,000 per child with a 50% "marginal tax rate." These back-of-the-envelope calculations present a greatly simplified UBI scheme meant not a practical proposal but as a method to obtain a ballpark estimate of the cost of UBI in isolation. Even with simplifying assumptions, these figures are several times more accurate than many common but exaggerated estimates. Key findings of this study include the following. The net cost—the real cost—of this UBI scheme is $539 billion per year: about one-sixth its often-mentioned but not-very-meaningful gross cost of about $3.415 trillion. The net cost of this UBI scheme is less than 25% of the cost of current U.S. entitlement spending, less than 15% of overall federal spending, and about 2.95% of Gross Domestic Product (GDP). The average net beneficiary is a family of about two people making about $27,000 per year in market income. The family's net benefit from the UBI would be nearly $9,000, raising their income to almost $36,000.

Keywords: Basic Income, Universal Basic Income, transfer payments, cost estimate**,** public policy, redistribution

The cost of Universal Basic Income[1] (UBI) is often poorly understood and sometimes greatly exaggerated. Because UBI is a universal program, people commonly make the mistake of calculating its cost as the amount given to each individual times the size of the population.[2] Call that the "gross cost" of UBI, but it's a gross exaggeration of the real cost of UBI. In fact, it's not a cost in any meaningful sense. UBI involves a very large amount of taking money from and giving it back to the same people at the same time in the same form. If you don't account for all this taking-and-giving-back, you can't get a realistic assessment of how much UBI costs or of the distributive benefits and burdens it involves. The following example shows why.

Suppose the government gives $1 to Haveless, financing[3] it by taking $1 in taxes from Havemore. The benefit of this targeted program is that Haveless gets $1. The cost is that Havemore has $1 less. This program effectively makes Havemore give Haveless $1. Next, the government universalizes this program by making Havemore give $1 to himself. How much more does this cost Havemore? Nothing. The cost and benefit cancel each other out, because they go to the same person at the same time in the same form. There may be a small administrative cost of running the program (see below) but the $1 that Havemore gives to himself indicates nothing whatsoever about the real redistributive burden or feasibility constraints of this transfer.

It costs you something if the government takes $1 from you and gives it to someone else, but it doesn't cost anything if the government gives and takes the same $1 from the same person at the same time. There is no economic or financial limit to how much money the government can create out of thin air and give to you and everyone else, as long as it immediately taxes it back. In financial terms, this giving and taking-back makes up the bulk of what UBI does, but it is not a cost to taxpayers, to the government, or to the economy, and cannot truthfully be counted as a cost at all.

Any realistic assessment of UBI's cost has to subtract—net out—this taking and giving back. What's left is the redistributive burden—the net cost, the *real* cost—of UBI: the amount of money the UBI transfers from one group of people to another plus the associated transaction cost. Any discussion of UBI's cost that fails to consider the net-cost issue is misleading at best and deceptive at worst. In the Havemore-Haveless example, the gross cost overestimates the real cost of UBI by a factor of two because there was one contributor (Havemore) and one beneficiary (Haveless). If there had been two contributors for each beneficiary, the gross cost would have been off by a factor of three (as the Havemores pay $2 to Haveless and $4 to themselves). If the net beneficiaries also paid taxes equal to half of their UBI, the gross cost would be off by a factor of six (as the Havemores pay only $1 to Haveless and the three citizens pay a total of $5 to themselves). Because the gross cost can be off by so much, even a back-of-the-envelope estimate of the net cost is far more meaningful.

This article shows how to calculate and understand the real cost of UBI. It discusses how some important publications have gotten the cost issue badly wrong, works the reader through some extremely simple estimates of the cost of UBI in the United States using 2015 Census Bureau data, and discusses implications of those estimates for the United States and other countries.

This article is not about the politics of UBI. It's not about whether or which programs could be replaced by UBI. It's not about how to integrate a UBI into the existing tax and benefit system. It is not even about how to pay the cost of UBI. It focuses on one question only: how much does UBI cost?

Key findings of this study include[4]:

- The net cost of a roughly poverty-level UBI ($12,000 per adult, $6,000 per child) with a 50% marginal tax rate is $539 billion per year.
- This UBI would drop the official poverty rate from 13.5% to 0%, eliminating poverty for 43.1 million people (including 14.5 million children).
- This UBI costs less than 25% of current U.S. entitlement spending, less than 15% of overall federal spending, and about 2.95% of Gross Domestic Product (GDP).
- Other countries with similar levels of GDP and inequality can expect similar results for cost as a percent of GDP. More equal nations and wealthier nations can expect lower costs for the same level of UBI. Less equal and less wealthy nations can expect higher costs.
- This UBI scheme is a net financial benefit to most households with incomes up to $55,000, making it an effective wage subsidy (or tax cut) for tens of millions of working families.
- The average net beneficiary of this UBI scheme is a household of about two people making about $27,000 per year. Their net benefit is nearly $9,000, which raises their net income to almost $36,000.
- The net cost of this UBI is less than one-sixth (15.7%) of its often-mentioned but not-very-meaningful gross cost ($3.415 trillion).
- The difference between gross and net cost will be similar in nations with similar levels of wealth and inequality, but low-income nations with extremely high levels of inequality will have a much smaller difference between gross and net cost.
- A UBI of $20,000 per adult and $10,000 per child cost $1.816 trillion.
- The cost of a $20,000 UBI is about 32% of its gross cost ($5.692 trillion), about 85% of current entitlement spending, about 49% of total federal spending, and less than 10% of GDP.

This article has four parts. Part one explains why net cost is so important to UBI and how some prominent publications have gotten it badly wrong. Part two walks readers through the methodology involved in producing a back-of-the-envelope estimate for a roughly poverty line UBI. Part three walks readers through the calculations necessary to an estimate of the net cost of UBI from U.S. Census Bureau data. Part four discusses the implications of this estimate for UBI in the United States and other countries.

Part One: the importance of net cost to UBI

The net-cost issue requires greater discussion because it is extremely important and almost unique to UBI. Most other transfer payments are targeted at people who are not at the time also paying taxes to support it, making the gross cost a reasonable approximation of its redistributive burden. UBI is not targeted. It's universal. Everyone gets it, including the net contributors whose taxes support it. Depending on the UBI scheme, most net recipients pay for at least some of their own UBI in taxes. Therefore, the vast majority of people (net contributors and net recipients alike) pay money and receive money back at the same time, making the gross cost of UBI very different from its net cost. Any estimate that fails to net out this giving-and-taking back will also fail to contribute to a realistic understanding how much UBI costs net contributors or how much it benefits net recipients.

Perhaps the key to understanding the difference between gross and net cost is to understand UBI as a *negative tax* if I can explain it in away that avoids confusion between the generic term "negative tax" and the policy with the proper name, "the Negative Income Tax" (NIT). In the generic sense, a "positive tax" means you pay the government, and a "negative tax," means the government pays you. Under an NIT program, people with incomes below a certain level do not pay income tax and receive a cash subsidy. Their income tax rate becomes negative; thus, the proper name, NIT, reflects the generic sense of a negative tax.

But the NIT is not the only negative tax in the generic sense. We have many negative taxes and many words for a negative tax: tax deduction, tax credit, tax cut, tax allowance, subsidy, supplement, transfer, and so on, but the phrase "negative tax" is most descriptive, and it can aid understanding of UBI's effect on people's overall tax burden.

Both the NIT and UBI are negative taxes. The NIT is a targeted negative tax, and UBI is a universal (or "lump sum") negative tax. The NIT is given only to low income people who do not also pay positive incomes taxes. It doesn't involve taking-and-giving-back to the same people at the same time, making its gross and net cost identical. UBI given to all citizens, most of whom also pay at least some positive taxes. It involves a great deal of taking-at-giving back. The difference between its gross and net cost is substantial.

What happens when a negative number meets a positive number? If they're the same size, they cancel each other out and become zero. If one is larger, they partially cancel each other out. If you want to know someone's tax burden, you have to subtract the negative taxes they receive from the positive taxes they pay. Those who receive more than they pay are net recipients or net beneficiaries. Those who pay more than they receive are net taxpayers or net contributors. You cannot come close to a realistic understanding of how much UBI costs without making an assessment of the extent to which its benefits and burdens cancel each other out.

The universality and in-cash nature of UBI make it very different from most existing transfers in the United States and elsewhere. Few if any people both pay for and, at the same time, receive Unemployment Insurance, the Earned Income Tax Credit, Temporary Assistance for Needy Families, disability insurance, and so on. Some people both receive Social Security and pay taxes, and the Social Security Administration could probably net out that cost. But the amount is so small compared to the overall size of Social Security, it might not be worth the effort. Only 20% of Americans (65.1^5 million people out of a population of 321.4 million) receive Social Security benefits at any one time, and most of the taxes that support it are paid by the other 80% of the population.

Most government healthcare spending is considered a transfer payment, and it often involves the same people both paying and receiving at the same time, but the health care they receive comes in a very different form than the taxes they pay. We need to know the gross cost of converting purchasing power into healthcare as well as the net redistributive effects of our healthcare system. Unlike cash payments, there is a limit to how much healthcare the government can provide you even if you pay all the taxes for it.

Perhaps most people are in the habit of ignoring the difference between gross and net cost because it is insignificant for almost all existing transfer programs. But if we ignore it, we can't understand how it differs in cost from existing policies or other policies proposals.

One might argue that giving-and-taking money from the same people at the same time does involve cost. This may be so, but it is a transactions cost. It is likely to be miniscule compared to the nominal value of any non-negligible transfer, and it is *uncorrelated* with the size of that transfer. For example, it is just as expensive for the government to tell your bank it's giving you $1 and instantly taking back $1 as it is for the government to tell your bank it's giving you $100 billion and instantly taking back $100 billion. The existence of transaction costs is no excuse to treat the gross cost as if it were a real cost.

None of this should be difficult for economists, social scientists, or policy professionals to understand, but a surprising number of them persist in this error. Many publications claiming to discuss the cost of UBI completely ignore net cost and treat the gross cost as if it were a real cost that indicated something about the tax burden associated with UBI.

For example, Pavlina Tcherneva, ignores net cost and reports a gross cost estimate as if that were a meaningful cost, writing, "A UBI above poverty or at a living-wage level would cost 20-35 percent of GDP."[6] Doing so, she misleadingly exaggerates the real cost of UBI by perhaps six times or more.

Robert Greenstein, of the Center on Budget and Policy Priorities, writes "There are over 300 million Americans today. Suppose UBI provided everyone with $10,000 a year. That would cost more than $3 trillion a year." He then proceeds as if this figure actually represented a burden to taxpayers.[7]

Barbara Bergman writes, "Sending a check equal to a poverty-line income to every adult between the ages of twenty and sixty-five would take about 15 percent of the GDP of a country with a per capita income like that of Sweden or the United States."[8] Her gross cost estimate is *five times* the real redistributive cost estimated below.

Negative numbers are just as important as positive numbers. Cost assessments that ignore them serve no purpose but to mislead.

Part Two: a walk through the methodology

This article uses income data for 2015 available from the Census Bureau[9] to estimate the net cost of UBI in the United States with "back-of-the-envelope" method, by which I mean it extremely simple data and simplifying assumptions, just to get a general idea—a ballpark estimate—of what a UBI will cost. The unsophisticated method will be imprecise, but it will be far more accurate than any estimate that portrays the gross cost as if it reflected the actual cost of UBI. Future studies with access to more complete data and more sophisticated techniques are warranted.

The simplifying assumptions mean that the UBI scheme examined here is just for illustration. It is not a practical proposal but a simplified approximation of a practical proposal. It is designed solely to streamline calculation and isolate the cost of UBI. Therefore, the UBI scheme here differs in important ways from any UBI scheme that anyone would actually introduce. This article discusses the implications of those differences as it goes along.

Any UBI scheme is typically identified by two essential parameters that can be chosen by policymakers: the "grant-level" and "marginal tax rate," each explained in turn.

The "grant-level" is simply the size of the UBI. The main text of this article examines a UBI set approximately at the official poverty threshold (more commonly

called the "poverty line" or the "poverty level")—the income a person or a family needs to escape official poverty. In 2015, the Census Bureau estimated the poverty line at $12,082 for an individual living alone and $16,337 for a household of two people, whether they are two adults or an adult and a child (defined as a person under age 18).[10] This article uses round figures of $12,000 per adult and $6,000 per child as an approximate example of a poverty-line UBI.

The "marginal tax rate" is the tax rate faced by net beneficiaries on a one-unit increase in market income. Although every citizen receives the same UBI, most or all proposals for a substantial-size UBI require everyone who makes an income above zero (or above a low threshold) both to receive money in UBI and to pay money in taxes. The marginal tax rate faced by net beneficiaries doesn't have to be the same as that faced by net contributors. It doesn't have to be the same for all net beneficiaries. It doesn't even have to be in the form of an income tax. But we have to pick one for net recipients to estimate how much UBI costs.

For simplicity, this article assumes that all net beneficiaries face the same marginal income tax rate of 50%. I chose it, partly because 50% simplifies the mathematics, and partly because it is a reasonable figure balancing marginal incentives with the need to phase out net benefits.

This poverty-level UBI scheme ($12,000 per adult and $6,000 per child with a 50% "marginal tax rate") is the main focus of this article. The discussion section considers other versions, one with a lower marginal tax rate and another with a higher grant level. These UBI schemes with a uniform marginal tax rate for all net recipients and grant level at the poverty level or higher are broadly representative of many practical UBI proposals. Although a streamlining the overall tax-and-benefit system is not inherently connected to UBI, proposals for it often suggest considerable tax-and-benefit simplification. Thus, these simple parameters are not the impractical simplifications mentioned above. Those begin next.

The financing of UBI involves two crucial questions: *how much does UBI cost?* and *How can or should we pay that cost?* Although these two questions are often addressed together, this article looks at the question of how much UBI costs in isolation. It considers a few possibilities for how to pay that cost, but includes no rigorous discussion of that question. It is limited in this way because the question of how much UBI costs is underemphasized and fundamental to many questions including but not limited to the question how to pay that cost.

Research focused solely on how much UBI costs looks only at the effects on net beneficiaries. Although the scheme applies a uniform marginal tax rate of 50% to all net beneficiary households, it does not address whether that rate applies to any net contributors. Once a household passes (the "breakeven point" at which the taxes the household pays equal the collective UBIs of its members), one can imagine that the uniform rate disappears and is replace by the more complicated existing tax code. Alternatively, one can imagine that it stays the same, or that it is slightly higher or lower. What it would actually do if UBI is put into place is within the power of policymakers. Answering the question how much UBI costs in isolation provides important information toward making that decision.

The one thing we do need to know about net contributors is that they pay enough in taxes to cover their own UBIs. Whatever their tax rates, they pay new taxes equal to or greater than the amount they (or their household) receives in UBI, so that their new negative tax is cancelled out by a new positive tax, leaving their overall tax burden unchanged.

This study examines only the static, budgetary effects of UBI without considering dynamic effects of how people's behavior might change in response. Of course, these changes in people's behavior are real and important. Part four includes a brief discussion of dynamic effects. But the focus on static effects gets us in the ballpark and provides the jumping off point for dynamic estimates.

The "net benefit" or the "net redistributive effect" of a UBI is the final amount beneficiaries receive after subtracting the taxes they pay from their UBI. The net benefit to recipients differs from the net cost to net contributors by "transaction costs." In static terms, "transaction costs" amount to the administrative cost of running the program. This article assumes UBI's administrative costs is the same as Social Security's—0.7% of total budget—because both are relatively simple-to-administer programs.[11] Thus, the net cost of UBI is the net benefit to recipients plus 0.7%.

To move from the current system to a UBI system involves making additional controversial decisions on at least two issues. First, will it replace any other government transfer payments or spending programs? If so, how much will that save? Second, what other changes in the tax code will accompany the introduction of the UBI? And how much will that cost? I don't want to impose answers to these controversial questions, and so this article only discusses how large the cost of UBI is *in and of itself*: "UBI in a vacuum," so to speak.

The UBI-in-a-vacuum approach makes no effort to consider how a UBI system might be integrated into the existing tax-and-benefit system. Readers are free to view the UBI in a vacuum in two ways. One, it uses a common starting point for economic modeling: assuming no taxes or transfers exist to begin with and imagines building UBI from scratch. Two, it imagines adding a UBI to the existing tax and benefit system without changing anything else. Readers should be aware of one conceptual difference between these two ways of looking at the UBI scheme examined here. If they imagine the UBI being introduced from scratch the "net beneficiaries" benefit from the whole of the government tax and benefit system. If they imagine it being added on to the existing tax and benefit system, the "net beneficiaries" benefit from the *change* in policy, but some of them may still be net contributors to the overall tax and benefit system.

Of course, when policymakers really introduce a UBI, they will not begin from scratch, and they will be extremely unlikely to leave all other tax and benefit programs unchanged. They will probably want to cut or eliminate some programs that UBI might make redundant. These cuts will save money. But with net recipients facing a marginal income tax rate of 50%, they will probably want to cut or eliminate many of the exiting taxes the net recipients would otherwise pay to avoid imposing very high marginal tax rates on net recipients over some range of income. To say that they face high marginal tax rates is not to say that they have high taxes. By definition, the overall tax burden of every net recipient decreases, and the marginal-tax-rate issue does not affect net contributors. But it will cost money to reduce the marginal tax rates of net recipients.

We can't assume the additional savings and costs associated with integrating UBI into the existing tax-and-benefit system cancel each other out, but aside from a brief discussion about their likely effects in part four, this article leaves these costs out for several reasons. First, the goal of the article is to isolate the cost of UBI in and of itself. The cost of UBI is one thing. The cost of integrating it into the existing system is another. Second, there are many different ways that a UBI can be integrated into the existing tax-and-benefit system, and the question of exactly how to do so is controversial. By isolating the cost of UBI in and of itself, this article avoids imposing any one integration strategy and calling that *the* cost of UBI. Third, the cost of UBI in

isolation is useful to know and a good starting point toward a full assessment of the possible transition to a UBI-based system.

Part Three: a walk through the calculations

This section shows it calculates the cost of UBI.

Ignoring administrative costs (added later) the net cost and net benefit of UBI are equal and can be determined by the following "**cost equation**," which is (in words):

> Net cost/net benefit (N) equals the UBI (U) minus market income (Y) times the tax rate (t).

Or (in symbols):

$$N = U – (Y \times t)$$

Under the poverty-level scheme specified above, the benefit for each adult net beneficiary is:

$$N = \$12{,}000 – (Y \times 0.50)$$

And the benefit for each child net beneficiary is:

$$N = \$6{,}000 – (Y \times 0.50)$$

UBI is given on an individual basis but most families pool their resources and pay taxes at the household level, which is where government collects most income-related data. Therefore, this article is forced to look at the effects of this *individual* grant on *households* by multiplying the number of adults in the family by $12,000 and the number of children by $6,000, making the cost equation for each household:

$$N = (\$12{,}000 \times \text{number of adults}) + (\$6{,}000 \times \text{number of children}) – (Y \times 0.50)$$

For example, the benefit of this level of UBI to a family of one adult and one child is given by this equation:

$$N = (\$12{,}000 \times 1) + (\$6{,}000 \times 1) – (Y \times 0.50)$$

Which simplifies to:

$$N = \$18{,}000 – (Y \times 0.50)$$

Filling in values for market income (Y) into this equation makes it possible to calculate this family's net benefit and their final income (net of taxes and transfers):

Market income (Y)	Net Benefit/Net Cost[12] (N)	Net income[13]
$0	$18,000	$18,000
$9,000	$13,500	$22,500

$18,000	$9,000	$27,000
$27,000	$4,500	$31,500
$36,000	$0	$36,000

This family, as a whole, reaches the breakeven point at $36,000.

An ideal estimate would separately solve the cost equation for all 60 million or so net-recipient households. Without such refined data, the article has to make do with extremely broad averages, but the U.S. Census Bureau provides enough to make a reasonable estimate possible.

Table 1 shows 2015 Census Bureau data for the distribution of household income by increments of $5,000.[14] This article estimates the cost of UBI by applying the cost equation to everyone in each income range as if it were one giant family. This reduces the number of equations to solve from about 60,000,000 to 12, making the estimate possible with the available data. Unfortunately, the source tables do not provide information about how many children are in each range, and so, although the number of children in each household undoubtedly varies with household size and income, I use the percent of children in the entire population (22.9%[15]) as an estimate for the percent in each income range.

Another unfortunate aspect of calculations based on these Census Bureau tables is that the estimate cannot account for the way households of different sizes reach the breakeven point at different income levels. According to the calculations below, the *average* net beneficiary household reaches the breakeven point at about $55,000. However, the breakeven point for individual families varies considerably. Single people reach it at only $24,000 while—say—a family of two adults and six children would not reach it until $120,000. Therefore, some households classified as net beneficiaries in these estimates are actually net contributors while some households classified as net contributors are actually net beneficiaries. Hopefully, on average, the overestimate and underestimate largely balance each other out, but I can't be sure which one is larger than the other.

Tables 1-4 all stop at the breakeven point for the average family ($55,000). The extra line at $55,000 to $59,999 is shown only for reference—to identify the breakeven point.

Column A shows the number of households in each range. Column B shows the mean income for families in each income range. Column C shows the mean size of families in each increment. Row 13 shows the total for column A and weighted averages for columns B and C, which are themselves averages, making their averages more useful than their totals.

Tables 2-4 are all based on the information in Table 1 and the assumptions described above. Column names carry on in order (A through L) across the four tables with column B repeated in a Table 4 for clarity.

Table 1: Relevant data from the U.S. Census Bureau				
		A	B	C
	Income range	**Number of households**	**Mean income per household**	**Mean size of household**
1	Under $5,000	4,235,000	$1,080	1.9
2	$5,000 to $9,999	4,071,000	$8,018	1.76
3	$10,000 to $14,999	6,324,000	$12,397	1.68
4	$15,000 to $19,999	6,470,000	$17,297	1.91
5	$20,000 to $24,999	6,765,000	$22,199	2
6	$25,000 to $29,999	6,222,000	$27,116	2.12
7	$30,000 to $34,999	6,354,000	$32,027	2.22
8	$35,000 to $39,999	5,743,000	$37,115	2.35
9	$40,000 to $44,999	5,203,000	$41,973	2.36
10	$45,000 to $49,999	5,002,000	$47,180	2.42
11	$50,000 to $54,999	5,078,000	$51,900	2.47
12	*$55,000 **	*Average breakeven point*		
13	Total or average**	61,467,000	$27,118	2.11
Source: U.S. Census Bureau Tables HINC-01, 2015 and HINC-06, 2015. See text for explanations. * Added for reference not included in totals or averages. * Total: Column A. Average: Columns B and C				

Table 2 makes intermediate calculations necessary to connect the raw data in Table 1 to the elements of the cost equation in Table 3. Column D calculates the number of people in each income range by multiplying the number of households (Column A) by the mean size of each household (Column C). Column E estimates the number children in each income range by multiplying the number of persons by 22.9% (see above). Column F subtracts the estimated number of children from the number of persons to obtain the estimated the number of adults.

Table 2: Intermediate calculations				
		D	E	F
	Income range	**Number of persons**	**Number of children**	**Number of Adults**
1	Under $5,000	8,046,500	1,842,649	6,203,852
2	$5,000 to $9,999	7,164,960	1,640,776	5,524,184
3	$10,000 to $14,999	10,624,320	2,432,969	8,191,351
4	$15,000 to $19,999	12,357,700	2,829,913	9,527,787
5	$20,000 to $24,999	13,530,000	3,098,370	10,431,630
6	$25,000 to $29,999	13,190,640	3,020,657	10,169,983
7	$30,000 to $34,999	14,105,880	3,230,247	10,875,633
8	$35,000 to $39,999	13,496,050	3,090,595	10,405,455
9	$40,000 to $44,999	12,279,080	2,811,909	9,467,171
10	$45,000 to $49,999	12,104,840	2,772,008	9,332,832
11	$50,000 to $54,999	12,542,660	2,872,269	9,670,391
12	*$55,000**	*Average breakeven point*		
13	Total	129,442,630	29,642,362	99,800,268
Source: author's calculations based on data in Table 1 * Added for reference not included in totals or averages.				

Table 3 uses data from Tables 1 and 2 to assemble the elements of the Cost Equation: $N = U - (Y \times t)$. Column G calculates the total income earned by all households in each range (Y in the Cost Equation). It is simply the number of households (Column A) times income per household (Column B). Column H is the total amount of UBI grants paid to people in each range (U): $6,000 times the number of children (Column E) plus $12,000 times the number of adults (Column F). Column I calculates the amount of taxes paid by households in each income range ("Y x t"): household income (Y from Column G) times 50% (t).

Column J finally brings together all the information necessary to estimate the net benefit and net cost of UBI (N). Following the Cost Equation, the net benefit (N) is the amount paid in UBIs (U in Column H) minus the taxes paid by UBI net beneficiaries ("Y x t" in Column I). The two figures in bold in the last two lines of that column are the most important. Line 13 shows the net benefit or the net redistributive effect of UBI: the amount distributed to all beneficiaries, net of taxes (excluding administrative cost): just under $535 billion per year. Line 14 adds 0.7% for administrative costs to estimate the net cost of UBI: $539 billion.

Table 3: Calculation of the Cost Equation to find the net cost of UBI of $12,000 for adults and $6,000 for children with a marginal tax rate of 50%

		G	H	I	J
	Income range	**Total income in range (Y)**	**UBI (U)**	**Taxes (Y x t)**	**Net cost (N)**
1	Under $5,000	$4,573,800,000	$85,502,109,000	$2,286,900,000	$83,215,209,000
2	$5,000 to $9,999	$32,641,278,000	$76,134,864,960	$16,320,639,000	$59,814,225,960
3	$10,000 to $14,999	$78,398,628,000	$112,894,024,320	$39,199,314,000	$73,694,710,320
4	$15,000 to $19,999	$111,911,590,000	$131,312,920,200	$55,955,795,000	$75,357,125,200
5	$20,000 to $24,999	$150,176,235,000	$143,769,780,000	$75,088,117,500	$68,681,662,500
6	$25,000 to $29,999	$168,715,752,000	$140,163,740,640	$84,357,876,000	$55,805,864,640
7	$30,000 to $34,999	$203,499,558,000	$149,889,080,880	$101,749,779,000	$48,139,301,880
8	$35,000 to $39,999	$213,151,445,000	$143,409,027,300	$106,575,722,500	$36,833,304,800
9	$40,000 to $44,999	$218,385,519,000	$130,477,504,080	$109,192,759,500	$21,284,744,580
10	$45,000 to $49,999	$235,994,360,000	$128,626,029,840	$117,997,180,000	$10,628,849,840
11	$50,000 to $54,999	$263,548,200,000	$133,278,305,160	$131,774,100,000	$1,504,205,160
12	*$55,000**	*Breakeven point for average household*			
12	Total	$1,680,996,365,000	$1,375,457,386,380	$840,498,182,500	**$534,959,203,880**
13	Total plus 0.7% estimated administrative cost				**$538,703,918,307**

Source: author's calculations based on data in Table 1 and calculations in Table 2

* Added for reference not included in totals or averages.

Part Four: discussion

Although it took the greater part of this article to explain and calculate UBI's net cost, its gross cost can be explained and calculated in one sentence. The gross cost of this UBI scheme is $12,000 times the U.S. adult population (245,426,316) plus $6,000 times the U.S. child population (72,895,754),[16] which comes to $3.415 trillion (ignoring administrative costs). Perhaps the simplicity of calculating gross cost is one reason so many people discuss it as if it said something about the real costs and benefits of UBI.

Comparing the two shows that the net cost of this UBI scheme is only 15.7% of its gross cost ($539 billion / $3.415 trillion). In other words, the gross cost of UBI is more than *six times* the actual cost of UBI. The cost of $539 billion is determined largely by the size of the United States and is not comparable across countries, but the ratio of net-to-gross cost will be similar for similar schemes in countries with similar levels of inequality and per capita GDP. Extremely unequal countries that are able to finance a UBI for the entire country with taxes only on a very small portion of the population will find the net cost to be much closer to the gross cost, but as long as UBI is financed in part by taxation, its net cost is always less than its gross cost.

One reason for the difference between gross and net cost is obvious: less than half of citizens are net beneficiaries. Another reason is just as important but less

obvious: net beneficiaries pay most of the cost of their own UBIs in taxes on their market income. Column H shows that net beneficiaries receive $1.375 trillion in UBI grants, but Column I shows that these same net beneficiaries pay $840 billion in taxes. That is, the average net beneficiary pays 61.1% of the gross cost of their UBI through taxes, cutting the cost to net contributors by the same 61.1%.

The taxes paid by net beneficiaries do not interfere with UBI's ability to do what it is designed to do. Table 4 helps illustrate this point. Column B shows mean household income—simply reproduced from Table 1 for reference. Column K shows the average net subsidy for households in each income range. It is the net cost excluding administrative costs (Column J) divided by the number of households in each income range (Column A). Column L shows the average income per household after that household both pays taxes and receives UBI. It is the average net subsidy (Column K) plus average income per household (Column B).

Table 4: Effects of UBI on households				
		B	K	L
	Income range	**Mean Income per household**	**Mean net subsidy per Household**	**Mean net income per household**
1	Under $5,000	$1,080	$19,649	$20,729
2	$5,000 to $9,999	$8,018	$14,693	$22,711
3	$10,000 to $14,999	$12,397	$11,653	$24,050
4	$15,000 to $19,999	$17,297	$11,647	$28,944
5	$20,000 to $24,999	$22,199	$10,153	$32,352
6	$25,000 to $29,999	$27,116	$8,969	$36,085
7	$30,000 to $34,999	$32,027	$7,576	$39,603
8	$35,000 to $39,999	$37,115	$6,414	$43,529
9	$40,000 to $44,999	$41,973	$4,091	$46,064
10	$45,000 to $49,999	$47,180	$2,125	$49,305
11	$50,000 to $54,999	$51,900	$296	$52,196
12	*$55,000**	*Average breakeven point*		
13	Average	$27,118	$8,703	$36,051
Source: author's calculations based on data in Table 1 and calculations in Tables 2 and 3 * Added for reference not included in totals or averages.				

This table shows that people at the very bottom of the income distribution receive the largest net subsidy. The average household in this range is made up of 1.90 people (Column C)—1.46 adults and 0.44 children. They receive a net subsidy of $19,649 (Column K), raising their income from $1,080 (Column B) to $20,729 (Column L), bringing them from very deep poverty to well above the official poverty line (which was $15,391 for a family of two in 2015).[17]

Three factors explain why this UBI set roughly at the poverty line raises the typical family in the lowest income range so far above it: First, even the mere $1,080 average market income in this group helps. Second, the poverty threshold varies with household size, but UBI does not. A UBI set to make sure adults are at least at the poverty-line helps multi-adult households do substantially better than the poverty-line. Third, the round figure of $6,000 per child is significantly more than official statistics require for the second person in a household.

This table also shows that, although UBI is unconditional, it is effectively a subsidy for working families. Each row down the list shows families with higher incomes, revealing that families do slightly better financially whenever their market income rises. Because the marginal tax rate is 50%, the net subsidy declines half as fast as income rises, ensuring that higher market income always leads to higher overall income.

Line 13 shows the weighted average for all net beneficiary groups combined. This would be a family of 2.11 people (Column C), 1.62 adults and 0.48 children. A

net subsidy of $8,703 (Column K) raises their income from $27,118 (Column B) to $36,051 (Column L)—an income well more than twice the official poverty line for a family of two. The built-in work incentive of the overall UBI system is apparent by how much more money this typical beneficiary family has than the lowest income families in line 1, again illustrating its effect as a wage subsidy.

This UBI scheme would drop the official poverty rate from 13.5% to approximately 0%, lifting 43.1 million people (including 14.5 million children) out of poverty.[18] The number of people living within 150% of the poverty line would also drop substantially, but Census Bureau tables used here don't provide a good way to estimate how many. This UBI would help far more people than these statistics show because many more people experience poverty for *part* of their lives than are in poverty at any one time. It would also relieve the fear of poverty for everyone.

Considering what UBI can do, a net cost of $539 billion is low. The United States could eliminate poverty at an increased cost of only 25% of current transfer payments, only about 14% of total federal spending, and only about 2.95% of GDP.[19]

Internationally, the figure of $539 billion is not comparable because it is determined primarily by the size of the U.S. population. But the net cost as a percent of GDP is likely to be similar in countries with similar levels of inequality and per capita income. Most European countries have slightly lower GDPs, which would increase cost as a percent of GDP, but they also tend to have greater equality which would decrease cost as a percent of GDP.

The above discussion applies only to the issue of how much UBI costs in isolation. Let's briefly consider both how to pay for that cost and how to integrate that UBI into the existing tax and transfer system.

At a cost of only 14% of total federal spending, one can imagine paying for the UBI entirely by reducing other spending, such as unnecessary parts of defense spending, corporate giveaways, the portion of transfers that UBI might make redundant, or whatever else one might be willing to cut. If so, the United States could permanently free every American from the threat of poverty with no net increase in anyone's tax burden.

Difficult political barriers inhibit cuts to nearly any part of the US federal budget, but UBI could reasonably replace many transfers even if it were done solely on a "hold-harmless basis." That is, avoiding all changes that would make any net recipient financially worse off. The net benefit of UBI would replace (or be replaced by) a like amount of other transfers. The main advantage of hold-harmless replacement is self-explanatory from its name, the main disadvantages are that it retains a great deal of the complexity of the current system and that it passes up opportunities for additional savings.

Not all transfers can reasonably be replaced on a hold harmless basis. Of the $2.08 trillion in U.S government transfer payments in 2009, about $977 billion were related to medical care, education, and Indian Affairs. Although allowing these payments to supersede UBI would not make recipients any worse off than they are now, it would leave many of them with disposable incomes below the poverty line,[20] violating the spirit of most UBI proposals.

The goal of this article is not to estimate how much of the remaining $1.10 trillion should be replaced by UBI. Some of it can; some of it can't. Even if hold-harmless replacement saves only one-fifth of that spending ($220 billion), the net cost of UBI drops from $539 billion to $319 billion.

Nevertheless, increasing inequality in the U.S. and most other wealthy countries over the last 40 years indicates that higher taxes on upper income people are

economically feasible and potentially desirable. Therefore, policymakers should seriously consider paying for UBI at least partially with a tax increase targeted at wealthy people.

These are just some ideas for financing UBI. Exactly how to do so is not the subject of this article. This article argues UBI is affordable. The more affordable something is, the more options there are to pay for it.

As mentioned in part two, along with the potential savings that UBI can generate in the existing transfer system, integrating it into the tax system will either create extremely high marginal tax rates for some net beneficiaries, or it will require the additional expense of replacing some or all of the current taxes paid by net beneficiaries.

As mentioned in part two, it is important to stress two issues that mitigate the marginal-tax-rate problem. First, it affects only a relatively small portion of net beneficiaries over a fairly narrow range of income as their incomes approach the breakeven point. Second, their higher *marginal* tax rates do not imply that they have a higher tax burden. By definition, all net beneficiaries face a *lower* tax burden. The reason policymakers would want to keep *marginal* tax rates low is not to help recipients, but to give recipients a greater work incentive. If one were to reject UBI because of the marginal-tax-rate issue, one would not be doing net beneficiaries any favors. One would be doing a favor for their potential employers. Third, high marginal tax rates over a relatively narrow range of income at the upper end of the net recipient range might not be a major work disincentive. Policymakers will probably want to replace most other taxes that affect this group, but they probably do not need to replace all of them to avoid major problems with work disincentives.

Unfortunately, the complexity of the U.S. tax-and-transfer system makes it difficult to estimate how many households will be affected, to what extent, over what range of income without a microsimulation analysis, but some evidence indicates that the cost of reducing marginal tax rates is not prohibitive.

Data from the Congressional Budget Office for taxes and transfers by quintile shows that average households in the bottom three quintiles (60% of the population) receive more in transfers than they pay in taxes.[21] Again, not all of these could be replaced by a UBI, but these figures indicate the potential for savings from replacing transfers to people at the lower end of the income distribution is greater than the potential cost of replacing taxes by people at that end of the distribution.

Appendix Table 1 provides an extremely rough estimate of the cost of reducing those high marginal tax rates. It reruns the analysis described in parts 2 and 3 with the same grant levels at the same (50%) marginal tax rate up to the first $35,000 per year of household income and a lower (25%) marginal tax rate on all income from there to the new breakeven point. The motivation for this example is that the lower rate on this tax counteracts (at least in part) other taxes that rise with income. This strategy is not the most desirable way to lower marginal tax rates: it reduces the simple tax associated with the UBI proposal and retains the complex taxes associated with the existing system. But it reduces the tax I can measure with the data I have and provides a rough cost estimate.

Appendix Table 1 consolidates columns A-L from all four tables in the main text into one long table. The explanations and sources remain entirely the same as described above. Column I (taxes) differs from the original to reflect the lowered marginal tax rates, and the following three columns change accordingly. This table adds several more rows showing that the average household reaches the breakeven point just before $90,000.

Column J, line 21 shows that the net cost (including administrative cost) of this UBI scheme is $654 billion—$125 billion (23.2%) more than the original scheme. The higher cost reflects both the greater number of net recipients as the breakeven point increases and greater net benefits to existing net recipients with incomes over $35,000 per year. The average net beneficiary of this UBI is a household of 2.29 people (Column C) making about $40,242 per year in market income (Column B), receiving a net benefit of $7,438 (Column K), which raises their income to $47,680 (Column L). Given that we are now considering integrating this UBI into the current tax-and-benefit system rather than building it from scratch, these "net beneficiaries" benefit from the *change* in policy. But many of them will be net contributors to the tax system as a whole.

These estimates of the cost of replacing other taxes and the savings of replacing other transfers give some indication that the additional savings are greater than the additional costs, but these estimates are rougher than the original estimate and consider only one of many different options for integrating this UBI scheme into the existing tax-and-transfer system. The evidence presented merely gives an indication that potential savings associated with integration might be substantial and the potential additional costs might not be daunting.

The potential for cost savings through integration with current tax-and-transfer system increases when one considers the likely dynamic effects of UBI. One dynamic effect increases cost: workers who can survive without work might work less at a given wage, causing a decline in hours worked, a decrease in taxes paid, and an increase in net costs.

However, other dynamic effects are likely to reduce costs. Two are particularly important. First, the same economic theory that predicts a decline in work hours at a given wage also predicts that employers will respond by increasing wages, encouraging workers to make up some of the lost time, increasing the income of all workers in markets in which the UBI had a noticeable effect on overall labor time. These higher wages and employment hours have potential to decrease the net cost of UBI, increase further economic equality, further reduce poverty or near-poverty among the working poor, and further increase the incomes of households well into the middle class.

Second, poverty and inequality have enormous costs for the individuals effected and for society as a whole. These costs are well-documented as is evidence that a UBI will greatly reduce the costs associated with poverty both in human and in financial terms.[22] Recent estimates suggest that these savings could pay for a great deal of the cost of UBI.[23]

The low price of the poverty-level UBI implies that a higher version is also likely to be affordable. This possibility is worth considering in part because the official poverty threshold is widely criticized for being too low. Some researchers find that families need an income of at least 150% of the poverty level, perhaps double it or more to afford basic expenses.[24] Thus, Appendix Table 2 reruns the above analysis for a UBI of $20,000 for adults and $10,000 for children with the original marginal tax rate of 50%. The breakeven point is now at nearly $99,000 per household.

This UBI scheme would ensure that every American had an income at least 160% of the poverty line and that very few would have incomes less than 200% of the poverty line. Yet, its net cost of $1.816 trillion (Column J) is less than half of total federal spending and less than 10% of GDP. It is $300 billion less than total transfer spending in 2009. Again, no UBI can replace all transfers, but one this large could certainly replace many of them. Of course, this program would cause even bigger problems with high marginal tax rates, if combined with the existing tax system, and the cost of reducing those rates would be substantial.

Notice that the net cost of the larger UBI has risen faster than the grant. The $20,000 UBI is less than double the size but more than triple the cost of the $12,000 UBI. The net cost of the $20,000 UBI is about one-third (31.7%) of its gross cost of $5.692 trillion,[25] compared to a ratio of about one-sixth for the $12,000 UBI. The disproportionate increase happens because a larger grant with the same marginal tax rate spreads net benefits to a much larger group of people. A focus on gross cost ignores this issue, and therefore, says little or nothing about UBI's actual redistributive effects.

The figures presented here use simple data and assumptions. More detailed studies with more refined data and more sophisticated methods are warranted. All such studies should clearly distinguish between the gross and net cost of UBI and focus the main thrust of their analysis on the meaningful figure, net cost. They should estimate the cost of UBI in isolation, (various options for) the potential savings from replacing other transfers, and the additional costs associated with (various options for) replacing other taxes. Cross country comparisons are, of course, extremely valuable as well, whether they use a similar back-of-the-envelope methodology or more sophisticated techniques.

A more sophisticated study will not change the basic result that the real cost of a UBI is far less than its gross cost. According to the estimates above, the net cost is in the range of one-third to one-sixth of the gross cost, depending on the size and structure of the UBI system in question. The ratio would be even greater for a less-than-poverty-line UBI, which would have far fewer net recipients. The mathematical structure of the UBI program ensures that any study examining similar programs in other countries will find similar ratios.

Portrayal of the gross cost of a UBI as if it shows anything at all about its real redistributive effects or the real issues in financing it is naïve at best and dishonest at worst.

Perhaps the most striking result of this article to many readers is not in the difference between gross and net cost but in how affordable these three versions of UBI are. When you consider what a UBI can do—eliminate the threat of poverty for every citizen while providing enormous tax relief to many middle-income families—the cost of 2.95% of GDP is a bargain.

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[1] UBI is a regular, cash payment to all individuals without means test or work requirement.

[2] For example, Pavlina Tcherneva, "At Issue: Should the United States Adopt a Universal Basic Income?," *Congressional Quarterly Researcher* 27, no. 31 (2017). B. R. Bergmann, "A Swedish-Style Welfare State or Basic Income: Which Should Have Priority?," *Politics and Society* 32, no. 1 (2004)., p. 116

[3] One economic school of thought objects to the use of the word "financing" for any government spending. This objection is based on the truism that government can simply create money out of thin air. It doesn't need to "obtain" cash. But, as these and all other economists are aware, if the government creates money it must also create at least some taxes or money will lose its value (i.e. inflation will occur). This article use the word "financing" to mean that which the government does to keep the currency from losing its value. Thus, the conflict with that school of thought is purely semantic. This article assumes balanced-budget financing for simplicity even though spending does not always require a one-to-one correspondence between taxes and spending. In this sense, it errs on the side over overestimating the cost of UBI. For examples of the school of thought that objects to the word "finance," see Pavlina R Tcherneva, "Chartalism and the Tax-Driven Approach to Money," in *A Handbook of Alternative Monetary Economics*, ed. Philip Arestis and Malcolm C Sawyer (Cheltenham, UK: Edward Elgar Publishing, 2006); L. R. Wray, *Understanding Modern Money: The Key to Full Employment and Price Stability* (Cheltenham, UK: Edward Elgar, 1998).

[4] See below for sources and calculations.

[5] Social-Security-Administration, "Monthly Statistical Snapshot, December 2015," (Washington, DC: Social Security Administration, 2016).

[6] Tcherneva.

[7] Robert Greenstein, "Universal Basic Income May Sound Attractive but, If It Occurred, Would Likelier Increase Poverty Than Reduce It," *Policy Futures* (2017).

[8] Bergmann., p. 116

[9] U.S.-Census-Bureau, "Hinc-01. Selected Characteristics of Households, by Total Money Income in 2015," in *Excel* (Wasington, DC: U.S. Census Bureau, 2016); "Table Hinc-06. Income Distribution to $250,000 or More for Households: 2015," in *Excel* (Washington, DC: U.S. Census Bureau, 2016).

[10] Bernadette D. Proctor, Jessica L. Semega, and Melissa A. Kollar, "Report Number: P60-256: Income and Poverty in the United States: 2015," ed. U.S. Census Bureau (Washington, DC: U.S. Census Bureau, 2016).

[11] Social-Security-Administration, "Social Security Administrative Expenses," The Social Security Administration, https://www.ssa.gov/oact/STATS/admin.html.

[12] These figures ignoring the 0.7% administrative cost that separates net benefit and net cost, but that amount is easily added at the end of the analysis.

[13] After receiving their UBI and paying their taxes.

[14] U.S.-Census-Bureau, "Hinc-01. Selected Characteristics of Households, by Total Money Income in 2015."; "Table Hinc-06. Income Distribution to $250,000 or More for Households: 2015."

[15] "Quick Facts," U.S. Census Bureau, https://www.census.gov/quickfacts/table/AGE295215/00.

[16] The U.S. population was 321,418,820 in 2015, and 22.9% of them were under 18. Ibid.

[17] "Poverty Thresholds for 2015 by Size of Family and Number of Related Children under 18 Years," (Washington, DC: U.S. Census Burea, 2016). The Census Bureau does not calculate the poverty line for a family of 1.9.

[18] Proctor, Semega, and Kollar.

[19] U.S.-Census-Bureau, "Table 540. Government Transfer Payments to Individuals by Type: 1990 to 2009," in *Excel* (Washington, DC: The Census Bureau, 2011).

[20] Ibid.

[21] Congressional-Budget-Office, "The Distribution of Household Income and Federal Taxes, 2013," (Washington, DC: Congressional Budget Office, 2016)., p. 31.

[22] Richard G. Wilkinson and Kate Pickett, *The Spirit Level: Why More Equal Societies Almost Always Do Better* (London: Allen Lane, 2009).; E.L. Forget, "The Town with No Poverty: The Health Effects of a Canadian Guaranteed Annual Income Field Experiment," *Canadian Public Policy* 37, no. 3 (2011).

[23] Richard Pereira, "The Cost of Universal Basic Income: Public Savings and Programme Redundancy Exceed Cost," in *Financing Basic Income*, ed. Richard Pereira (New York, NY: Palgrave Macmillan, 2017).

[24] Kinsey Alden Dinan, "Budgeting for Basic Needs: A Struggle for Working Families," (New York, NY: National Center for Children in Poverty, Columbia University, 2009).

[25] Authors calculation based on the cost and population figures above.