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The Cost of Basic Income in the United Kingdom: A Microsimulation Analysis

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Abstract

This article uses microsimulation analysis to estimate that the net cost of a roughly poverty-level Universal Basic Income (UBI) for the United Kingdom is about £67 billion per year or 3.4% of GDP. The scheme examined involves a UBI of £7,706 for adults and £3,853 for children with a marginal tax rate of 50% on net beneficiaries. The cost of this UBI scheme adds only 39% to the cost of the UK's existing transfer system and only 8.7% to the UK's total government spending. About 70% of UK families would benefit from the transition to this UBI scheme, with the average gain for each net-beneficiary family being £4,056. The figure of £67 billion is a "net cost" in two senses. First, it subtracts the amount of UBI that individuals pay themselves as they simultaneously receive a UBI and pay higher taxes to finance it. This calculation alone shows that the cost of UBI is only about one-third of the often-quoted-but-not-very-useful concept of "gross cost," which ignores the fact that it costs nothing for a person to give themselves a pound. Second, this article also adds and subtracts the costs and savings involved in integrating the UBI scheme into the UK's existing tax and benefit system. This calculation further reduces the scheme's cost to 13% of gross cost. Under this scheme, the percent of UK families with incomes below the current official poverty line would drop from 16% to 4% and poverty among children and the elderly would all but disappear. The largest increase in incomes would be felt by those most deeply in poverty so that absolute poverty would virtually disappear.

1 Introduction

A Universal Basic Income ("UBI") is a regular cash grant paid to each individual of a political community (such as all citizens of a country) without any means-test or work requirement.[1]

Wildly different claims about the cost of UBI have been made in the literature. Opponents of the idea claim that a UBI large enough to eliminate poverty would be too expensive to finance, while less-than-poverty-level UBIs fail at realizing large parts of the claimed benefits (e.g. Piachaud, 2016). Conversely, proponents claim that a UBI at the poverty level or higher would be affordable (e.g. Miller, 2017, chapter 14).

This article contributes to that discussion by using microsimulation analysis to estimate the cost for an illustrative poverty-level UBI in the United Kingdom (UK), and discussing the substantially different

[1] See https://basicincome.org/about-basic-income/

implications of taking various perspectives on cost. Our scheme is not optimised for political feasibility and does not discuss incentive effects of introducing such a scheme on e.g. labour supply. Instead, by using micro-data at the individual level from the UK's Family Resource Survey, and defining an appropriate measure for the costs, we are able to estimate required funding for such an illustrative UBI scheme, showing that this roughly poverty-level UBI is both affordable in principle and capable of many of the significant effects claimed by supporters.

Key findings of this study include[2]:

- The cost of a poverty-level UBI for the United Kingdom is £67 billion per year or about 3.4% of Gross Domestic Product (GDP).
- This figure (£67 billion, 3.4% of GDP) is the net cost—the real cost—of a UBI scheme of £7,706 for adults and £3,853 for children, with a 50% marginal tax rate for net beneficiaries, integrated into the UK tax-and-benefit system in a way to ensure that the majority of UK citizens benefit from the transition and no one in the bottom 20% of distribution of income is financially harmed by the loss of programs replaced by the UBI.
- This UBI scheme adds only 39% to the cost of the UK's existing benefits system (not including the spending on the National Health Service), and an 8.7% increase in the UK's total government spending (£67/£771 billion).
- This UBI scheme is a net financial benefit to most households in the lower 70% of UK income distribution, making it an effective wage subsidy (or tax cut) for millions of workers and their families.
- The average-sized UK family (1.88 adults, 0.51 children) with incomes up to a total of £32,906 per year would benefit financially from the introduction of this UBI scheme.
- An average-sized UK family making no private income would receive UBIs totalling £16,453, slightly above the poverty line (£16,375) for a family that size.
- The average benefit over the existing system for each net-beneficiary family is £4,056.
- Under this scheme, the percent of UK families with incomes below the current official poverty line would drop from 16% to 4% and poverty among children and the elderly would all but disappear.[3]
- The net cost of this UBI scheme subtracting only the amount people pay to themselves (£155 billion) but ignoring the costs and benefits of integrating the UBI into the existing tax and benefit system is about one-third (35.4%) of its often-mentioned but not-very-meaningful gross cost (£438 billion).
- Also subtracting the cost of existing programs that can be replaced by UBI without financially harming anyone in the bottom 20% of the income distribution makes the net cost only about 15% the program's gross cost.

This article proceeds as follows. **Section 2** briefly discusses theoretical issues such as the gross and net cost of UBI, earlier estimates of the cost of UBI, and the use of microsimulation models in such cost estimates. **Section 3** discusses our assumptions and presents a short overview of relevant socio-economic statistics for the UK. **Section 4** explains how we model the cost of UBI on its own ("in a vacuum") and the costs and benefits of embedding it into the current UK tax and benefit system. **Section 5** presents our estimates for the cost of the UBI and interprets the results. **Section 6** concludes by comparing our results to past research, discussing the ramifications of our findings for the UBI debate, and considering the prospects for further research along these lines.

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[2] See below for sources and calculations.

[3] The official poverty line in the UK (which measures relative poverty) will increase with the increase in median income caused by the introduction of this UBI scheme. Our model suggests that the relative poverty line would increase by roughly 21% after introducing our UBI scheme, while overall risk of relative poverty more than halves. However, the new relative poverty line has strongly diminished information value. We therefore concentrate on a comparison holding the pre-UBI poverty line constant. See also section 5.2.2 for more detail.

2 Theory and Literature

2.1 The Distinction between Net and Gross Cost of a UBI Scheme

The wildly divergent cost figures in the academic literature on UBI (differing often by factors of 6 to 10) exist because writers focus on two very different concepts of cost (Widerquist 2017). These are the "gross cost," which we argue below, is easy to calculate but not very meaningful or useful, and "the net cost," which is much more difficult to calculate but meaningful and useful.

The gross cost of a UBI is simply the size of the UBI times the size of the population receiving it. No tax-benefit model is needed to calculate it. If the grant differs for different groups (such as adults and children), the gross cost is (still very simply) the size of the UBI for each group times number of the people in each group.

The net cost of UBI is the amount of money the UBI transfers from one group of people (the "net contributors") to another group of people (the "net beneficiaries"), plus the associated transaction cost. The net cost of UBI is, therefore, roughly equivalent to its net benefit. The net cost of UBI is a far more difficult calculation because, although everyone receives UBI, almost everyone also pays at least some of the taxes needed to "finance"[4] it; almost everyone will be affected by savings generated by cuts in other programs that can be replaced by UBI; and some people will be affected by the loss of those programs' benefits.

Any meaningful cost-benefit analysis of UBI has to take all of these things into account. We cannot calculate the real financial cost of the UBI (who is financially harmed by the transition and by how much) or the real financial benefit of UBI (who financially gains from the transition to UBI) without focusing on the *net* cost. Calculating the net cost requires specifying income tax rates for certain income groups, what programs will be replaced by UBI, estimating where the burden of those changes will fall, and subtracting that figure from the UBI each individual receives. If that figure is negative the individual is a net contributor; if it is positive, the individual is a net beneficiary. The sum of every net beneficiary's overall financial gain from the program plus transaction costs is the net cost of the program.

For further explanation of why gross cost is so misleading see Arndt & Widerquist (2019); Fouksman and Saxe (2019), Santens, (2017), Widerquist (2017) and Widerquist (2018).

2.2 Literature on Costing UBI Schemes and the Use of Microsimulation

2.2.1 Costing

Despite many authors pointing out the error, misplaced focus on gross cost prevails in the literature both within the UK and around the world.

Perhaps the most egregious example in the UK is Portes et al. (2017), which claims that government-provided social services could deliver about *ten times* the "user-value" (as they call it) for the poor than a "cost-equivalent UBI". While Portes et al. allow for second-order effects to be taken into account for

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[4] Some might argue that governments would not need to "finance" a UBI because governments don't need to "get money" to spend money. They simply create it. This view is highly contentious though. If government simply created money for all spending increases, especially big ones like UBI, they would cause rampant inflation, hence the need for what we call "financing." Readers who are sceptical about that word should substitute the phrase, "measures taken to counteract the inflationary pressure UBI would otherwise cause" every time they read the word "finance" or "financing".

their definition of "user-value", their estimate of the "cost-equivalent UBI" solely rests on the gross cost of their scheme. Indeed, their stark conclusion can only be supported by such a lopsided comparison.

Similarly, Piachaud (2016) claims that introducing a UBI would be prohibitively expensive. In a stylised example, he argues that a UBI of half the mean income (which would be close to the poverty line) would require an additional income tax of 50% over and above the current rate. In his example, current government spending on social security, which he estimates at one third of total government spending, would be completely abolished. This leads to a tax rate in his example of two-thirds of current taxes plus an additional income tax rate of 50%. He concludes that such a high tax rate would probably be untenable. However, his calculation over-simplifies by disregarding the substantial amount taxes citizens essentially pay to themselves. His article demonstrates only how people can use faulty reasoning to arrive at prohibitively high cost figures that don't reflect the benefits and burdens of financing a UBI scheme.

Miller (2017, chapter 14) avoids the gross-cost error without entering the debate over it. Although she recognises the importance of the net cost of a UBI scheme as the relevant cost measure (p. 149), the question that interests her is the required income tax rates necessary to finance them. One can answer this question without calculating either the gross or net cost. She concludes that flat-rate income taxes necessary to maintain balanced-budget financing for a set of increasingly generous UBI schemes ranging from between 27% and 47%, compared to the progressive income tax rates of 20% to 45% currently in place. This information is useful and all Miller needs for her purposes, but it doesn't answer the questions that are the focus of this article: who financially benefits from the UBI scheme; who financially contributes to a UBI scheme, and how much does that scheme financially benefit or cost them?

Regarding the use of microsimulation to evaluate UBI proposals, Malcolm Torry has extensively explored the feasibility of different proposals in the UK context over several years (see Torry (2019) for an overview of his work on the subject). His approach, however, differs substantially from the present paper, both in motivation and implementation. Torry investigates only partial UBI proposals (coalescing around an annual UBI grant of roughly £3,600 or approximately half of our own proposal). He also imposes strict constraints on financing sources and retains most of the current social security system. Additionally, Torry's recent article focusses on UBI schemes which could be implemented on a revenue-neutral basis with only modest increases in income tax. In contrast, the present paper primarily illustrates the conceptual point that the relevant cost perspective for evaluating any UBI proposal is the net cost approach. Like Miller, Torry understands this issue but does not discuss it in any detail.

We use microsimulation to provide a more accurate intuition of the implications of considering the net costs. The present paper therefore extends the discussion on the effects of implement a UBI scheme in the UK in a different direction than Torry's work.

Martinelli (2017a, 2017b) uses microsimulation to analyse the effects of implementing different UBI schemes in the UK, but he neglects the net-cost issue. His most generous proposal has a gross cost similar to our own at £427 billion. He focusses on how much the elimination of different social security services might contribute to covering the gross cost of UBI, and explores different distributional as well as incentive effects. Martinelli therefore leaves the question of the actual cost which needs to be covered from outside the scheme open. Where appropriate, the present paper will compare Martinelli's results regarding distributional effects to our own findings below. We omit discussing incentive effects in the present papers given our different focus.

Outside of the UK, Robert Greenstein 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 — and $30 trillion to $40 trillion over ten years." Nowhere in the article does he mention the net cost or that these

gross cost figure fail to reflect any real costs of implementing UBI. Dave Canarie (2019) responds to Michael Howard's (2019) argument that gross cost is not very meaningful with the unsupported assertion, "[O]f course it is."

One of the authors of this article, Widerquist (2017), has tried to correct the gross-cost error as he estimates the cost of a poverty-level UBI in the United States (US) using what he calls a "back-of-the-envelop" approach—i.e. a highly simplified methodology that makes it possible to estimate the cost of UBI directly from Census Bureau income tables without microsimulation. He finds that the US could implement a GDP at the cost of roughly $539 billion, 2.95% of GDP, about one-sixth (15.7%) of its gross cost. This figure "nets out" (accounts for) the amount people pay to themselves but not the costs and benefits of integrating UBI into the existing US tax-and-benefit system—i.e. the cost of "UBI in a vacuum," so to speak.

Although we share the net-cost perspective and the goal of correcting the gross-cost error, our figures are an advance on Widerquist (2017) in three ways: they involve a more sophisticated microsimulation methodology, they net out the cost of existing programs that can be replaced by UBI, and they net out the tax replacement cost of UBI (more on these differences in sections 4.2 and 6.1).

2.2.3 Microsimulation

The use of microsimulation and Tax-Benefit-Models ("TBM") based on micro data has a long history in public policy analysis, having been used to assess costs and effects of social policy changes for at least 50 years (Sutherland & Figari, 2013).

The general idea of a TBM is simple: it represents all policy rules relevant for calculating social security payments as well as direct (income) taxes and social security contributions. In a first step, the TBM calculates the transfers between individuals and the state (e.g. social security payments and taxes) based on socio-economic data like age, income and household composition. The socio-economic data is usually collected at the individual or household level from national surveys such as *the Family Resource Survey* in the UK or the EU's *Statistics on Income and Living Conditions*. By calibrating the model with observed transfer payments from the data, TBMs can accurately estimate the relevant taxes and benefits in a given year. In a second step, such a calibrated TBM can then be used to investigate the effects of changing individual policy rules like tax rates, benefit levels or allowances using the same set of micro-data as for the calibration. In this way, a TBM allows predictions about future effects of new policies.

Of course, TBMs have their limitations. They are, for example, usually only able to show the effects of policy reforms in a static framework without accounting for people's behavioural changes caused by the policy change. They nevertheless represent one of the few tools to empirically investigate the effects of social policy proposals.

TBMs are regularly used as benchmarks for social policy proposals because of their simplicity. However, considering the relevance of financial feasibility to the UBI debate and the value of TBMs in addressing the feasibility question, empirical works based on microsimulation are relatively rare but not absent in the UBI literature. Their use for evaluating UBI dates back at least as far as Atkinson's work toward the end of the last century (Atkinson, 1995). In preparation of the pilot projects currently under way, national agencies also used microsimulation to explore results which could be expected from the pilot projects (e.g. KELA, 2016).

3 Model Discussion and UK Baseline Statistics

3.1 Model Specification

3.1.1 Level of UBI

We specify our illustrative UBI at roughly the UK's official poverty line, which uses the most widespread definition of poverty within OECD countries. This definition is a *relative* poverty line—defined as 0.6 of median income (OECD, 2010). The equivalised median income for couples in the UK was £25,688 in the fiscal year 2016-2017 (Department for Work & Pensions - DWP 2018, table 2b). This yields a poverty line of £15,413 for couples.[5]

We choose a UBI for adults of exactly half that amount: £7,706 per person per year. Therefore, our illustrative UBI would provide a poverty-level income for two adults living together (£15,413), but it would be below the poverty line for one individual living alone (£10,327, see Table 1 below). We choose this level for the UBI because, on the one hand, it substantially reduces poverty and enables us to substitute most means-tested social security programs. On the other hand, it reduces the total cost of the scheme by taking advantage of household economies of scale—i.e. that the average living cost per household member decreases as the number of people in the household increases.

In the context of a UBI, the issue of household size is particularly relevant because the UBI itself, being unconditional, does not account for the number of household members. Because a couple living together can live affordably on less than double the income of a person living alone, an (unconditional) UBI ends up either leaving couples substantially above the poverty line or leaving adults living alone slightly below it.[6] While our illustrative scheme will not eliminate poverty entirely, it will bring *everyone* much closer to the poverty line. Therefore, it is set at "roughly" the poverty line both in the sense that it brings most people to it and in the sense that it brings everyone else very close to it—often people who would otherwise be far below it.

For children below the age of 18, we set the UBI at 0.15 the median income, or £3,853 (half the adults' UBI). This amount is between the poverty line for children age 14 and older (£5,086) and younger children (£3,083). For the average-sized UK family (1.88 adults, 0.51 children; see Office of National statistics - ONS 2018b, table 21), these specifications result in UBI grants totalling £16,453 per year.

3.1.2 Beneficiaries' income tax rate

The net-cost representation of a UBI scheme requires setting both the level of UBI and the net beneficiaries' income tax rate. Only the combination of these two parameters fully specifies the gains a UBI scheme provides for net beneficiaries, and only the combination allows us to calculate the financial cost of providing these benefits. For our illustrative UBI scheme in this paper, we set the income tax rate for net beneficiaries at 50% flat. We acknowledge that such an increase in income tax rate might be politically infeasible in the short-term (see also e.g. Torry 2019). From a distributional perspective, it is worth keeping in mind though that net beneficiaries by definition benefit financially from the introduction of our scheme, most of them substantially so.

Readers might ask the question *what is the tax rate for net contributors*. This article does not address that question: it focuses exclusively on the question *how much does UBI cost*, leaving the question *how*

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[5] $£25{,}688 * 0.6 = £15{,}413$.

[6] For example, housing costs decrease substantially with the number of occupants of a given housing space.

can or should the UK finance that cost for future research. The scheme does require all net contributor's income taxes to up just enough to match their UBI, but whether their income taxes go up any more than that depends on how the UK decides to finance this UBI scheme. We briefly discuss financing options in section 6 and leave a more thorough discussion for future research.

The definition of an income tax schedule for net beneficiaries also specifies the "break-even point" for those beneficiaries: The break-even point indicates the income level at which net beneficiaries, given the composition of their household, become net contributors. Put differently, the "break-even point" is the income level at which a household's UBI exactly matches the taxes they pay.

A tax rate of 50% for all net contributors implies a break-even point for a single-person household at a market income of twice the individuals' UBI grant. Because income taxes in the UK are collected at the individual level (a procedure that we retain), while UBI grants are likely shared to some extent between household members, break-even points for households change with their composition (see table 1 below).[7,8] See also Torry (2019) for a more extensive discussion of differences between collecting taxes on the basis of individuals or households.

For the average UK family, the break-even point of our scheme is at £32,906 which is well above the average family's equivalised median market income of £27,409.[9] The break-even point for the average family is also close to the 70th percentile of the current income distribution.[10] Put differently, around 70% of households would, to different degrees, become net beneficiaries of the UBI scheme, assuming a uniform distribution of household sizes across the income spectrum.

Table 1 below shows UBI grants for different family compositions and how these compare to the poverty line of those model families.[11] The table also shows the break-even points for different family compositions.

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7 Consider e.g. a single-person household versus a single parent with one child. As discussed, in our scheme the single-person household reaches the break-even point at twice the individual UBI grant, or £15,412. In contrast, the single-parent/child household receives a UBI grant of £11,560 and would thus reach the break-even point only at a market income of £23,120.

8 A further practical complication following from the above is that a tax schedule defined at the individual level could require a net beneficiary to pay additional taxes at the margin. If e.g. net contributors would be required to pay income taxes of 70% and the tax band of 50% for net beneficiaries would terminate at the break-even point of a single-person household (i.e. £15,412 in our scheme), income earners in larger households would be required to pay 70% for income above £15,412 before reaching the household's break-even point. Consider e.g. again the single-parent/child household. If the income tax rate were 50% for all incomes, the household's break-even point would be at £23,120. If, however, the income tax would rise to 70% for incomes above the single-person household's break-even point of £15,412, the single-parent/child household's break-even point would fall to $\frac{£11{,}560 - £15{,}412 * 0.5}{0.7} + £15{,}412 = £20{,}918$. We have omitted this complication by retaining a 50% tax rate for all income levels throughout the paper. This both simplifies the analysis and reflects our desire to keep marginal tax rates for net contributors low as well (see also our discussion in section 6). This is not, however, a necessary feature of our analysis and could be changed if desired.

9 To account for different household compositions, the UK Department of Work's data includes an equivalisation factor. The equivalisation factor of the average household is $1.06 = 1 * 0.67 + 0.88 * 0.33 + 0.51 * 0.2$.

10 The 70th percentile is at £31,564 (see ONS 2018c, Table 2a).

11 For calculating the poverty line, we assume an equivalisation weight of 0.2 for children. This represents the OECD's weight for children below the age of 14 (see OECD 2010).

Table 1: UBI, poverty line, and break-even points for different household compositions			
Family Composition	**UBI**	**Poverty Line**	**Break-even point**
Single Individual	7,706	10,327	15,412
1 Adult, 1 Child	11,560	13,409	23,119
Couple	15,413	15,413	30,826
Average Family (1.88 adults, 0.51 children)	16,453	16,375	32,906
2 Adults, 1 Child	19,266	18,495	38,532
2 Adults, 2 Children	23,119	21,578	46,238

3.1.3 Model and Data Source

We use EUROMOD version G2.0 as our Tax-Benefit-Model. EUROMOD is a Tax-Benefit Model covering the entire European Union and the United Kingdom. It "simulates individual and household tax liabilities and benefit entitlements according to the policy rules in place in each member state" (Sutherland & Figari, 2013, p 5).

We use the 2017 policy year as the basis for our analysis. The micro data underlying the model is taken from the 2014/15 UK Family Resource Survey.

3.2 Descriptive Statistics UK

To interpret the results presented in later sections, it is useful to consider some general statistics about the UK economy. This helps to give perspective to the cost of our UBI scheme estimated below. All figures are for the government's fiscal year 2016-2017 or the calendar year 2017 unless otherwise stated.

Table 2: Descriptive Statistics of the UK		
Total population	66.05 million	ONS (2018a)
Share of people aged 65 or older	18%	ONS (2018b)
Share of people aged 16 and younger	19%	ONS (2018b)
Total GDP	£1,960 billion	ONS (2018a)
GDP per capita	£29,670 per year	ONS (2018a)
Total Government expenditure	£771 billion (39.3% of GDP)	HMT (2017, p 34)
Government spending on social security[12]	£264 billion (13.5% of GDP)	HMT (2017, p 74)
of which direct benefit spending	£174 billion (8.9% of GDP)	DWP (2017)

4 Modelling

4.1 The Gross and Net Cost of this UBI Scheme in a Vacuum

Although calculating the gross cost of our scheme does not require a TBM, to ensure internal consistency we nonetheless use EUROMOD to calculate it. This yields gross costs of £438 billion (22.3% of GDP).

[12] Includes e.g. tax credits in addition to direct benefit spending.

For comparison, simply multiplying the number of adults in the UK with the adults' UBI and the number of children with the children's UBI gives a gross cost of £460 billion.[13]

A somewhat more difficult calculation is the net cost of UBI in a vacuum—without making any effort to integrate it into the UK's tax and benefit system. The vacuum calculation imagines the creation of UBI assuming all else equal. That is, assuming either no other benefits or taxes affecting net beneficiaries exist, or no other benefits or taxes affecting net beneficiaries will be changed. The net cost of UBI in a vacuum is the gross cost minus the amount individuals pay to themselves. Our tax-benefit model calculates this figure at £155 billion or 7.9% of GDP (Line 1 of Table 4), 35.4% of its gross cost. The net cost of the scheme thus amounts to 89% of current benefit spending, which makes it substantially easier to finance than the gross cost.

4.2 Embedding the UBI into the Existing Benefit System

The most complex calculation we perform assesses how to integrated UBI into the existing tax-and-benefits system. Because virtually all countries already have tax-and-benefit systems that overlap with the aims of UBI and the means of financing it, any sensible implementation of a UBI scheme would involve integrating it into the existing tax-and-benefit system, determining which of the old benefits to retain and which to replace by the UBI. This will consequently affect the net benefit individuals receive from the program and the total cost of introducing the new integrated social security system.

4.2.1 Treatment of individual benefits

Programs that might conceivably be replaced by UBI can be divided into three broad categories: means-tested benefits (MTB), contributory benefits, and non-means tested, non-contributory benefits.

- *MTBs* are dependent on a person's current financial situation and usually require extensive oversight to monitor the eligibility for the benefit. Examples of such benefits in the UK are Social Assistance or Housing Benefits. The adverse effects of MTBs on privacy, self-worth, or saving rates are well documented (see e.g. Torry 2018, pp 59-63).
- *Contributory benefits* depend on previous contributions made by the individual. Such programs encompass most forms of pensions and unemployment benefits.
- *Non-contributory, non-means-tested benefits* depend on a set of eligibility conditions other than past monetary contribution. Such programs include, for example, most forms of disability benefits, student support, or child benefits.

Various authors argue that one of the central benefits of implementing a UBI is its ability to replace MTBs and hence reduce their adverse effects (see e.g. Miller 2017, pp 42-43). The major MTBs currently administered in the UK are listed in Table 3 below. Because our UBI scheme roughly equals the poverty line and is intended as an income floor enabling households to meet all basic necessities, it has the same general function as an MTB. Hence, most, but not all, MTBs should be replaced by our scheme.

The only MTB we retain are housing benefits. Housing benefits pose a special case of MTBs because their primary role is to alleviate geographical income differences, providing more funds to low-income households living in high-rent environments, and the unconditional nature of a UBI is ill-equipped to deal with these spatial differences. The inability of UBI schemes to replace housing benefits directly is a topic which is recognised by many authors (e.g. KELA 2016, p 12; or Miller 2017, pp 90-91). Housing benefits constitute one of the substantial unresolved challenges when considering the implementation of

[13] The difference is likely caused by our data source, the UK's Family Resource Survey, being from 2014/15, instead of 2017 like the data in Table 2 above.

a UBI: Housing benefits in their current form require strong oversight and exhibit most adverse aspects of MTBs. However, overcoming the challenges posed by housing benefits is outside the scope of this paper.

Regarding contributory programs, different approaches are imaginable. If one regards contributory programs as a service – albeit a mandatory one – by the government to its citizens, one could argue to retain them under a UBI scheme. There are certainly arguments for both keeping or abolishing them, and resolving this issue is again outside the scope of this paper. For the illustrative purposes of this paper, we abolish contributory programs, mostly because contributory social security programs are explicitly intended to alleviate the cost of MTBs in requiring able individuals to insure themselves from adverse events like unemployment or old age (Goodin, 1992). There is less need for this type of insurance under our scheme, because a UBI is designed to meet these same basic social needs.

It is noteworthy, however, that contributory programs as defined here *do not* encompass healthcare contributions. While healthcare contributions are partly intended to counteract losses in earnings from illness, they mostly serve to cover the actual costs of treating the illness. As such, healthcare exists largely outside the work environment which we are considering here, and is thus retained. Because healthcare contributions are not part of EUROMOD either, they do not enter any of our analysis below.

Lastly, the third category of non-means-tested, non-contributory social security programs is designed to meet special needs arising from special circumstances. Because the UBI is not well equipped to account for individual differences in beneficiaries, most of these programs should be retained under a UBI. The only major program of this category which can naturally be replaced by a UBI is the Child Benefit. We don't retain it separately because our illustrative UBI scheme also encompasses a payment to everyone under the age of 18 years which is more generous than the Child Benefit.

4.2.2 Limitations of our treatment

Our replacement strategy has at least three drawbacks. First, even if UBI becomes politically viable, the question of which programs should or should not be replaced by it will probably remain controversial. Second, some contributory benefits might be motivated by market failures, such as under-rewards for some types of behaviour. Third, the goal of almost any UBI supporter is not to redistribute money *among* low-income people but to redistribute money *from* high-income, wealthy people *to* low-income people in general.

We have addressed this third problem by choosing to "hold" the transition "harmless" for people in the bottom 20% of the income distribution. Simply substituting our UBI scheme for all the above programs would cause a small number of households in the bottom 20% of the income distribution to lose out financially, and we don't want to aggravate the situation of the most vulnerable.

The households losing under the UBI scheme are usually single people who receive a large amount of social security payments under the current system, or otherwise disproportionally benefit from the current system. Under our scheme, only 2% of households in the bottom two deciles are affected by the condition. It is difficult to identify the specific circumstances of every such household and the reasons they lose under this UBI. The impact of this intervention on general financing is very small, however.

Therefore, we impose a "hold-harmless" condition in our model which raises the income of all households in the bottom 20% losing from the introduction of the UBI to their pre-UBI income level. This intervention costs about £10 million; a negligible share of the total cost stated above. Most net beneficiaries in the next two quintiles gain on average, but a minority will lose more than they gain by the replacement of the selected programs with our UBI scheme. It is possible to extend the hold-harmless condition to people with higher incomes, but we have not estimated the cost.

Table 3 below summarizes our UBI scheme's treatment of all major social security programs currently in place in the UK. Italics denote programs retained under the UBI scheme.

We ask readers to bear in mind that our proposal is illustrative. We are not committed to it as necessarily the "best" UBI scheme. It gets people an idea of the cost of UBI by focusing on one specific scheme. We suggest readers make up their own mind whether it might be worth spending a little more than our estimated cost and/or accepting a little more complexity than our greatly simplified social security system to retain such-and-such a policy. Readers might equally well decide to save a little money by cutting a few more programs.

Table 3: List of UK Social Security Programs; programs in italics are retained under UBI scheme

MTB	**Contributory**	**Non-MTB; Non-Contributory**
Income Support	Job Seeker's Allowance	Child Benefit
Jobseeker's Allowance	Employment and Support Allowance	*Attendance Allowance*
Employment and Support Allowance (income-based part)	Retirement Pension	*Disability Living Allowance*
Pension Credit	Bereavement Benefit	*Personal Independence Payment*
Housing Benefit, Local Housing Allowance	Maternity Allowance	*Severe Disablement Allowance*
Council Tax Benefit		*Carer's Allowance*
Working Tax Credit		*Industrial Injuries Disablement Benefit*
Child Tax Credit		*Guardian's Allowance*
Social Fund		*War Pensions*
Universal Credit		Winter Fuel Allowance

4.3 Embedding the UBI benefits into the existing Tax System

In our illustrative UBI scheme, net beneficiaries face a relatively high marginal tax rate of 50%, even though the design of our scheme ensures that they benefit from the introduction of the UBI in absolute terms. To avoid even higher marginal tax rates and the associated draw-backs (e.g. the so-called poverty trap[14]), we choose to transfer net beneficiaries' current tax burden to net contributors as well. These additional costs of replacing net beneficiaries' tax burden under the status quo have to be added to the net cost of the scheme. In addition, this design improves the tractability of our net-cost calculations and improves the intuitions which can be derived from it.

In contrast, social security contributions can be cancelled without replacement. Because we choose to abolish all contributory social security programs, the contributions lose their original purpose in any case. The addition of net beneficiaries' income tax burden under the status quo adds another £35 billion to the net cost of our scheme.

[14] The poverty trap describes a situation where low-income households receive social security benefits with high withdrawal rates. Consequently, these households face very high effective marginal tax rates. This "traps" households at low levels of income: For substantial income ranges, it is very difficult for these households to improve their economic position, reducing incentives to try (see e.g. Jordan et al. 2002).

5 Results

5.1 Country-Level Results

Table 4 summarizes the estimates of our simulation model for important variables related to our illustrative UBI scheme. The bottom line (Line 10) shows that the net cost of the UBI scheme outlined above is £67 billion per year. In other words, a UBI of £7,706 per year for adults and £3,853 per year for children, together with a 50% income tax rate for net beneficiaries and fully integrated into the UK's tax-and-benefit system, requires an additional expenditure of £67 billion. This figure represents about 3.4% of GDP. It is an 8.7% increase in total government spending, and a 39% net increase of in spending on social security benefits. This net cost amounts to roughly 15% of the scheme's gross cost.

This bottom-line cost figure is "net" in several different senses of the term: it subtracts both the amount individuals pay to themselves and the cost of programs UBI replaces. In addition, it adds the cost of shifting taxes paid by net beneficiaries onto net contributors and the cost of holding the replacement of benefits financially harmless for people in the bottom 20% of the income distribution.

Let's work through how the table gets to the final net cost figure.

Line 1 shows that the net cost of UBI in a vacuum (as explained in section 4.1 above) is £155 billion (about 7.9% of GDP).

Line 2 shows that the current cost of existing benefits, as calculated by EUROMOD, is £193 billion (9.8% of GDP).

Line 3 shows that the tax savings that would be generated if the United Kingdom were to scrap its entire existing benefits system and replace it with our UBI scheme is £38 billion (1.9% of GDP). It is calculated simply by subtracting line 2 from line 1. It is not part of the calculation of other figures. We include this plan only for reference and oppose it as a policy option.

Line 4 shows that the cost of the existing system plus the cost of the UBI assuming no corresponding cuts and no effort to integrate the new UBI scheme into the existing tax system is £348 (17.8% of GDP). It is calculated simply by adding lines 1 and 2. This figure is the *total* cost of the combined system; the *additional* cost is already given in line 1. This figure also plays no part in the following calculations, and is included only for reference. Although we do not oppose this option as strongly as the full-replacement UBI, we do not support it either, given that it ignores the fact that the goals of UBI overlap with the goals of many existing programs. If the UK were willing to increase its commitment to redistribution by 7.9% of GDP, there would be more judicious ways to do it rather than simply adding a UBI without trying to integrate it into the existing system.

Line 5 shows that the cost of the existing programs that we suggest can be replaced by UBI is £123 billion (6.3% of GDP). This figure is simply the total cost of all the programs slated to be cut in section 4.3 above.

Line 6 shows that the net cost of a UBI replacing these programs is £32 billion (1.6% of GDP). It is calculated by subtracting line 5 from line 1.

Line 7 shows that the total cost of the benefits retained from the existing system plus the cost of UBI is £225 billion (11.5% of GDP). It represents a £32 billion net increase over existing spending. It is calculated by adding lines 6 and 2.

Line 8 shows that the tax replacement cost of UBI is £35 billion (1.8% of GDP). As discussed in section 4.3, one needs to decide whether the scheme's income tax for net beneficiaries will be imposed in addition to their current income tax burden, or whether their current tax burden is transferred to other funding sources. We choose to transfer their current tax burden to net contributors as well, which increases the net cost of our scheme by the corresponding amount of £35 billion.

Line 9 shows that the total cost of the benefits retained under the existing system, the cost of UBI, and the cost of integrating the UBI tax scheme into the existing tax system together amount to £260 billion (13.3% of GDP).

That returns us to line 10 (the total net cost of integrating a UBI into the existing tax-and-benefit system: £67 billion, 3.4% of GDP). It can be calculated either by adding lines 6 and 8, or by subtracting line 2 from line 9. This figure shows that the United Kingdom can virtually eliminate poverty with a UBI integrated into the existing tax system at an additional net cost of £67 billion, or 3.4% of GDP. While line 9 shows that the total commitment to redistribution is 13.3% of GDP, line 10 shows that that represents a 3.4% increase over the current commitment of 9.8% of GDP.[15] Of that increase, 1.6 percentage points[16] represent increased spending on redistributive programs, and 1.8 percentage points represent a shift in the tax burden from people at the lower end to the income distribution to people at the higher end.

Table 4: Final Cost for Different Ways of Integrating UBI into Existing Social Spending

	Cost Item	**Cost in billions**	**Percent of GDP**
1.	UBI in a vacuum	155	7.9%
2.	Existing benefits system (in TBM)	193	9.8%
3.	Full-replacement UBI (line 1-2)	-38	-1.9%
4.	Cost of UBI and existing benefits without replacement (1+2)	348	17.8%
5.	"Replaceable" benefits (RB)	123	6.3%
6.	Hold-harmless (HH) benefits and UBI (1-5)	32	1.6%
7.	Total cost of remaining (HH benefits) and UBI (6+2)	225	11.5%
8.	Tax replacement (TR)	35	1.8%
9.	Fully integrated HH benefit system including UBI (7+8)	260	13.3%
10.	**Total net cost of integrated UBI (6+8 or 9-2)**	**67**	**3.4%**

A cost of £67 billion per year, or 3.4% of GDP, is certainly sustainable and likely to strike many people as affordable or even a bargain for a program that makes such dramatic reductions in poverty and eliminates the threat of absolute economic destitution from all UK citizens. But it is important to recognize that the cost must be borne by a considerably smaller tax base. The tax base decreases because the entire cost has to be borne by net contributors alone, and they make up only about 30% of the UK population—70% are net beneficiaries of this UBI scheme. Net contributors are the wealthiest 30% of the population and many of them have benefitted significantly from the increase in economic inequality that the United Kingdom has experienced over the last 40 years, and so the purchasing power is available; but the tax increase necessary to free it up is not trivial. We briefly discuss some possibilities for financing in section 6.

[15] Subject to rounding errors

[16] Percentage points represent an absolute increase in fractions. For example, increasing a tax rate from 10% to 11% would represent an increase of 10% of that tax rate, but an increase of only one percentage point.

5.2 Household-Level Results

Table 5 below shows the average changes in disposable income for net beneficiaries on the household level. It shows that typical households reach the break-even point by £35,000, but the results vary considerably with family size. A two-income UK family of average size (1.88 adults, 0.51 children) with an income up to about £32,906 per year would benefit financially from the introduction of this UBI scheme.

This UBI scheme is a net financial benefit to most households in the lower 70% of UK income distribution, making it an effective wage subsidy (or tax cut) for millions of working people. The average gain over all net beneficiaries is £4,056 per year. This table shows that the lowest-income families, those with market incomes between 0 and £5,000 per year, gain the most. It is noteworthy that the benefits of the new UBI scheme decline only very slightly as income rises. This is likely driven by the generosity of our proposal and our decision to not raise the income tax rate for net contributors further (leading to only modest tax increases for middle-income households while still providing substantial additional income through the UBI). We did not investigate effects of using other possible funding sources (e.g. increasing corporate or financial taxes) on net beneficiaries. It is therefore possible that especially middle-income households would potentially be less well-off in a fully-funded scheme than suggested below by e.g. receiving less returns on stock-market investments.

Table 5: Disposable Income for Households for Different Income Ranges Before and After UBI is introduced

Market Income range		Number of Households	Disposable Income in Status Quo (including benefits)	Disposable Income with UBI (including benefits)	Difference
0	5,000	6,685,158	13,116	17,276	4,160
5,001	10,000	2,226,864	16,543	20,080	3,537
10,001	15,000	1,874,369	19,664	23,202	3,538
15,001	20,000	1,958,282	21,578	25,696	4,118
20,001	25,000	1,730,138	24,436	28,680	4,244
25,001	30,000	1,573,945	27,487	31,808	4,321
30,001	35,000	1,344,565	29,712	34,190	4,477
35,001	40,000	1,341,045	32,852	37,333	4,481

Our calculations show that under this UBI scheme, the percent of UK families with incomes below the current official poverty line would drop from 16% to 4%, and even this 12-percentage point decrease understates the change because those remaining 4% of people would be among the largest net beneficiaries measured in absolute increase in their monetary income, making their incomes and consumption levels much closer to the poverty line than before. The fear of economic destitution or absolute poverty would disappear from the UK, as would relative poverty among children and the elderly. A slightly more ambitious UBI scheme could entirely eliminate poverty in the UK.

The poverty rates before and after the introduction of our UBI scheme reported in the last paragraph are calculated relative to the official pre-UBI poverty rate. Given that the UK's official definition of the poverty line is relative, calculated as 60% of median income, the official poverty line after the introduction of our UBI scheme would increase and official poverty would decrease by less than stated above. That is, we defined our scheme in a way that makes roughly 70% of the country net beneficiaries. Therefore, it will increase the median income, which in turn will increase the official poverty line. Our calculations suggest that the relative poverty line will increase by roughly 21%.

However, the relative poverty line after the introduction of UBI is much less meaningful. While the new poverty line captures changes in the relative income distribution, it does not properly reflect the substantial absolute gains for over 50% of the population. The livelihood of substantial parts of the population might increase drastically without the relative distribution of wealth below the median changing much. Readers should be aware that this UBI system eliminates absolute poverty (e.g. as it is measured in the United States) from the UK.[17]

6 Discussion

This article outlined an illustrative UBI scheme for the UK set at about the poverty line. The main results of our study are summarized and interpreted in section 5. This concluding section compares our findings to Widerquist (2017), discusses the ramifications of our findings, and the prospects for further research.

6.1 Comparison of our results and Widerquist's estimates for the United States

Readers should not be distracted by the superficial similarity between Widerquist's (2017) net cost estimate of 2.95% of GDP for the US and our net cost estimate of 3.4% of GDP. These two figures are not directly comparable: they use different methodologies to measure different concepts in economies with very different characteristics. This section explains how the findings of these two studies relate to each other.

The figure in our study that is most readily comparable to Widerquist's (2017) estimates is not the figure of 3.4% of GDP in Table 4, Line 10, but the figure in Line 1, which reports that UBI in a vacuum would cost 7.9% of British GDP—more than double Widerquist's estimate of 2.95% of GDP.

Our top- and bottom-line net cost figures can simultaneously be *higher* and *lower* because our bottom-line figure "nets out" (subtracts) more things than Widerquist's study does. His study subtracts only the taxes that people pay to themselves under UBI, making no rigorous effort to integrate UBI into the existing US tax-and-transfer system. Our study accounts both for the taxes people pay to themselves *and* for the costs and benefits of integrating UBI into the existing UK tax-and-benefit system. These additional calculations on our part explain why our initial net cost estimate of 7.9% of GDP drops to 3.4% of GDP in our final estimate. Had Widerquist done a similar calculation, his costs would have decreased substantially; but not by as much as ours, because the United Kingdom has a much more generous social safety net than the United States, and therefore it has more income-support programs that could potentially be replaced by UBI.

Consider why the comparable figures for UBI in a vacuum differ so substantially (7.9% of UK GDP as opposed to 2.95% of US GDP). Following from these findings, our net-to-gross-cost ratio is more than twice as high as Widerquist's (2017): 36% versus 16%. Although it is difficult to identify the reasons

[17] See also section 6.1 below.

with certainty, most or all relevant factors can be grouped into two kinds: differences in methodology and differences between the US and UK economies.

The main difference in methodology is that Widerquist (2017) uses more simplifying assumptions in his self-described "back-of-the-envelope methodology," including most substantially no microsimulation analysis at all. This assumption biases the analysis in uncertain ways. Widerquist's (2017) assumption of a uniform household size and composition is also based on data limitations in his study. Actual household compositions vary substantially with income: while UK households with the lowest 10% of incomes only have on average 1.4 members, households with the top 10% of incomes have on average 3.14 members (ONS, 2017). This skews the distribution of net beneficiaries and contributors upwards, also leading to more net beneficiaries in reality than assumed by the simplified model.

One difference between the two countries that might affect our estimates is that per capita income is slightly higher in the US than in the UK, meaning that there is more money to go around. Per capita US income in 2015 was the equivalent of £37,116 (U.S. Bureau of Economic Analysis, 2019) compared to £29,008 (ONS, 2018a) in the UK that same year.

Probably the most important difference between the two countries for our purposes is that the US and UK governments define poverty very differently, while both articles estimate the cost of almost eliminating "official poverty" in the two respective countries. The United States uses an absolute measure based on the cost of commodities (mostly food) considered necessary to keep a person out of poverty. The UK's poverty line is determined relative to median income. The UK poverty line is 60% of its median income; the US poverty line was only about 27% of its median income in 2015 (the year of Widerquist data).[18] Therefore, at current exchange rates, our study uses a UBI level for the UK (see section 3.1) that is 48% higher than the UBI Widerquist used in his study, and it was still 40% higher when adjusting for purchasing power parity.[19] Obviously a 40-48% higher UBI will cost more, and as Widerquist (2017) argues, the difference between gross and net cost tends to decrease as the size of the UBI increases. Very possibly, this difference accounts for most of the difference between the two cost estimates and the two ratio differences.

The lower official poverty threshold in the US needs to be understood in combination with the greater income inequality in the US, where the top of 20% household incomes are about 17 times as much as the bottom 20% of incomes (US Census Bureau, 2017). In the UK, the comparable multiplier is about 12 (ONS, 2018c, Table 2). This already more equal society with a higher poverty threshold has far more people just above that threshold who will therefore be net beneficiaries. These facts contribute to the break-even point being different in the two countries: around the 45th percentile of the income distribution for the US and at the 70th percentile for the UK. Hence, in the US fewer people are net beneficiaries, lowering the net cost of the UBI scheme further.

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[18] US poverty line and median income taken from Proctor et al. (2016); 2015 GPB / USD exchange rate at an average of 0.655 OECD (2019b, https://data.oecd.org/conversion/exchange-rates.htm#indicator-chart). Note that the US data is not based on equivalised median income figures because those are not published for the US. This might explain part of the strong discrepancy. However, OECD (2019a, https://stats.oecd.org/Index.aspx?DataSetCode=IDD#) suggests that US median income is indeed substantially higher than in the UK while the poverty line is not.

[19] 2015 GPB / USD exchange rate at an average of 0.655; PPP-adjusted exchange rate at 0.692 (2019b, https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm#indicator-chart). Purchasing power parity takes into account differences in price levels between countries. It reflects that e.g. the equivalent of US$ 1,000 in the UK can potentially buy more goods than US$ 1,000 in the US.

6.2 Further ramifications: Gross cost, net cost, and paying the cost, now and in the future

Section 5 summarized the main direct ramifications of our illustrative UBI scheme on poverty and cost. This section briefly summarizes some of the further ramifications of this study. We discuss first what it implies about the usefulness of gross and net cost figures. We then discuss how to pay that cost, and finally, we consider some of the dynamic effects of a UBI scheme like this one.

6.2.1 Gross cost concluded

The net cost of this illustrative UBI scheme is far lower than the often-mentioned but not very useful concept of "gross cost." Netting out only the amount people pay to themselves (and ignoring the additional savings generated by integrating it into the existing tax-and-benefit system) shows that the cost is £155 billion per year, about one-third (35.4%) of gross cost (£438 billion per year). Once we net out the cost of integrating this UBI scheme into the existing tax-and-benefits system, the net cost comes to only about 15.3% the of its gross cost.

One clear ramification of our findings is how much more useful net cost is than gross cost. Not only do gross-cost figures wildly exaggerate the cost of UBI, they are also not useful in determining who benefits and by how much; nor are gross-cost figures useful in determining who bares the cost and how much it costs them. However, these are exactly the things one wants to learn from a cost of study. Only with net-cost analysis was this study able determine that 70% of the UK population benefits from this illustrative UBI scheme; that the benefit would be about £67 billion (3.4% of GDP); and that that benefit would be a financial cost to the remaining 30% of the population.

We've argued that the gross cost of UBI is not merely less useful than net cost but that it is *meaningless*. Now we can further explain why. In order to determine that 70% of UK families would benefit by a total of £67 billion per year, we had to specify not only the size of the UBI but also an entire UBI scheme including the tax rate on net beneficiaries (50%). Had we made the tax rate on net beneficiaries higher, people would have reached the break-even point sooner; there would have been fewer net beneficiaries; the cost of UBI would have been lower; and more net contributors would have been available to share that cost. Therefore, the financial burden on each one would have been lower. The gross cost of UBI is independent of the tax rate on net beneficiaries, and therefore, it could not capture any of those changes.

Similarly, had we made the tax rate lower, people would have reached the break-even point later; there would have been more net beneficiaries; the cost of UBI would have been higher; and fewer net contributors would have been available to share that cost. As before, the gross cost being independent of the tax rates would not reflect any of these changes. Cost figures for distributional programs are meaningless if they cannot show what the financial burden is or who remains to bear that burden after beneficiaries are accounted for. Gross cost figures can't do any of that or contribute to a discussion of it.

6.2.2 Possible taxes to finance this UBI scheme

Although a net cost of £67 billion (3.4% of GDP) is almost certainly sustainable and affordable, we do not recommend financing it solely by increasing the income tax on net contributors. Doing so would require extremely high marginal tax rates on upper-income earners, and other options exist that tax the same group but don't involve high marginal tax rates. Demonstrating why a purely income-tax financed UBI would involve high marginal tax rates is beyond the scope of this paper.

It's important to remember though that high *marginal* tax rates do not imply a high overall tax burden. For example, the net beneficiaries in our study face a relatively high marginal income tax rate of 50%

when overall, they basically pay *negative* taxes on their incomes. Even if the overall tax burden would not be excessive, high marginal rates can have negative effects, and therefore, we should look at tax options that don't involve high marginal rates.

Such options include the value added tax or VAT (which we do not recommend because of its regressive aspects), resource and rent taxes, wealth taxes, and financial or technology taxes. A thorough discussion of the merits of each of these taxes is beyond the scope of this article, but it also is a promising area for further research.

The most important aspect of the financing issue is that 3.4% of UK GDP can be raised out of taxes on the wealthiest 30% of UK households. The UK is a highly unequal country (relative to most industrialized countries although not to the US), and inequality has been rising in the UK for decades. The money is available, if the UK chooses to use it to eliminate poverty and create a much more equal society.

6.2.3 Dynamic effects

Our analysis is entirely static. While TBMs are valuable tools for exploring static effects, they are silent on changes in the behaviour of both net beneficiaries and contributors over time. Given the strong effects of introducing a UBI on income distribution and, at least in our scheme, tax rates, we expect dynamic effects to change the results of our analysis substantially. These dynamic effects have at least three layers: first, direct changes to individual behaviour with respect to labour supply, saving and other factors; and second, the likely response of firms to these changes in individuals' behaviour encompassing e.g. the adjustment of wages, prices or output. These first two layers might have considerable effects on the cost of UBI. The expected initial effect of people working fewer hours will shift the tax burden of UBI; the labour demand response is likely to increase wages and improve working conditions overtime, at least partly counteracting the decreased labour supply effect.

The third layer of dynamic effects—probably the hardest one to measure—will also have substantial effects. It is expensive to be poor; it is expensive to live in a country that has poor people. Poverty is correlated with ill health, accidents, crime, violence, low education, and many other problems all of which generate enormous costs for society. Children who grow up in poverty suffer long-term negative effects that are costly for them and to society as a whole for the rest of their lives. Research shows that reducing poverty with cash transfers can have positive effects on these and many other problems with the potential that a UBI scheme like this one could save enormous amounts of money over time, maybe shifting the cost-benefit analysis dramatically (Forget 2011; Levine et al. 2005; Pereira 2017; Widerquist and Lewis 2006; Wilkinson and Pickett 2009).

6.3 Further Research

Further research is needed in various areas of UBI cost estimation. These include specific issues with our illustrative scheme (as above in section 4.2), investigating the interactions between high marginal but low average tax rates, and discussing the relative merits of various other financing options. One particularly promising area for further research would be to examine the cost of fully eliminating official poverty in the UK.

Without addressing how UBI is financed, no cost study can be carried through to an estimate of its impact on inequality. Additional research into financing options could encompass more accurate estimates of what different sources could contribute to financing a UBI. It should also focus on likely effects of using different financing sources on factors like wages and prices. Extending our analysis, investigating dynamic effects is arguably one of the most important aspects of the long-term cost-benefit analysis of UBI.

Within the framework of our model, various questions like the choice of retained social security programs in general and the treatment of housing benefits in particular need to be resolved. In addition, as our comparison with the results in Widerquist (2017) shows, different results are expected for different countries. Therefore, applying a similar methodology to the US and other countries with different tax-benefit systems would be valuable.

Bibliography

Arndt, G., & Widerquist, K. (2019). Deceptively Simple: The Uselessness of Gross Cost in the Cost-Benefit Analysis of Universal Basic Income. *Maine Policy Perspectives November 2019*, 17-19.

Atkinson, R. S. (1995). *Public Economis in Action.* Oxford: Clarendon Press.

Canarie, D. (2019). Not Ready for Prime Time: A Response to "Universal Basic Income: Policy Options at National, State, and Local Levels. *Maine Policy Review*, 76-66.

Clark, T., & Dilnot, A. (2002). *Long-Term Trends in British Taxation and Spending.* The Institute for Fiscal Studies Briefing Note No. 25.

Department for Work & Pensions. (2017). *Autumn Budget 2017 - Expenditure and Caseload Forecasts.*

Department for Work & Pensions. (2018). *Households Below Average Income, 2016/17.*

E. Fouksman, A. S. (2019, June). *UBI and NIT Marginal Tax Rate Proof*. Retrieved from efouksman.weebly.com/: https://efouksman.weebly.com/uploads/5/6/6/1/56610801/saxe_fouksman_2019_ubi_nit_marginal_tax_proof.pdf

Forget, E. L. (2011). The Town with No Poverty: The Health Effects of a Canadian Guaranteed Annual Income Field Experiment. *Canadian Public Policy, 37*(3), 283-305.

Goodin, R. E. (1992). Towards a Minimally Presumptuous Social Welfare Policy. In P. Van Parijs, *Arguing for Basic Income: Ethical Foundations for a Radical Reform* (pp. 195-214). London: Verso.

HM Revenue & Customs. (2017). *Annual Stamp Tax Statistics 2016-17.*

HM Treasury. (2017). *Public Expenditure - Statistical Analyses 2017.*

Jessen, R., Rostam-Afschar, D., & Steiner, V. (2015). *Getting the Poot to Work: Three Welfare Increasing Reforms for a Busy Germany.* Free University Berlin Discussion Paper, School of Business & Economics: Economics, No. 2015/22.

Jordan, B., James, S., Kay, H., & Redley, M. (1992). *Trapped in Poverty? - Labour-Market Decisions in Low-Income Households.* Abingdon: Routledge.

Kela. (2016). *From Idea to Experiment - Report on Universal Basic Income Experiment in Finland.* Working Papers 106.

Martinelli, L. (2017). Exploring the distributional and work incentive effects of plausible illustrative Basic Income schemes. *IPR Working Paper*.

Martinelli, L. (2017). The fiscal and distributional implications of alternative Universal Basic Income schemes in the UK. *IPR Working Paper*.

Miller, A. (2017). *A Basic Income Handbook.* Edinburgh: Luath Press Ltd.

OECD. (2010). Using the OECD Equivalence Scale in Taxes and Benefits Analysis. *Economic & Labour Market Review 4:1*, 49-54.

Office for National Statistics. (2017). *Percentage of households by size, composition and age in each gross income decile group.* Table A49.

Office for National Statistics. (2018a). *Gross domestic product per head: Table P.*

Office for National Statistics. (2018b). *Overview of the UK Population: November 2018.*

Office for National Statistics. (2018c). *The Effects of Taxes and Benefits on Household Income, 2016/17 - Reference Tables.*

Office for National Statistics. (2019). *Gross Domestic Product: chained volume measures: Seasonally adjusted £m.* Series 110219.

Pereira, R. (2017). The Cost of Universal Basic Income: Public Savings and Programme Redundancy Exceed Cost. In R. Pereira, *Financing Basic Income* (pp. 9-45). New York, NY: Palgrave Macmillan.

Persaud, A. (2015). *Closing the Stamp Duty Loophole.* Intelligence Capital Report.

Piachaud, D. (2016). *Citizen's Income: Rights and Wrongs.* Centre for the Analysis of Social Exclusion Report.

Piketty, T. (2014). *Das Kapital im 21. Jahrhundert.* München: C. H. Beck oHG.

Portes, J., Reed, H., & Percy, A. (2017). *Social Prosperity for the Future: A Proposal for Universal Basic Services.* Social Prosperity Network Report.

Proctor, B. D., Semega, J. L., & Kollar, M. A. (2016). *Income and Poverty in the United States: 2015.* United States Census Bureau Current Population Reports.

R. A. Levine, H. W. (2005). A Retrospective On The Negative Income Tax Experiments: Looking Back At The Most Innovative Field Studies In Social Policy. In M. A. K. Widerquist, *The Ethics and Economics of the Basic Income Guarantuee* (pp. 95-106). Aldershot: Ashgate.

R. G. Wilkinson, K. P. (2009). *The Spirit Level: Why More Equal Societies Almost Always Do Better.* London: Allen Lane.

Santens, S. (2017, July 7). *The Cost of Universal Basic Income is the Net Transfer Amount, Not the Gross Price Tag*. Retrieved from Scottsantens.com: http://www.scottsantens.com/the-cost-of-universal-basic-income-is-the-net-transfer-amount-not-the-gross-price-tag

Sutherland, H., & Figari, F. (2013). EUROMOD: The European Union Tax-Benefit Microsimulation Model. *International Journal of Microsimulation 6:1*, 4-26.

Torry, M. (2018). *Why We Need a Citizen's Basic Income.* Bristol: Policy Press.

Torry, M. (2019). Static microsimulation research on Citizen's Basic Income for the UK: a personal summary and further reflections. *EUROMOD Working Paper Series, 13/19.*

U.S. Bureau of Economic Analysis. (2019). *Gross domestic product per capita, Not Seasonally Adjusted.* Data Series A939RC0A052NBEA.

US Census Bureau. (2017). *Historical Income Table.* Table H-3.

Van Parijs, P., & Vanderborght, Y. (2012). Basic Income in a Globalized Economy. In B. Reynolds, & S. Healy, *Does the European Social Model Have a Future? Challenges and Responses 70 Years After the Beveridge Report* (pp. 31-60). Dublin: Social Justice Ireland.

Widerquist, K. (2017, September 10). *The BIG Misunderstanding About the Cost of Universal Basic Income*. Retrieved from progress.org: https://www.progress.org/articles/the-big-misunderstanding-about-the-cost-of-universal-basic-income

Widerquist, K. (2017). The Cost od Basic Income: Back-of-the-Envelop Calculations. *Basic Income Studies 12:2*.

Widerquist, K., & Howard, M. (2012). *Exporting the Alaska Model.* Palgrave Maxmillan.

Widerquist, K., & Lewis, M. A. (2006). An efficiency argument for the Basic Income Guarantee. *International Journal of Environment, Workplace and Environment, 2*(1), 21-43.