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RESEARCH

Is Funding a Large Universal Basic Income Feasible? A Quantitative Analysis of UBI with Endogenous Labour Supply

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This article addresses a key point of contention in the ongoing UBI debate: given the way labour supply responds to tax changes, is it possible to fund a large UBI using income taxes? Using recent empirical estimates and quantitative tools from the public economics literature, we assess what level of UBI may be funded given the fall in labour supply that could be induced by the required larger taxes. Despite a prevalent belief that a large UBI would be fiscally irresponsible, we find that it is possible to fund a large annual UBI over £11,000 per person, that it could be funded through a 45% flat tax, but that increasing taxes on the most affluent alone would be insufficient. Our findings highlight an important tension: a large UBI is possible, but it requires large tax rates, including for those at the bottom of the income distribution.

Keywords: poverty; inequality; redistribution; taxation; welfare

1. Introduction

Once viewed as a radical policy proposal, the idea of a universal basic income (UBI) has entered the political mainstream internationally in recent years. Its proponents view it as a simple and powerful tool to eradicate poverty and to help the greatest number of people achieve real economic freedom. However, its detractors argue that UBI would be incredibly costly, would erode the norms of responsibility and reciprocity that underpin our societies, and may even be counter-productive from the perspective of poverty alleviation.

Such ostensible advantages and disadvantages are largely discussed in abstract terms, without being grounded in data [1].[1] In this paper, we show how to leverage novel empirical results and conceptual insights from the recent literature in public economics in order to shed new light on the debate over UBI.[2]

We focus on a key point of contention in the ongoing UBI debate: given the response of labour supply to taxes, is it possible to fund a large UBI through income taxes? We focus on a specific UBI proposal, where the UBI is funded solely through changes in income taxes; we are not considering reducing current benefits or using other forms of taxation.[3]

A potential concern is that funding a large UBI through incomes taxes would require high income tax rates, which may disincentivize work and in turn lead to a fall in hours worked, effort, and other components of labour supply.[4] This fall in labour supply would lower taxable income, potentially making it impossible to fund a large UBI. There is a thus tension between two factors, with the high tax rates- almost certainly necessary to finance a large UBI- likely to deter labour supply. In turn, this lowers the revenue available to tax and fund a large UBI. Whether a large UBI is feasible hinges on understanding how these competing factors balance against one another.

A prevalent view among many economists is that this tension makes a large UBI unsustainable. For example, for the United States Hoynes and Rothstein argue that implementing a moderate-sized UBI ($12,000 per year to each US resident over age 18) would cost about 75% of current total U.S. federal expenditures and require a prohibitively high tax hike [2]. It can thus be argued that proposing a large UBI is fiscally irresponsible.

[1] Ghatak and Maniquet, for example, provide a review of the theoretical arguments.

[2] We would like to thank Filip Klein and Ramya Raghavan for excellent research assistance and conference participants at the Beveridge 2.0 Symposium: Priorities for Reforming Transfer Programmes for helpful comments.

[3] While this is a more restricted exercise than one that allows reducing existing benefits or using other taxes like wealth, sales, or capital gains taxes, this approach makes the case for feasibility of a large UBI stronger as one might think that the required increase in income taxes and the resulting disincentive effects may make such a proposal impractical.

[4] For example, getting promoted may not appear as attractive if the marginal income tax rate is very high. Some workers may consequently decide to reduce work effort and delay their career progression given the lack of strong financial incentives.

Although this view may be plausible, an alternative view may be equally so: that a carefully devised funding (tax) structure may make it possible to sustainably deliver a large UBI. For this to succeed, the tax rates must not be so high as to deter most individuals from working, while being high enough to fund the UBI. It is inevitable that there would be some disincentivising effects upon part of the workforce, but a precisely designed tax schedule could minimise them. This question can only be settled empirically and quantitatively.

Despite this clear need for empirical and quantitative work, to the best of our knowledge there is no quantitative study, based on empirical evidence, examining whether a UBI is feasible given that the necessary tax rates should reduce labour supply. Instead, existing quantitative analyses focus on the distinction between gross and net costs of UBI (e.g. Widerquist [3]) and fail to account for any potential changes to the labour supply, assuming that earned income will remain the same when taxes increase to fund UBI.

In this paper, we show how estimates and tools from the public economics literature can be used to transparently assess what level of UBI may be funded given the fall in labour supply induced by higher income taxes.[5] We do so by using the workhorse optimal taxation model, estimated to fit empirical labour supply estimates and including the key features of the current UK tax and transfer system, and income distribution.

Using this approach, we answer three questions about the feasibility of funding UBI through changes to the income tax system without reducing other benefits:

1. Could, given the response of labour supply to tax changes, it be possible to fund a large UBI through changes to income tax rates?
2. Could a large UBI be funded by a 'simple' income tax system, such as a flat tax?
3. Could a large UBI be funded by only increasing the tax rate for the top earners (e.g., the top 10% or the top 1%)?

We find that it is possible to fund a large UBI, and that it could be funded through a flat tax, but that it cannot be funded by increasing income taxes on the most affluent taxpayers alone.

This analysis delivers three broad insights for those interested in the feasibility of UBI from a policy point of view and normative justifications for it.

First, a large UBI is feasible, but, since it cannot be funded by top earners alone, it is essential to build broad-based support.

Second, a key feature of tax systems that can sustain a large UBI is that there must be a high marginal tax rate towards the lower end of the income distribution. This means that there is an inherent trade-off between providing a large UBI and encouraging work near the bottom of the income distribution on grounds of feasibility. Our results suggest that a flat tax may provide a good balance, in addition to having the benefit of simplicity.

Third, since a large UBI is feasible, a key question left for future work on the issue is to consider the normative principles that may (or may not) make UBI desirable. In the present analysis, we use the standard approach in economics, where utilitarianism is the normative criterion, which turns out to justify a UBI amount over £15,000 per year in the context of the UK.

We hope that these results demonstrate that taking a quantitative and comparative approach is instructive to address some of the key points of disagreement between the proponents and critics of UBI. The quantitative approach is informed by estimates of empirical parameters, such as the elasticity of taxable income, and clarifies what outcomes could be expected from the introduction of a UBI. The comparative approach means that any UBI proposal should be precisely compared to the relative costs and benefits of any alternative tax and transfer schemes, including the existing tax and transfer schedule.

We organise the analysis into three parts. In Section 2, we briefly present the model, data, and empirical estimates that underpin our approach and results. In Section 3, we present and discuss the main results of the analysis, computing feasible UBI amounts given the response of labour supply to tax rates. In Section 4, we propose a complementary analysis describing the effects of UBI on inequality, disposable income, and earned income across the distribution of households.

2. Model and Data

2.1 Conceptual framework

Here we present, in a simplified setup, the key ideas and mechanics of our model, which is based on the Nobel Prize winning optimal taxation model of Mirrlees and its recent adaptations [4, 5, 6]. Readers who are not interested in mathematical details can skip this subsection without missing any of our key arguments.

Let y be post-tax income, wl be pre-tax income (where w is the wage and l hours worked), and $T(wl)$ be total taxes paid. A UBI can be interpreted as a lump-sum transfer b. In a tax system where taxes paid increase with income, de facto UBI can be interpreted as a negative income tax scheme: $y = b + wl - T(wl)$.

Conversely, a negative $T(0)$ can be interpreted as a UBI. In a standard setting where positive marginal tax rates, i.e. $T'(0) > 0$, only individuals with earnings above some threshold pay more taxes than they receive in transfers. These

[5] As we noted earlier, we focus on using income taxes exclusively to fund the UBI and we keep the current benefit system unchanged.

simple observations show that UBI cannot be thought of independently from the change in the tax schedule that is required to fund it.

In the fully fledged model, individuals choose their labour supply l to maximise utility. Individuals have different levels of earnings potential (captured by the wages, w). A social planner sets tax rates on earnings in a fully unrestricted way to maximise social welfare according to a utilitarian criterion. The key point is that the social planner realises that individuals will adjust their labour supply when their earnings are taxed and incorporates this into her calculations. The response of earnings to tax rates is governed by the elasticity of labour supply, a parameter in the model that can be estimated empirically.[6] Plugging this and other parameter estimates into the model then delivers the results we are interested in: an understanding of how all these factors will come together in practice under different levels of UBI and taxation, ultimately telling us the highest feasible UBI under different conditions.

2.2 Data and empirical estimates

To make an empirical assessment of the feasibility of a UBI scheme funded by income taxes, we need to have a measure of how much labour supply is likely to react to changes in income taxes. That is, the first key parameter that needs to be estimated in order to answer our question on UBI's feasibility is the elasticity of labour supply. Conceptually, this parameter is a measure of the amount by which people adjust their earnings when the after-tax wage changes. This topic has been subject to sustained analysis in public and labour economics for over 30 years. From a statistical point of view, the key difficulty is to disentangle correlation from causation. Recent work uses quasi-experiments for empirical estimation of the labour supply elasticity – exploiting situations where the changes in the tax structures were exogenous, i.e. orthogonal to economic trends. This approach delivers credible, robust, and causal estimates. For example, Kleven and Schultz use tax reforms in Denmark to show the causal effect of changes in taxes on work effort and earnings [7].

Overall, there is a clear consensus on the value of the labour supply elasticity around 0.3. This value means that when an individual's wage doubles, their total earnings more than double, increasing by 130%. The increase in wage means that that the incentives to work increase, and so do actual hours worked. Therefore, there is not merely a mechanical doubling of total earnings (i.e., where the wage rate increases but labour supply remains fixed). Instead, because both the wage rate and labour supply increase, total earnings (which is simply the wage rate times labour supplied) increases more than the wage increase alone. Although there would doubtless be some contextual variance, the evidence suggests that a labour supply elasticity of 0.3 is accurate for most developed economies, including the United Kingdom.

The second empirical input required by our model is a description of the existing tax and transfer system, ensuring the model is calibrated appropriately and accounts for the budgetary requirements of the UK government (which we take as fixed irrespective of the UBI level). Although this task may seem conceptually simple, it is challenging because of the complexity of the UK's tax and transfer system. For example, we must consider the many different forms of taxation on various sources of income, while accounting for the phasing out of welfare benefits.

Newly released data from the Office of National Statistics (ONS) for the fiscal year 2017–2018 enables this to be done in a precise and comprehensive manner. For each household income decile, we obtain a comprehensive picture of income, benefits in cash (including job seeker allowance, employment allowance, incapacity benefits, child benefits, tax credits, housing benefit, and disability allowances) and taxes (including income taxes, employee and employer national insurance contribution, council taxes, and VAT). In addition, the ONS also provides information on the total revenue that must be raised for benefits in kind, including education, NHS, social care, subsidies for housing, rail and bus, and school meals.

This data lets us describe the existing tax system in the UK, shown in **Figure 1**. The figure shows the average effective marginal tax rate faced by households in the UK for each decile of the income distribution. An effective marginal tax rate of 50% means that for every additional pound of earned income, the household gets 50 pence in disposable income. The effective marginal tax rates reflect existing taxes as well as the fact that a household may become ineligible to certain welfare benefits as their earned income increases.

An interesting feature of the existing tax schedule in **Figure 1** is that the effective marginal tax rate is negative in the first decile of the income distribution, with existing work subsidies topping up the income of households with low levels of earned income. The key question we aim to answer is to determine whether or not there is room to introduce a large UBI, given the level of tax rates and budgetary needs in the existing tax and transfer system, and the fact that we are restricting ourselves to a proposal where UBI is not replacing any existing scheme.[7]

3. A quantitative analysis of UBI

In this section, we present our main quantitative results. We first describe the optimal tax schedule in the quantitative model following Mirrlees [4]. Second, we answer the three questions described in the introduction: (i) how large a UBI can be funded through income tax changes; (ii) could it be funded with a flat tax; and (iii) could it be funded by only increasing income taxes for the highest earners?

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[6] We refer the reader to the references above for more detail.

[7] Although UBI is often framed as a partial replacement of existing transfers, as noted earlier we study whether a large UBI can be funded whilst preserving existing transfers. In Section 3, we find that a large UBI can be funded even without replacing existing transfers. This result is stronger and more surprising than if we allowed UBI to replace many existing transfers.

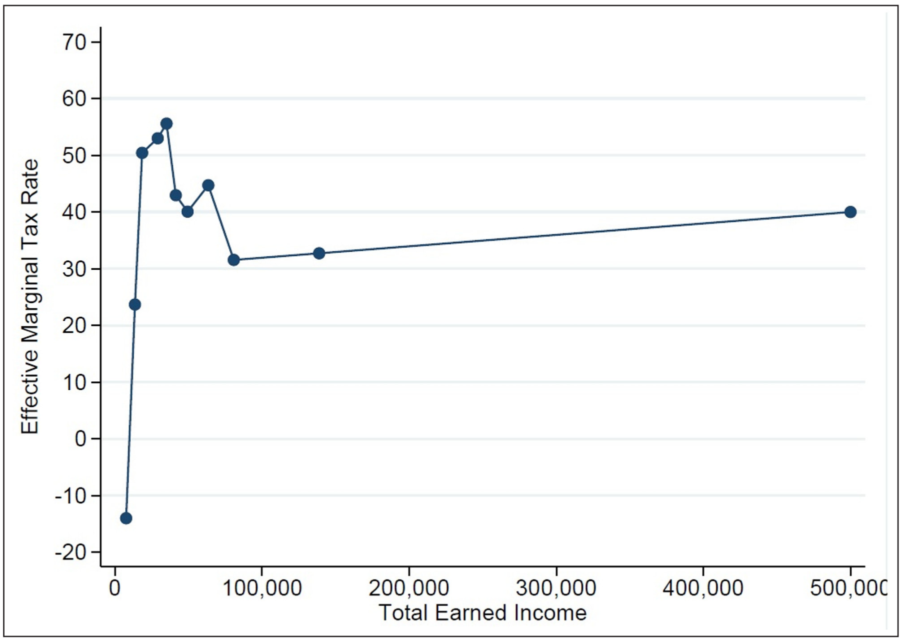

Figure 1: Marginal Tax Rates in the UK Tax and Transfer System, Fiscal Year 2017–2018.
Source: ONS and authors' calculations.

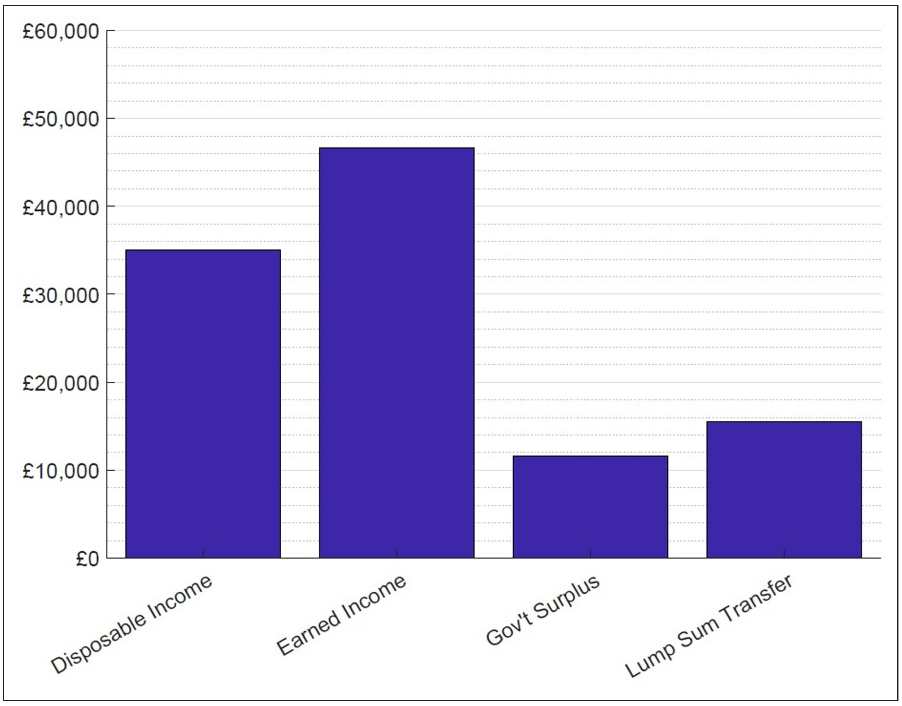

Figure 2: Income and Tax Statistics at the Optimal Tax Schedule.
Source: Authors' calculations. The numbers are given per capita.

3.1 Normative analysis: UBI and optimal redistribution with standard utilitarian preferences

In deciding what the best, or most efficient, methods and levels of taxation are in a given society, we need a sense of how the members of that society would value different distributions of take-home income (i.e. UBI plus wage/income, net of taxes), varying in the degree of equality. Such societal-level valuation, reflecting attitude towards inequality, will need to take into account what any redistribution would benefit or cost different members of society, in the form of either transfers or taxes. Based on this, we can determine what is 'best' or 'optimal' for society as a whole. Here, we use the standard utilitarian criterion most often used in the literature – one that involves maximizing the sum total of utility of all citizens. In technical terms, social preferences for redistribution in this case are governed by logarithmic social utility over agents' private utility.

We obtain three key results from the model. First, the optimal redistribution takes the form of a UBI, i.e. a transfer at zero earned income. This result is not 'mechanical' – i.e. it is not just a direct and obvious consequence of our modelling assumptions – since the social planner can set any incentive compatible tax system. Rather, this result shows that the utilitarian criterion naturally leads to redistribution at the bottom of the income distribution, as this is where any additional disposable income is most highly valued. Second, the UBI is large, at about £15,500. This shows that with standard utilitarian preferences for redistribution, the prescribed UBI is substantial. Third, marginal tax rates are high throughout the income distribution, including at the lower end.

These results are depicted in **Figures 2** and **3**. **Figure 2** shows that at the optimal tax schedule, the average earned income per capita is about £47,000. At the observed tax schedule the average earned income is about £51,000 per capita – the difference is explained by the increase in marginal tax rates at the optimal tax schedule, which disincentivises work in order to increase redistribution. The government surplus is about £12,000 per capita, which we have set to match the value at the observed tax schedule.[8] The lump-sum transfer of about £15,500 is the amount given to agents who have zero earnings, i.e. it constitutes a UBI. Disposable income per capita (about £35,000) is simply equal to earned income (£47,000) minus the government surplus (£12,000 per capita).

Figure 3 shows the shape of optimal marginal tax rates across the income distribution. The optimal marginal tax rates have a U-shaped pattern. It may seem counterintuitive to see high marginal tax rates, close to 70%, at the bottom of the earned income distribution. The social planner, after all, would want to redistribute resources to these agents the most. However, the model, when calibrated with the data as described above, suggests that this redistribution is best achieved in a tax system with high tax rates at the bottom. Although this observation is not key for understanding our main result, it is useful to explain this point for the interested reader. Increasing the marginal income tax rate at the bottom of the tax schedule raises more government resources from everybody earning high levels of income, because their *average* tax rate is higher. But it only distorts work incentives of the households who have low levels of income, who face a higher *marginal* tax rate.[9] It is these two countervailing forces that explain the U-shaped tax schedule. At first blush, the schedule of marginal tax rates in **Figure 3** may not look progressive,' because the marginal tax rates are decreasing up to levels of earned income of about £70,000. But it is, in fact, very 'progressive' – in the sense of being redistributive – because the income raised through the tax system is rebated to low-income households in the form of a large UBI (or lump-sum transfer).

Compared to the existing tax schedule depicted in **Figure 1**, it is worth noting two features of the optimal tax schedule in **Figure 3**.

First, the optimal marginal tax rates are higher everywhere than the existing marginal tax rates. This result inherently depends on the strength of social preferences for redistribution. There are different ways to construct a measure of societal preference and although we have used the logarithmic preferences that are standard in the literature, it is useful to keep in mind that this result is sensitive to model specification. Rather than this model suggesting that a large

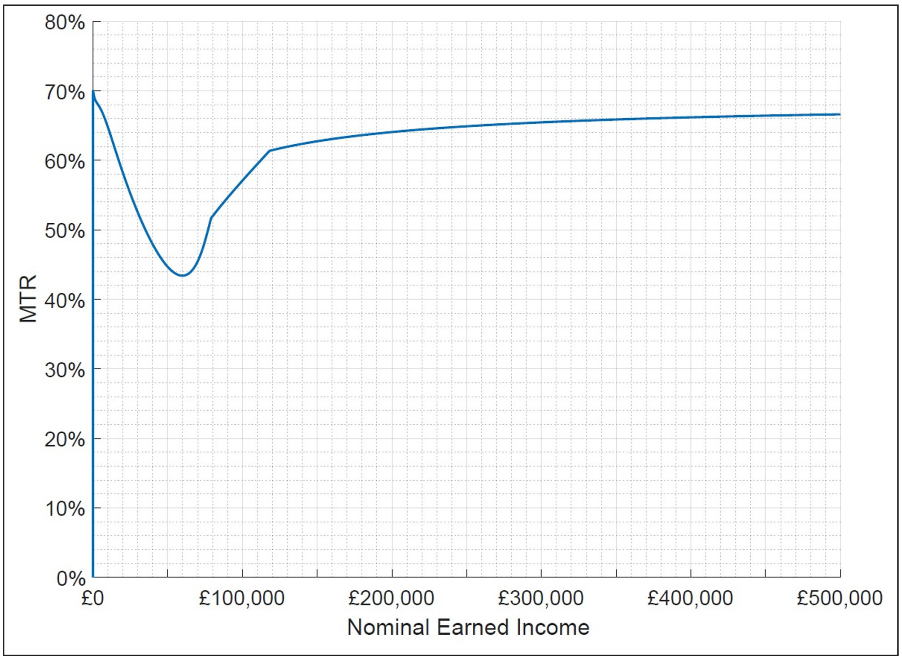

Figure 3: Optimal Marginal Tax Rates, Utilitarian Case.
Source: Authors' calculations.

[8] This amount of government surplus makes it possible to fund the other budgetary needs of the government, including the benefits we keep constant, which include incapacity benefits, child benefits, housing benefit, and disability allowances.

[9] Marginal tax rates, rather than average tax rates, govern incentives to work. For example, low marginal tax rates create incentives to increase hours worked, or to get a promotion faster.

UBI is desirable, it should be viewed as demonstrating that it could be financially sustainable. Whether it is desirable is a different, ethical, question, which should be answered normatively.

Second, it is useful to note that the current observed tax rate features particularly high marginal tax rates for levels of earned income between £40,000 and £70,000, while the optimal tax schedule in our model has relatively low marginal tax rates in this range. Indeed, it is optimal to tax at higher rates earlier in the distribution to achieve higher redistribution at a lower efficiency cost.

When we alter the model to incorporate other preferences for redistribution, other labour supply elasticities, and additional features, including innovation dynamics as in Jaravel and Olivi [6], we obtain qualitatively similar results, i.e. that a large UBI is feasible under an appropriate taxation system.

3.2 Positive analysis: How large a UBI could be funded?

The previous subsection has established that in the Mirrlees model, optimal redistribution takes the form of a UBI. As noted above, the level of UBI inherently depends on the strength of the social preferences for redistribution. The question that motivated this paper is whether or not a large UBI can be funded given that labour supply will be affected by the tax regime necessary to fund the UBI, and that this will in turn affect tax revenues, ultimately going to UBI's affordability. To answer this question more directly, it is useful to consider an extreme case where the social planner aims to maximise redistribution to agents with no earned income. These social preferences are known as 'Rawlsian preferences' and can be incorporated into our model. This exercise is instructive because it gives an upper bound on the feasible UBI.

Figure 4 reports the optimal tax schedule with Rawlsian preferences, compared with the actual tax schedule. The Rawlsian tax schedule features very high marginal tax rates, close to 100% at the bottom of the income distribution, falling to 60% for earned incomes around £60,000, and increasing up to 70% for the highest income levels. As in the utilitarian case described in Section 2.1, the shape of the schedule of marginal tax rates is U-shaped, which stands in contrast with the observed tax schedule.

Figure 5 answers the main question we ask in this paper: what is the largest UBI that can be funded? It reports the levels of UBI that are possible to fund under different tax schemes. The UBI level is maximised, reaching a level of £20,000 per annum, within the optimal Rawlsian tax schedule discussed above. It is worth emphasising that this amount would come in addition to existing transfers, which can still be funded in all simulations of our model (as we impose a revenue requirement of close to £12,000 pounds per capita to account for current benefits). It is also instructive to note that the Rawlsian UBI is about five times larger than the UBI that de facto exists in the current UK transfer system (i.e., transfers at the bottom of the income distribution for individuals that do not have children).

Both political figures and the public may not like or easily understand a tax schedule as complicated as the ones presented thus far. A meaningful practical question is therefore whether the largest feasible UBI we found, which was funded by the Rawlsian scheme, could instead be funded through a simple tax system. We analyse this question by looking at what UBI levels can be raised using a flat tax, at different rates. Under a flat tax regime, a rate of 69% maximises the UBI level, reaching about £17,500. This result shows that it is possible to raise a large UBI without using a highly complex, non-linear Rawlsian tax schedule as in **Figure 4**. However, the more complex tax system could sustain a UBI

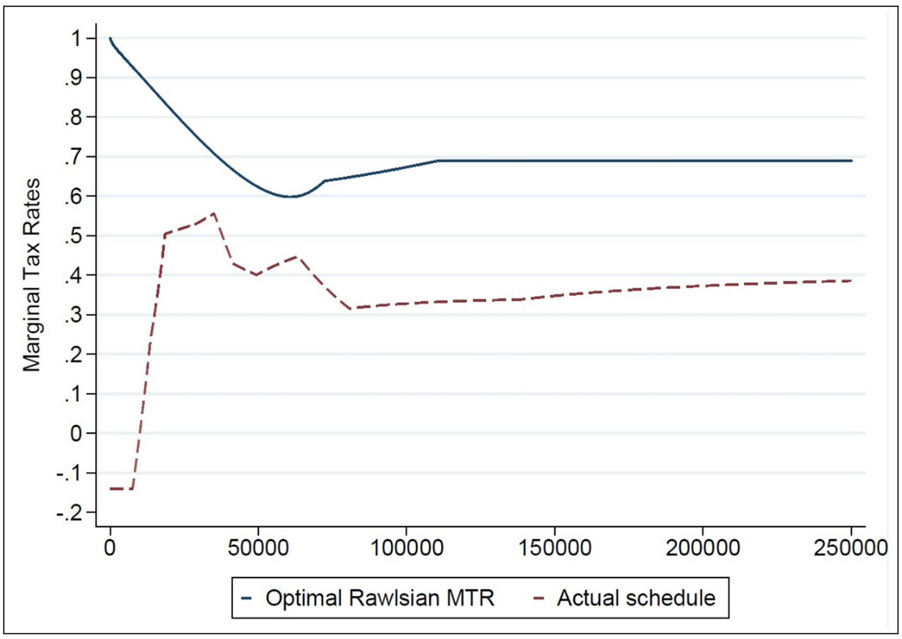

Figure 4: Optimal Marginal Tax Rates, Rawlsian Case.
Source: Authors' calculations.

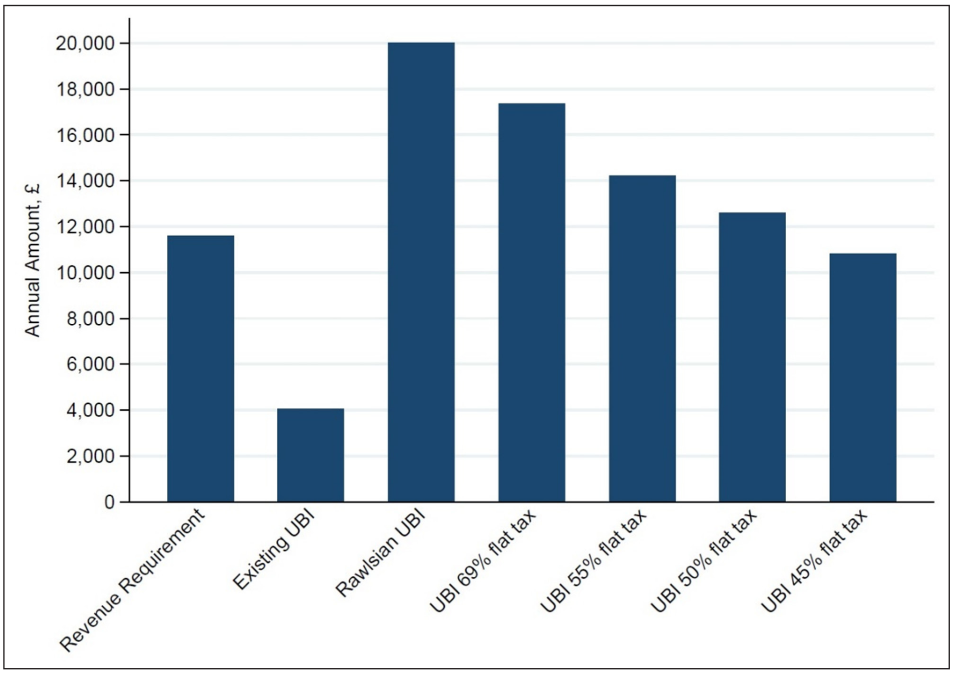

Figure 5: Feasible UBIs across Tax Regimes.
Source: Authors' calculations.

approximately 15% larger. The other columns in **Figure 5** report the financially sustainable amount of UBI for other flat tax rates. Naturally, the UBI amount falls with the tax rate, from £17,500 at a tax rate of 69% to £14,000 with a 55% flat tax, £12,500 with a 50% flat tax, and £11,000 with a 45% flat tax. These feasible UBI levels under flat tax regimes all remain significantly larger than the current UBI.

In a final quantitative exercise, we assess whether a substantial UBI could be funded by increasing the top tax rate to 70%, leaving tax rates below median earnings unchanged at their current level, as shown in **Figure 1**. We pick 70% as the alternative top tax rate because this level is the revenue-maximising top tax rate. Under this alternative tax system, our calibrated model shows that the UBI would remain modest, at about £6,000. In other words, it is not possible to fund a large UBI only by increasing taxes on the richest households. This was by no means a foregone conclusion, and it provides another illustration of the power of a quantitative approach.

Thus, our analysis shows that a large UBI can be funded, but only with an overhaul of the total tax system. It turns out that tax systems with a large UBI are sustainable only with a high phase-out rate at the bottom of the income distribution: as households increase their earned income, the effective UBI transfer (net of taxes) they receive must fall, otherwise the system cannot be funded. These findings highlight an important tension: a large UBI is possible, but it requires large tax rates at the bottom of the income distribution (more so than in the existing tax schedule), i.e. the benefits of a large UBI come with a big reduction in work incentives for low-income households.

4. The distributional effects of a large UBI

The preceding analysis shows that a UBI of up to £20,000 per annum can be funded, and so, if a society truly wants a large UBI, it can be achieved. But for such a system to be implemented, the required tax rates mean that there would be very clear winners and losers. In the last section of this paper, we describe the distributional effects of a tax system with high tax rates and a high UBI. This analysis illustrates how quantitative models can be used to think through whether a tax reform is desirable, given its implied distributional effects.

4.1 Distributional effects of the optimal Rawlsian tax schedule

As discussed in Section 2, the optimal Rawlsian tax schedule maximises the UBI level but requires high marginal tax rates close to 100% near the bottom of the income distribution. It is useful to document what this implies for total labour supply, in the aggregate and across the income distribution. We find that the Rawlsian tax schedule reduces total earned income substantially, because the incentives to work are diminished.

Specifically, total earned income, which is equivalent to GDP in our model, falls from £51,000 per capita at the observed tax schedule to £41,084 per capita at the optimal Rawlsian schedule. Therefore, the UBI is large, but overall economic activity is reduced by 20% – a substantial decline. As part of this change, disposable income, used for consumption after funding the government's budget, falls by 26%. These numbers may seem to paint a negative picture of the Rawlsian tax schedule, but they ignore distributional effects by focusing on the aggregate economy, rather than what would happen for the average individual or any specific group of interest. The aggregate picture, for example, fails to convey that person-weighted disposable income turns out to *increase* by 7.31%, i.e. the average person has higher disposable income under the Rawlsian schedule.[10]

Figure 6 documents the distributional effects at play by showing how earned income changes across the income distribution, comparing the optimal Rawlsian tax system to the observed tax schedule. The patterns are striking. In the bottom quintile of the income distribution, earned income collapses by about 70%. Because low-income households now face very high marginal tax rates, as reported in **Figure 4**, work incentives are significantly reduced and earned income falls. Likewise, incomes fall in the remainder of the distribution, although the fall is 'only' 20% near the top of the income distribution.

Figure 7 documents changes in disposable income across the income distribution, again comparing the optimal Rawlsian tax system to the observed tax schedule. The figure shows that disposable income increases dramatically in the bottom 20% of the earnings distribution. At the very bottom of the distribution, disposable income increases by

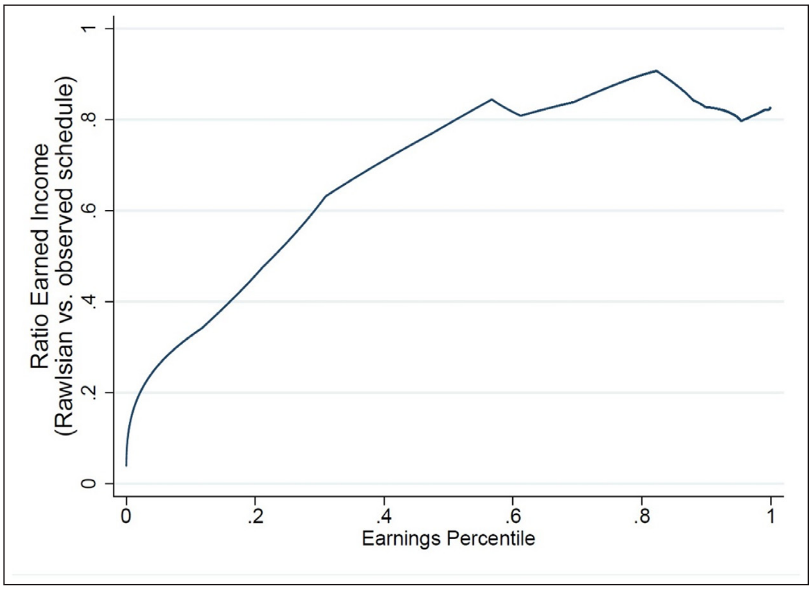

Figure 6: Changes in Earned Income, Rawlsian vs. Observed Tax Schedules.
Source: Authors' calculations.

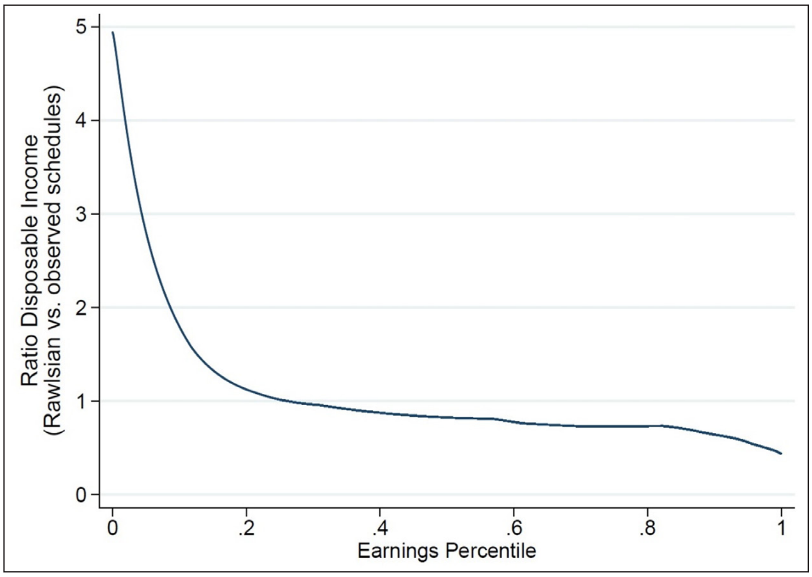

Figure 7: Changes in Disposable Income, Rawlsian vs. Observed Tax Schedules.
Source: ONS and authors' calculations.

[10] We compute the *person-weighted* change in disposable income by taking the average of the percentage changes in individuals' disposable incomes across all individuals in society. In contrast, it can be shown that the percentage change in aggregate disposable income per capita is equal to an *income-weighted* average of the percentage changes in individuals' disposable incomes. This weighting scheme gives more weight to high earners, whose disposable income falls more under the Rawlsian schedule. Hence the person-weighted average change in disposable income can be positive even though aggregate disposable income per capita fell.

a factor of about five, because the UBI in the Rawlsian tax system is about five times larger than the observed UBI. At the 10th percentile of the earnings distribution, disposable income roughly doubles, even though (as shown on **Figure 6**) earned income falls by 70%. These results illustrate the channels previewed earlier: very high marginal tax rates at the bottom reduce work incentives at the bottom, but they also allow for more redistribution. This ultimately leads to a much higher disposable income but much lower earned income for those at the bottom of the income distribution.

These patterns are quantitatively large and echo the intuitive argument raised by the proponents and detractors of UBI: a large UBI does reduce poverty, but the necessary tax changes, together with the grant, lower incentives to work and so reduce earned incomes at the bottom of the earnings distribution.

4.2 Distributional effects of a 45% flat tax

The Rawlsian tax schedule leads to strong distributional effects in **Figures 6** and **7**. Are the effects as large with a flat tax large enough to fund a substantial UBI? Let us consider a 45% flat tax, which allows for a UBI of £11,000 (**Figure 5**). We find that average earned income per capita falls from £51,000 at the observed schedule to £49,823 with a 45% flat tax, a modest fall of 2.4%. Disposable income per capita falls from £39,401 to £38,224, i.e. a fall of 3%. Person-weighted disposable income increases by 7.23% (which is very close to the Rawlsian case), i.e. for the average person disposable income increases.

Figure 8 depicts the distributional effects in earned income implied by switching to a tax schedule with a 45% flat tax. Earned income falls for the poorest third of those in the distribution, by 15% on average. This fall is because, in the current tax system, low-income households face tax subsidies, i.e. their marginal tax rate would increase substantially under a 45% flat tax and their incentives to work would be reduced. The middle of the distribution increases its labour supply, with an increase in earned income of about 5% from the 35th to the 60th percentile of the income distribution. Indeed, in the current tax system the middle class faces higher marginal tax rates, sometimes above 50%. If a 45% flat tax were established, they would actually face a lower marginal tax rate. Finally, there is a small fall in labour supply at the very top of the distribution.

Figure 9 depicts the implications of the 45% flat tax for disposable income across the income distribution. Disposable income increases substantially for households in the bottom 15% of the distribution, remains stable for households up to the 80th percentile, and decreases above. This indicates that a 45% flat tax has the potential to alleviate poverty while preserving incentives to work for most households, only meaningfully reducing disposable income for those at the top of the income distribution.

Although very simple, this analysis of the distributional effects highlights the importance for any UBI proposal to specify how the tax system will be adjusted and to work out the implications for labour supply and earned and disposable income across the distribution. Taken together, the results suggest that a flat tax may be more feasible politically than the optimum Rawlsian tax schedule, which prescribed a UBI almost twice as large but led to a fall in GDP of about 20%, compared with 2% with the 45% flat tax.

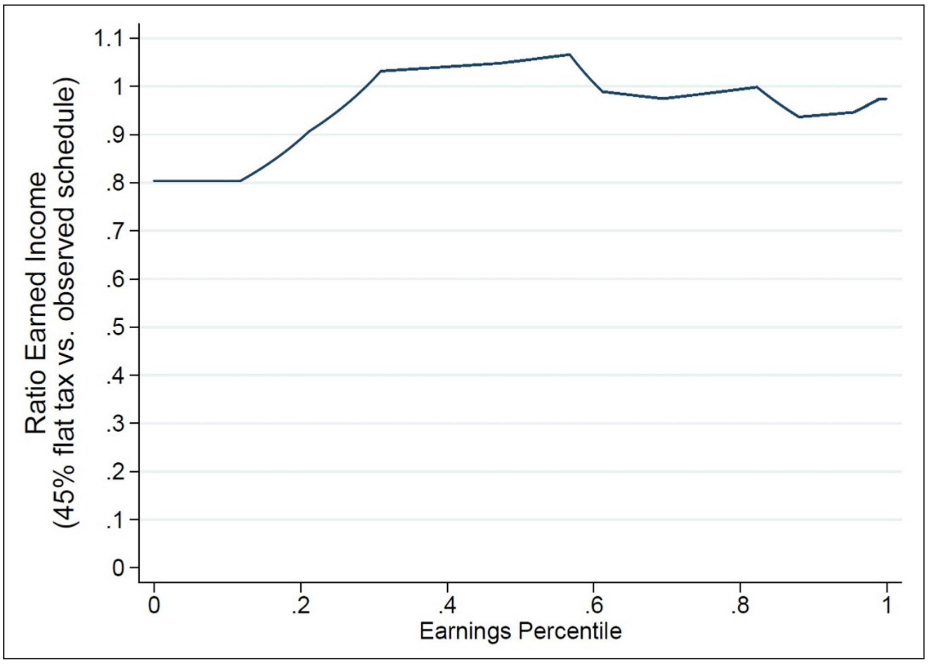

Figure 8: Changes in Earned Income, 45% Flat Tax vs. Observed Tax Schedules.
Source: ONS and authors' calculations.

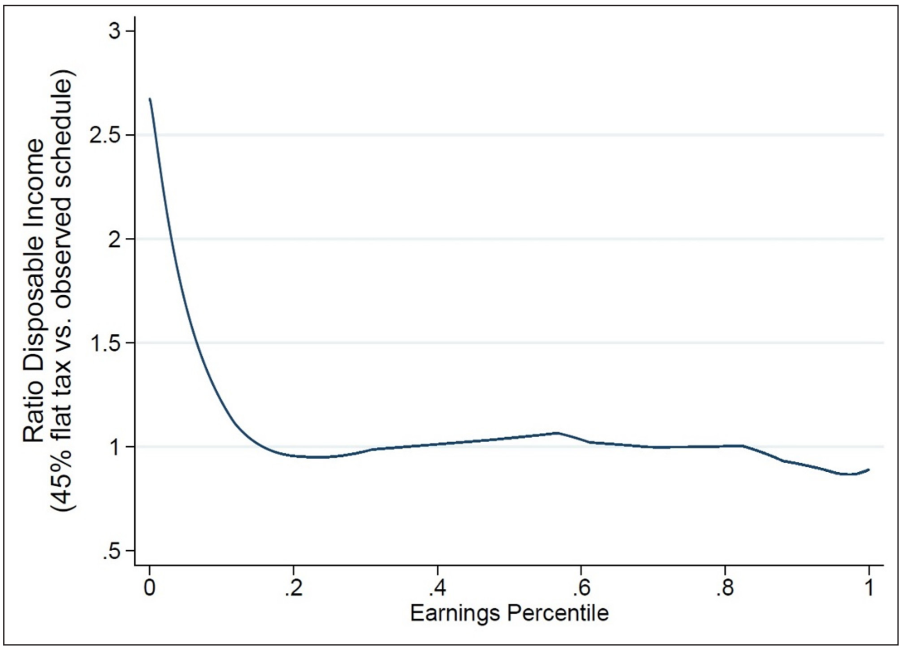

Figure 9: Changes in Disposable Income, 45% Flat Tax vs. Observed Tax Schedules.
Source: ONS and authors' calculations.

5. Conclusion

In this paper, we have used recent tools and empirical estimates from public economics to assess whether a large UBI is feasible to deliver, using income taxes whilst retaining the existing set of benefits. We have established several results concerning UBI's feasibility at different levels, the income taxation systems that could sustain these options, the consequences for different forms of income inequality and the mechanisms behind these consequences.

Collectively, the results show the value of a quantitative and comparative approach to the UBI debate. Using the standard model of optimal taxation, we have found that the optimal redistribution scheme closely resembles a UBI, i.e. it consists in a net positive transfer at zero earned income. With standard utilitarian preferences for redistribution, we have found that the prescribed UBI is substantial. More generally, we have found that across a range of prospective income tax systems, a large UBI could be funded, but that it would require substantial adjustments to the current tax system. Finally, we have shown that it is instructive to assess the distributional effects of proposed tax reforms in terms of changes in both earned income and disposable income across individuals, rather than just looking at averages or aggregates.

In addition to illustrating the value of using quantitative analysis to better inform the UBI debate, this paper has reached some substantive conclusions. A 45% flat tax appears to be a pragmatic approach to simultaneously simplify the tax system and allow for a large UBI of £11,000, while still preserving incentives to work throughout most of the income distribution. This is one of several ways forward and its merits will need to be considered amid the desire for UBI and against alternatives. For example, future work could explore modifications to our assumptions that the current benefit system would be unchanged in the presence of UBI, or that funding would be exclusively through income taxes. We have shown that a large UBI is feasible even under these restrictive conditions, which makes the general case in support of UBI stronger.

Competing Interests

The authors have no competing interests to declare.

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