Fuller measures of output, input and productivity in the non-profit sector: a proof of concept

Authors:
Josh Martin
Bank of England and ESCoE
Jon Franklin
Pro Bono Economics

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Authors' contacts:
josh.martin@bankofengland.co.uk

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The Productivity Institute, headquartered at Alliance Manchester Business School, The University of Manchester, Booth Street West, Manchester, M15 6PB. More information can be found on The Productivity Institute's website. Contact us at theproductivityinstitute@manchester.ac.uk

Abstract

The National Accounting framework recognises a number of institutional sectors, based on the way in which economic units are organised and funded. One such sector is the Non-Profit Institutions Serving Households (NPISH) sector. In the UK, NPISH comprises most higher education establishments, charities, and a range of other non-profit bodies. Like the government sector, the output of the NPISH sector cannot be measured by market transactions, since there are not economically meaningful prices. Thus, productivity cannot easily be measured either. This has been partially overcome for the public sector based on recommendations in the Atkinson Review, but little attention has been paid to similar challenges measuring the output of the NPISH sector.

We explore the appropriate conceptual framework for thinking about non-profit output and productivity, and sketch a roadmap for measuring the productivity of the non-profit sector. Doing so requires us to go beyond the National Accounts, since some inputs to NPISH sector output (such as volunteer time) are outside the GDP boundary. Using a range of publicly available data we estimate new input and output measures for the non-profit sector, and from these estimate productivity levels and growth. We find that the NPISH sector in the UK has grown rapidly over the past 20 years, with hours worked and nominal GVA growing faster than for the economy as a whole. Our fuller measures suggest NPISH accounts for about 4.4% of GDP in 2019, compared with 2.9% before conceptual adjustments, and up from 3.3% two decades before.

The NPISH sector is less productive than the UK average, although similar to other labour-intensive industries like retail. We estimate little growth in real productivity, although price measurement in the relevant industries is difficult, so there is considerable uncertainty around our estimates of real GVA and productivity growth. There are also conceptual and practical difficulties in measuring the value of a sector that is likely to exhibit significant positive externalities, such that our adjusted measures still undervalue the sector.

1. Introduction

Whether it is through interventions to support the homeless, providing mental health care for children, or funding research into life-threatening diseases, the non-profit sector (also often described as the “third sector” or “social sector”) plays an important role in tackling some of the most complex problems that our society faces. And yet, we know relatively little about it compared to many other parts of our society. We do not know the scale of its economic contribution, how efficiently it uses the resources provided to it by funders or, importantly, whether it is getting more effective at tackling these problems over time.

In other parts of the economy we use measures of productivity to understand improvements in the efficiency of sectors and industries over time. However, such measures are challenging both conceptually and practically for the non-profit sector.

Measures of productivity could help us understand two key questions for the non-profit sector:

- How do levels of productivity compare to other sectors? Productivity levels are interesting to find out the relative efficiency of different countries, regions, industries or firms compared to each other. For instance, the manufacturing industry tends to be more productive than services industries, although the financial services industry is also a highly productive industry. We are interested to see how the productivity of the non-profit sector compares to other industries in the UK economy. This would be measured based on the value of output produced per unit of input; these are measured in the prices of a period, and can be compared across countries, regions, industries or firms at a point in time.
- How have productivity levels in the non-profit sector changed over time? Productivity growth rates are interesting to see how the efficiency of the production process is changing over time. For the economy as a whole, productivity growth is one of the main drivers of living standards over time – faster productivity growth should enable firms to produce more goods and services from the same number of hours of work, and thus offer higher real wages, increasing living standards. This is measured as the growth in the volume of output produced per unit of input over time; these are measured in constant prices (i.e. adjusting for inflation) and enable understanding of the growth of productivity; these growth rates can also be compared across countries, regions and industries.

At present, we cannot readily answer these questions for the non-profit sector, since reliable measures of the output, inputs and productivity of the sector do not exist. This is for many reasons, including definitional and conceptual challenges, data deficiency, and inattention in statistical circles. We aim to address some of these issues in this paper, by presenting a new framework for thinking about the output of the non-profit sector in National Accounting terms, assembling publicly-available data into this framework, and presenting initial results.

The National Accounting framework recognises a number of institutional sectors, based on the way in which economic units are organised and funded. One such sector is the Non-Profit Institutions Serving Households (NPISH) sector. In the UK, NPISH comprises most higher education establishments, charities, and a range of other non-profit bodies. As measured, it accounts for about 3% of UK Gross Value Added (GVA) in 2019, although as we demonstrate, this is an underestimate of its true value.

Like the government sector, the output of the NPISH sector cannot be measured by market transactions, since there are not economically meaningful prices. Thus, productivity cannot

easily be measured either. This has been partially overcome for the public sector based on recommendations in the Atkinson Review, but little attention has been paid to similar challenges measuring the output of the NPISH sector.

The paper proceeds as follows: Section 2 defines the non-profit sector for the purposes of this work, and sets out the conceptual framework; Section 3 describes the data and methods employed in the work; Section 4 presents the results of a proof of concept set of estimates for inputs, output and productivity of the non-profit sector; and Section 5 concludes.

2. Conceptual framework

In this Section we first address definition issues, then set out the conceptual framework for inputs and output, before providing a summary and describing some unresolved issues.

2.1. How do we define the non-profit sector?

The data, methods and approach in this paper are rooted in the National Accounts, which are the internationally recognised way to compile statistics of the economy. While this has its limitations, including many that impinge on the accurate measurement of the non-profit sector, it is nonetheless a useful starting point for this work given its central position in most economic statistics. We will have to go 'beyond the National Accounts' in a number of places through this work.

The National Accounts define five main[1] institutional sectors[2], which reflect differences in ownership and funding. One of these is the Non-Profit Institutions Serving Households (NPISH) sector, which is for economics units that are non-profit making, non-market operators (earn less than 50% of their revenue from sales of goods and services; or do not charge economically meaningful prices), but not state-owned. The other sectors are: non-financial corporations (both publicly and privately owned); financial corporations; government (both central and local); and households (reflecting households as consumers, and unincorporated businesses).

While the NPISH sector is the obvious home for non-profit organisations, they can exist in other institutional sectors, especially the Private Non-Financial Corporations (PNFCs) sector. A business that is non-profit making but does still operate in the market (charges economically meaningful prices, or earns more than 50% of its revenue from sales) would be classified in the PNFCs sector, but might be of relevance to analysis of the productivity of the non-profit sector. It is difficult to quantify the size of the non-profit sector outside of the NPISH sector, but we suspect it would be large and an important target for future research. However, identifying non-profit organisations outside the NPISH sector is impossible from published aggregate data, and would only be possible from microdata analysis, which is beyond the scope of the current work. We revisit this topic briefly in Section 5.

For this paper, we focus on the NPISH sector. This encompasses much of what we are interested in when considering the non-profit sector, and is the only sector in the National Accounts which is clearly related. We will refer to the broader non-profit sector, in abstract or specifically, as "the non-profit sector" (NPS), and restrict use of "NPISH" when speaking specifically about that National Accounts institutional sector.

[1] Most of these sectors also have more detailed subdivisions, which are not pertinent to this paper.
[2] Throughout, we use "sector" in the National Accounting sense, referring to the description given in the text here. The way in which many people use "sector" – to describe the *type* of output, e.g. manufacturing or services – are referred to as "industries" in the National Accounting context, which is again the term we use throughout.

2.2. Conceptualising and measuring inputs in the non-profit sector

Like the rest of the economy, inputs in the non-profit sector can be thought to include labour, capital assets, and intermediate goods and services. However, unlike most of the rest of the economy, not all of those factors of production are paid for in the non-profit sector, notably the labour.

We conceptualise the production function of the non-profit sector as:

$$Y = Af(L_p, L_v, K, I)$$

Where Y is output, equal to a function of paid labour L_p, volunteer labour L_v, capital K, and intermediate inputs I, with a productivity term A. Define $L = L_p + L_v$.

The specific functional form[3] is not important to the subsequent sections, but it is necessary to state that L_p and L_v are positive and non-overlapping: that is, each hour of labour input is either paid or given voluntarily, such that measuring only L_p would underestimate inputs by L_v.

While L_p can be measured through standard household and labour market surveys, as for the rest of the economy, L_v cannot. L_v is a relatively large input in the non-profit sector, but a relatively small input outside the non-profit sector. As such, its measurement does not attract much attention when measuring the economy as a whole, or most of the sectors. Measuring L_v is thus mostly a challenge unique to the non-profit sector.

Measuring only L_p would clearly lead the estimated level of total labour input (and total inputs) to be too low; that is $L > L_p$. However, also relevant for productivity analysis, the rate of change of L_p might not be a good proxy for the rate of change of L, since there is no reason to assume that $\partial L_p = \partial L_v$. Put another way, if the balance of paid to unpaid labour input changes over time, which it might well, then measuring only paid labour input would be to mismeasure the growth of total labour input. It is therefore crucial to account for volunteer labour input (L_v) as well as paid labour input (L_p).

The preferred measure of labour input for productivity statistics is hours actually worked (as opposed to hours paid, or contracted, for instance), although numbers of jobs or workers are also sometimes used. Data on hours worked is usually found in household surveys, such as the Labour Force Survey (LFS).

However, the institutional sector classification of organisations in the National Accounts has no bearing on voluntary activity, so it is quite possible that people volunteer for organisations outside the NPISH sector, and even outside the broader non-profit sector. Thus, if adding volunteering time to inputs, in order to maintain alignment between inputs and output, we must aim for either of the below cases:

$$Y^{NPISH} = Af(L_p, L_v^{NPISH}, K, I)$$

$$Y^{NPS} = Af(L_p, L_v^{NPS}, K, I)$$

Where Y^{NPISH} is the output of the NPISH sector, Y^{NPS} is the output of the broader non-profit sector, L_v^{NPISH} is volunteer time in the NPISH sector, L_v^{NPS} is volunteer time in the broader

[3] L_p and L_v may be seen as either complements or substitutes in production. We see them as mostly substitutes, although they will display some complementarities in some settings.

non-profit sector, and other terms are as before (where relevant superscripts have been omitted for brevity, but should clearly also relate to the relevant sector definition).

Put another way, we must either:

- Measure for the NPISH sector, and so restrict the volunteer time we add to be just volunteering done for NPISH units, or
- Measure for the broader non-profit sector, and have our inputs, output and productivity measures cover non-profit units in any institutional sector.

The former is difficult, since volunteers will not typically know the institutional sector of the organisation they are volunteering for, and could not report it even if asked, which they are not. We can make an estimate of the fraction of formal volunteering done for NPISH units by aligning the reported 'fields' of volunteering with the industries of NPISH units, and making some informed estimates, which we describe in Section 3.3.

The alternative is to expand our measures to cover all non-profit organisations, regardless of institutional sector. In some ways this is easier, but in others harder – it avoids additional modelling of volunteering input, but necessitates the identification of non-profit units outside the NPISH sector, which is challenging. We believe this is preferable, and would be more useful to industry and policymakers, but is beyond the scope of the present paper.

2.3. Conceptualising and measuring output in the non-profit sector

In order to ensure additivity across the economy, the typical numerator in the productivity equation is "gross value added" (GVA). GVA is calculated by deducting "intermediate consumption" (IC) from total output (TO). Total output is equal to the value of all output of the unit, including market output (i.e. sales, or turnover), non-market output (output produced and provided for free or at prices that are not economically meaningful), and output for own final use (output produced by a unit and retained for its own use, such as the in-house development of software).

Intermediate consumption is the cost of purchased intermediate goods and services produced by other units, which is the output of other units in the economy. It covers all current expenditures, such as raw materials, business services, utilities, rent, overheads, etc. Expenditures on capital assets are not deducted. Deducting this from total output avoids double counting when adding across the economy.

In the market sector of the economy, total output can be readily measured as turnover, and so GVA can be calculated by subtracting intermediate consumption from total output. GVA can equivalently be expressed as the sum of:

- Full labour costs – all payments to workers, i.e. wages and salaries, bonus and overtime payments, and non-wage labour remuneration such as employer's pension and National Insurance contributions, collectively known as "compensation of employees" (CoE)
- Costs of the use of capital assets – covering both depreciation (consumption of fixed capital) and a return on capital, collectively "gross operating surplus" (GOS)
- Taxes less subsidies on production[4] – taxes and subsidies relating specifically to production, and not to products, hence excluding Value Added Taxes (VAT), fuel duties, etc. ($T - S$)

[4] Henceforth we ignore this component, since it is small relative to the other components, and would not materially affect the results to factor it in.

Algebraically:

$$TO = CoE + IC + GOS + (T - S)$$

$$GVA = TO - IC = CoE + GOS + (T - S)$$

Gross Operating Surplus (GOS) can be decomposed into the costs of using capital through depreciation (consumption of fixed capital, CFC) and a return on capital which is broadly equivalent to profit, known as net operating surplus (NOS). Algebraically:

$$GOS = CFC + NOS$$

$$GVA = CoE + CFC + NOS + (T - S)$$

These concepts relate to standard economy theory of the firm, summarised for a representative profit-maximising firm in the market economy in Figure 1, below. Faced with a linear demand curve[5] and constant marginal costs[6] the firm will set price, P, and produce output, Q, at the profit maximising point where marginal revenue is equal to marginal cost.

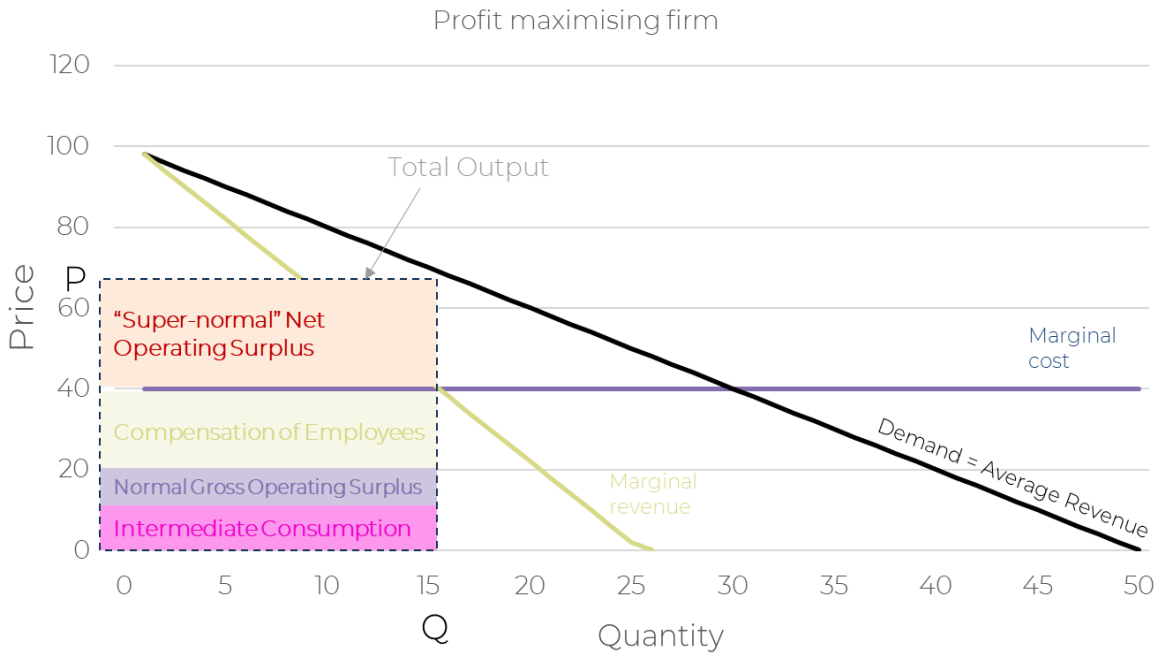
The marginal cost[7] of producing a unit of output will be made up of compensation of employees (the cost of workers), intermediate consumption (the cost of input goods and services), a "normal" level of Gross Operating Surplus reflecting the consumption of capital[8] and a basic rate of return on capital equivalent to the opportunity cost (i.e. return from investing the capital in low-risk financial assets, or equivalently the cost of financing investment). As a firm with a downward sloping demand curve, it has some market power, and it would earn some additional Net Operating Surplus from "super-normal" profits. Gross Value Added is equivalent to Total Output (Q*P) minus the intermediate consumption.

However, this basic model for market sectors does not work for the non-profit sector. Like the public sector, output of the non-profit sector is largely not paid for, and thus cannot be reported as turnover in standard business surveys. While it's value can be approximated as the sum of costs of production, this relies on full and accurate estimates of the economic costs of production, which are challenging.

We address the two main components of GVA – compensation of employees, and gross operating surplus – in the next sections, highlighting how National Accounts measures could be adapted to better reflect economic reality of the non-profit sector.

[5] A demand curve represents the relationship capturing aggregated consumer preferences for a firm's output as a trade-off between volume of product demanded and the price at which it is offered.
[6] Marginal costs are cost of producing each additional unit of output.
[7] Here we map National Accounts concepts to economic theory, but this does not mean that national accounting imposes any such assumptions or restrictions.
[8] While in practice consumption of fixed capital is measured irrespective of output or capital utilisation, it does in theory relate at least in part to the number of units of output produced, and does thus partially reflect marginal cost. Some elements of capital consumption are arguably more akin to fixed cost.

Figure 1 – National accounts definitions applied to a profit maximising firm



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2.3.1. Gross Operating Surplus in the non-profit sector

By its definition, the non-profit sector is unlikely to be aiming to maximise profits, although some third sector organisations do make provide which is reinvested or distributed. Instead it is more likely to be maximising its output, delivering as much of its output as it can without making a loss. This means that the amount of Net Operating Surplus earned in the sector is likely to be far lower than for a profit maximising firm – it is unlikely to earn the "super-normal" component, leaving just the "normal" component. This is shown in Figure 2 with a representative non-profit firm choosing to operate at P' and Q' where marginal cost equals average revenue.

The components of Gross Operating Surplus can be hard to measure accurately across the whole economy. Estimates of consumption of fixed capital depend on assumptions and models about depreciation rates. GOS as a whole, and NOS within that, are often calculated by residual in the National Accounts. In the case of the non-profit sector, these components are even harder to measure – conceptually, and practically. The National Accounts, following international guidance, currently measure GOS of the NPISH sector as follows:

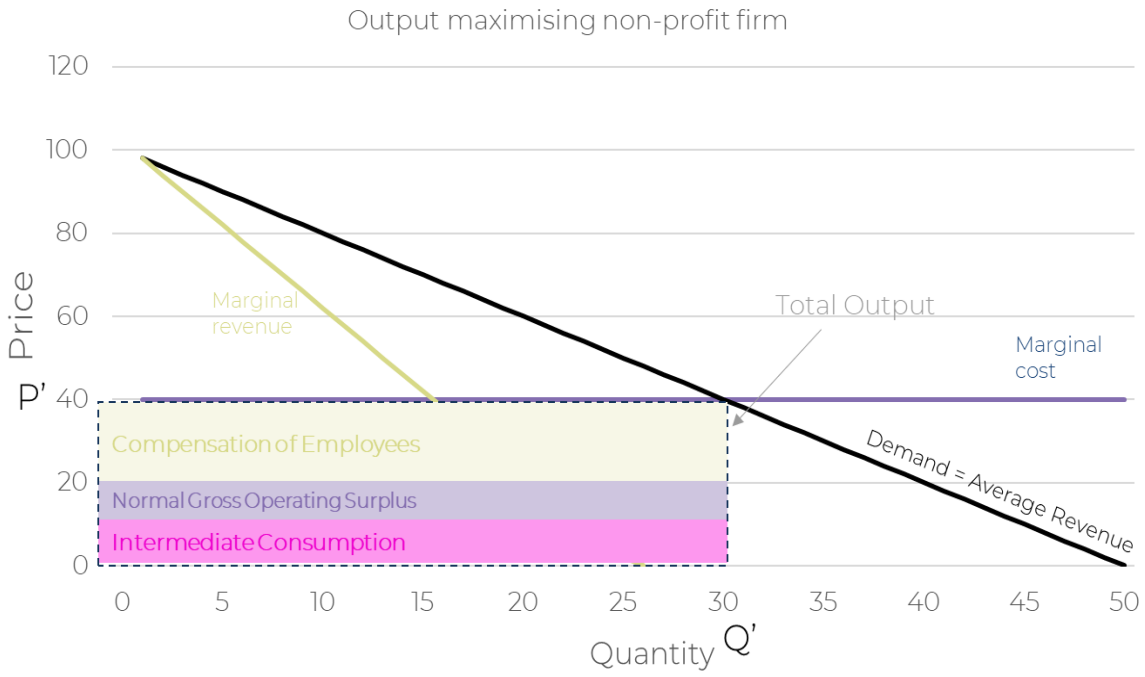
- An estimate is made for Consumption of Fixed Capital using models for the capital stock of the sector, based on surveys and administrative data about capital investment, and assumptions about depreciation rates;
- Net Operating Surplus is assumed to be zero for entities in the NPISH sector.

Whilst NOS is likely to be far less important in the non-profit sector than in other sectors, for the reasons argued above, we feel a low "normal" rate of profit is still appropriate conceptually[9]. This follows the Hall and Jorgenson (1967) conceptualisation of the user cost of capital as reflecting both economic depreciation and a rate of return on capital, reflective

[9] This argument applies equivalently to the government sector, with international guidance setting NOS to zero. As for NPISH, we believe this undervalues the contribution of capital in the public sector in the National Accounts.

of the opportunity cost of holding the investment in that asset rather than in a financial product for instance. By excluding this opportunity cost, we feel National Accounts underestimates the true Gross Operating Surplus for the non-profit sector. A “normal” rate of return on capital is usually thought to be about 5% per year, although this varies somewhat over time depending on the prevailing economic conditions.

Figure 2 – National accounts definitions applied to an output maximising non-profit



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That is not to say we want to attribute profits to the non-profit sector. Rather, this is a method to reflect the true value of the capital services used in production in order to value output. This is not necessary in the market sector, since there are economically meaningful prices. For the non-profit sector, where we cannot rely on prices and have to instead value output by the sum of costs, it is important to reflect the true economic value of those costs. Valuing capital services more fully, by incorporating the opportunity cost component as well as consumption of fixed capital, does that.

Thus, we adapt National Accounts measures by first re-defining GOS:

$$GOS = CFC + 'normal' NOS + 'supernormal' NOS$$

And setting only $'supernormal' NOS = 0$ for the non-profit sector (rather than both NOS components as in the National Accounts), that gives adjusted GOS of the non-profit sector as:

$$GOS^* = CFC + 'normal' NOS$$

2.3.2. Compensation of employees in the non-profit sector

Economic theory predicts that, under certain conditions, the “value” of labour to production, known as the marginal product of labour, is equal to the total cost of employment. On this basis the total labour cost should be a helpful way of measuring the value of labour where

outputs of a sector are not directly observable. However, there are two challenges in the non-profit sectors.

First, many non-profit organisations will use unpaid volunteers to help deliver their outputs. A shadow wage can be used to estimate the cost of that labour had it been purchased on the market. Obvious choices for the shadow wage include the wage of *employees* in the non-profit sector, or of employees in the private sector in industries that specialise in the activity undertaken by the volunteer. The validity of the shadow wage will depend on the similarity of the voluntary activity with that done by the wage donor. As for employees, these shadow wages should be adjusted to represent "total employment costs" (i.e. compensation of employees).

Second, the labour costs component is further compromised if the total labour cost does not truly represent the marginal product (value) of labour services. There is evidence that the paid (and unpaid) workforce in the non-profit sector is motivated by non-pecuniary factors, such as the social value of the work (see e.g. Kamerāde and McKay, 2015). This means they may accept wages below the wage for an equivalently skilled job in the market sector, since they receive a form of non-monetary compensation for their labour, despite the fact that their marginal productivity should be almost identical. How much higher will depend on the value that the workers place on the non-pecuniary benefits. DCMS (2020) and Croner (2017) find that workers in the non-profit sector earn 20-30% less than workers in other sectors. O'Halloran (2022) controls for a range of individual-level factors such as education and experience, and suggests that the differences in wages may be smaller than this but still significant. Thus, the true value of the labour services is likely to be higher than that paid by the non-profit sector.

We do not seek to include the value the non-pecuniary benefit *per se*. Indeed, many well-paid workers in the market sector might receive non-pecuniary benefits in their jobs too. Rather, we wish to accurately value the labour services provided by the workers in the non-profit sector, in order to more accurately value the output of the sector. The disconnect between pay and the value of the labour services is only a challenge for the non-profit sector as, unlike in the market sector, the value of labour services is used to value the output of the sector. The presence of non-pecuniary benefits is simply the reason that the pecuniary value of labour services would undervalue the output of the sector.

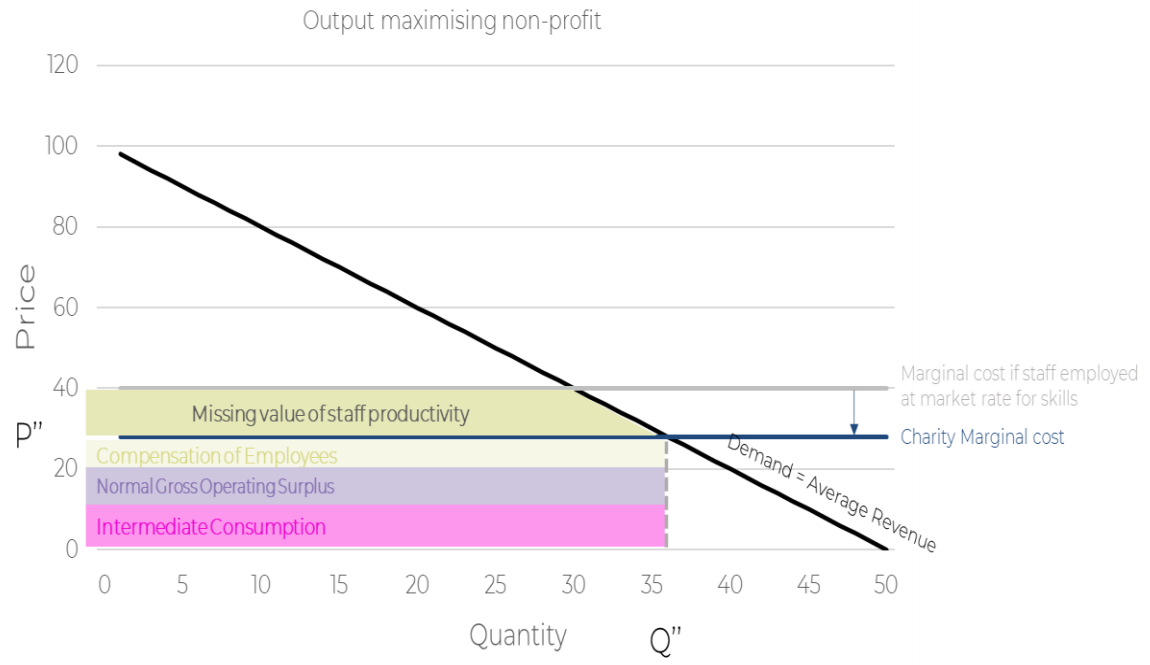
The impact of reduced labour costs due to the non-pecuniary benefits discussed above are demonstrated in Figure 3. A charity faces a reduced marginal cost curve than if they had to employ their staff at the market rate for those skills. This means that the quantity they are able to produce is actually Q'' but the "compensation of employees" element appears smaller than it would if they paid the market clearing wage. This results in an underestimate of the value of the output equivalent to the area marked as "Missing value of staff productivity".

Thus, we adapt National Accounts measures by first expanding compensation of employees to include the value of volunteer time:

$$CoE^* = W_p L_p + W_p L_v$$

Where W_p is the going hourly labour compensation (including non-wage labour costs, etc.) of paid workers in the market, L_p is hours of paid labour, and L_v is hours of volunteer labour.

Figure 3 – Impact of non-pecuniary employment benefits on national accounts definitions applied to an output maximising non-profit



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We assume that workers in the non-profit sector accept a below-market wage due to non-pecuniary benefits, such that:

$$(1+\alpha)W_p^{NPS} = W_p$$

Where α is a factor reflecting the degree of discount accepted by workers in the non-profit sector due to non-pecuniary benefits. If $\alpha = 0$, then there is no discounting, and wages in the non-profit sector are market wages. If $\alpha > 0$, as we believe, then there is discounting, and wages in the non-profit sector are below market wages, and thus understate the true value of the labour services.

Then our adjusted measure of compensation of employees in the non-profit sector can be written as:

$$CoE^* = (1+\alpha)W_p^{NPS}L_p + W_pL_v$$

$$= W_pL_p + W_pL_v$$

Whereas current measures for the non-profit sector are:

$$CoE = W_p^{NPS}L_p$$

So our adjusted measure exceeds the National Accounts measure by[10]:

$$CoE^* - CoE = (1+\alpha)W_p^{NPS}L_p + W_pL_v - W_p^{NPS}L_p = \alpha W_p^{NPS}L_p + W_pL_v$$

[10] This difference is a first approximation to the "true" undervaluation as it does not account for the slope of the demand curve between the level of output (Q'' in Figure 3) and the level of output that would be produced at a higher wage.

2.4. Further missing value of non-profit sector output

Even after making the adjustments set out in Sections 2.3.1 and 2.3.2, we are still estimating the value of output in the non-profit sector by costs of production. This relates only precariously to the true social value of the output. As the old maxim says: "something is only worth what someone is willing to pay for it", except in this case, no-one is paying (or at least, not paying what it is truly worth, given the purpose of the sector). However, the value of the output is still more appropriately thought of from the perspective of the recipient, than the funder or donor.

One way to put this is that many non-profits generate positive externalities – benefits that fall to those other than the individual deciding to "pay" for the services delivered by non-profits. There are two reasons to believe this would be the case:

- While the person buying a good or service in a market sector is normally the person consuming that good or service, in the non-profit sector it can often be a donor that effectively "buys" the service for an entirely different group of beneficiaries. There is no reason to believe that the value the donor places on the output will be the same as the value that the direct beneficiaries or all other potential donors will place on the non-profit's output.
- Non-profit interventions can often affect the consumption of publicly provided goods and services or the productive capacity of the wider economy. There are many studies that highlight the relatively high social benefit-cost ratios of charitable interventions, suggesting there are significant positive externalities to their work.[11]

The impact that these positive externalities would have on the valuation of output in the non-profit sector are summarised in Figure 4. In this scenario the original demand curve is for the donor (the effective buyer) and reflects the private marginal benefit to them of each additional unit of non-profit output. However, the social marginal benefit of each unit is higher than this private benefit reflecting the positive externalities. This means that the true value of the sector would be underestimated by even the adjusted GVA calculation set out in this Section so far.

Unfortunately, to robustly estimate and incorporate the value of these benefits would require significant additional data to be gathered about the outputs and outcomes delivered by the non-profit sector. It would also require us to go 'beyond GDP', since externalities (positive or negative) are not included in the National Accounts.

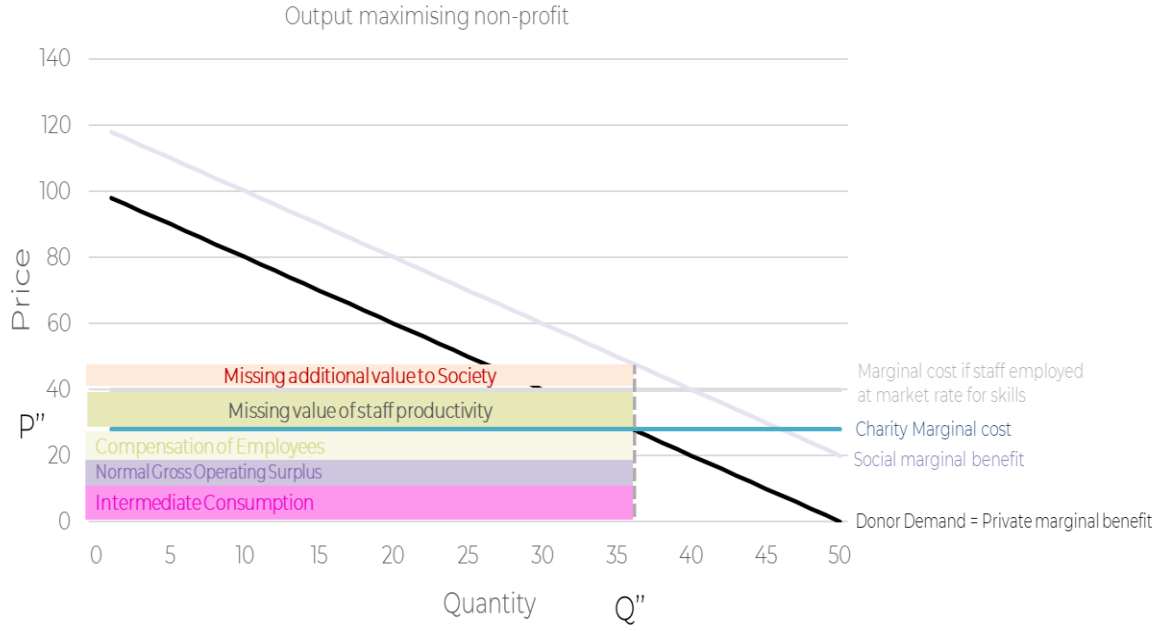
A step in the right direction would be measures of output that account for changes in the quality of the services provided. This is the case for the measurement of public service output in ONS public service productivity statistics, that explicitly adjust for changes in service quality over time. Following the Atkinson Review (Atkinson, 2005), this approach links the public services delivered to the outcomes intended, with the measure of output reflecting the degree to which these outcomes are met. This would be an appropriate and complementary model for the non-profit sector, and allow for comparison between sectors on a consistent basis. This approach does not, however, account for the value of the positive externalities generated.

Such an endeavour would be a substantial undertaking and is well beyond the scope of the present paper. Measuring public service output and productivity in this way was only made

[11] See for example, PBE (2020) or PBE (2021).

possible by many years of investment by the ONS in the mid-2000s, and work continues to this day to develop the methods further (Foxton, Grice, Heys and Lewis, 2019).

Figure 4 – Impact of positive externalities on value of output maximising non-profit



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2.5. Appropriate deflators (price indices) and volume output measurement

Measurement of productivity growth requires output be measured in volume terms, that is as an estimate of the *volume* of output rather than its cost. This is usually achieved by applying suitable price indices, or "deflators", to estimates of the cost of the output. This converts the output estimate from one in "current prices" (prices paid in the period) to "constant prices" (prices held constant at a point in time, so as to abstract from price changes). Changes in cost are either due to changes in price (inflation) or changes in volume, so by removing changes in price from changes in cost, changes in volume are revealed.

Price indices should account for changes in observed and unobserved price, including changes in quality. If products improve in quality, but observed price stays the same, effective prices have fallen – this can be thought of as getting 'more' (a higher quality good) for the same price, and thus the *effective price* falling. Prices of high-tech products like laptops and mobile phones are explicitly adjusted for quality change in the inflation statistics using a variety of techniques, but most services are not adjusted for quality change explicitly (see ONS, 2019).

In measurement of public service productivity, ONS makes explicit adjustments for changes in service quality, and applies these to the change in the 'quantity' of output (e.g. ONS, 2022). For instance, in estimating the true growth in the volume of public service education services, quality measures of exam attainment are incorporated alongside quantity measures of the number of students. This relies on good and relevant data to proxy for quality changes existing, that are attributable to the service being provided. Where this can be done, the estimates are likely to be of high quality, and ONS is a world-leader in the

measurement of public service output – however, this has high data demands and requires significant research effort.

Ideally, future work would explore direct volume output measures for the non-profit sector, similar to those used for public sector output. For instance, the volume of output of non-profits working to help people back into employment could be measured directly by the number of people supported or the number of coaching sessions delivered. Crucially, these would need to be adjusted for changes in quality, such as increase in the number of people getting sustained employment who would not otherwise have done. This would require significant investment in data collection and methodology.

For the proof of concept in this paper, we will use price indices covering relevant activities to deflate the estimates of the cost of output in the non-profit sector. This will give estimates of the growth in "real output" (output in constant prices). However, this is crucially dependent on the relevance and quality of the deflators used.

2.6. Summary of conceptual framework

To summarise, we propose the following modifications to current National Accounts measurement to produce conceptually superior estimates of the level of productivity of the non-profit sector:

- Adjust labour inputs to also capture volunteer time, either by estimating the fraction of volunteering time that relates to NPISH units in the National Accounts, or going beyond the NPISH sector and instead covering all relevant non-profit organisations, regardless of institutional sector classification;
- Adjust the value of output to capture:
    - the cost of volunteer time (covering shadow wages and salaries and shadow non-wage labour costs)
    - the non-pecuniary value workers in the non-profit sector receive from working in that sector, so as to put the valuation onto market equivalent rates
    - a 'normal' rate of return on capital, as well as consumption of fixed capital

And for estimates of productivity growth, we must also ensure the use of suitable deflators (price indices).

Our adjusted GVA measure can thus be written as:

$$GVA^* = W_p^{NPS} L_p + \alpha W_p^{NPS} L_p + W_p L_v + CFC + 'normal' NOS$$

Which compares to the unadjusted GVA measure of:

$$GVA = W_p^{NPS} L_p + CFC$$

3. Data and methods

Accurate productivity measures require consistency between the input and output measures used – namely that they correspond to the same activity, and cover the same time period. Measures of the input and output of the non-profit sector suffer issues that make good productivity measures challenging.

To make "proof of concept" estimates of our expanded GVA concept for the non-profit sector, and accordingly productivity measures, we use a range of publicly available data and

some creative methods and assumptions. The publicly-available data are limited, and the results are accordingly fairly uncertain. We are confident that with access to microdata, and with further work, considerable improvements would be possible.

The data sources used in this preliminary research are set out below. Links to the data used are provided in the Data Appendix.

3.1. GVA of the NPISH sector (before adjustment)

3.1.1. Current price GVA

Data from UK National Accounts publications from ONS give us compensation of employees and gross operating surplus (which is equal to just consumption of the fixed capital in the absence of any net operating surplus) for the NPISH sector, which added together gives GVA (ignoring net taxes on production, see section 2.3).

We are grateful to the ONS for publishing the proportion of GVA in each industry that comes from the NPISH sector, annually between 1997 and 2019. We combine these with ONS estimates of GVA in each industry (from the "GDP low-level aggregates" dataset) to estimate NPISH GVA in each industry, and then aggregate for a sector-whole figure, which approximately[12] matches the estimate from aggregate CFC and CoE above.

By doing so, we can explore the industrial make-up of the NPISH sector in the National Accounts for the first time. As measured, around three-quarters of the NPISH sector comes from the education industry – primarily reflecting universities, as well as other education institutions that meet the NPISH inclusion criteria (largely nurseries). Since universities are not what most people are interested in when considering the non-profit sector[13], we present estimates with and without the education industry included.

3.1.2 Deflators and real GVA

In order to explore the growth of the volume of output, and hence of productivity, we must adjust for inflation over time using price indices, also known as "deflators". The appropriate deflators for NPISH GVA are those that reflect the activities of NPISH, and are conceptually well matched to the implied industry GVA deflators of the NPISH industries.

We construct implied industry GVA deflators from the ONS industry GVA data (the "GDP low-level aggregates" dataset), and assume that the price growth of the aggregate industry is a good match for price growth of the NPISH component of that industry. This will be a better assumption when NPISH accounts for a large fraction of the industry.

Using the current price industry shares of NPISH GVA established in section 3.1.1 as weights, and the implied industry GVA deflators, we construct a composite NPISH GVA deflator series as a chained Paasche[14] price index. We do this with and without the education industry, adjusting weights accordingly. Applying these composite deflators to the current price GVA estimates with give real GVA estimates.

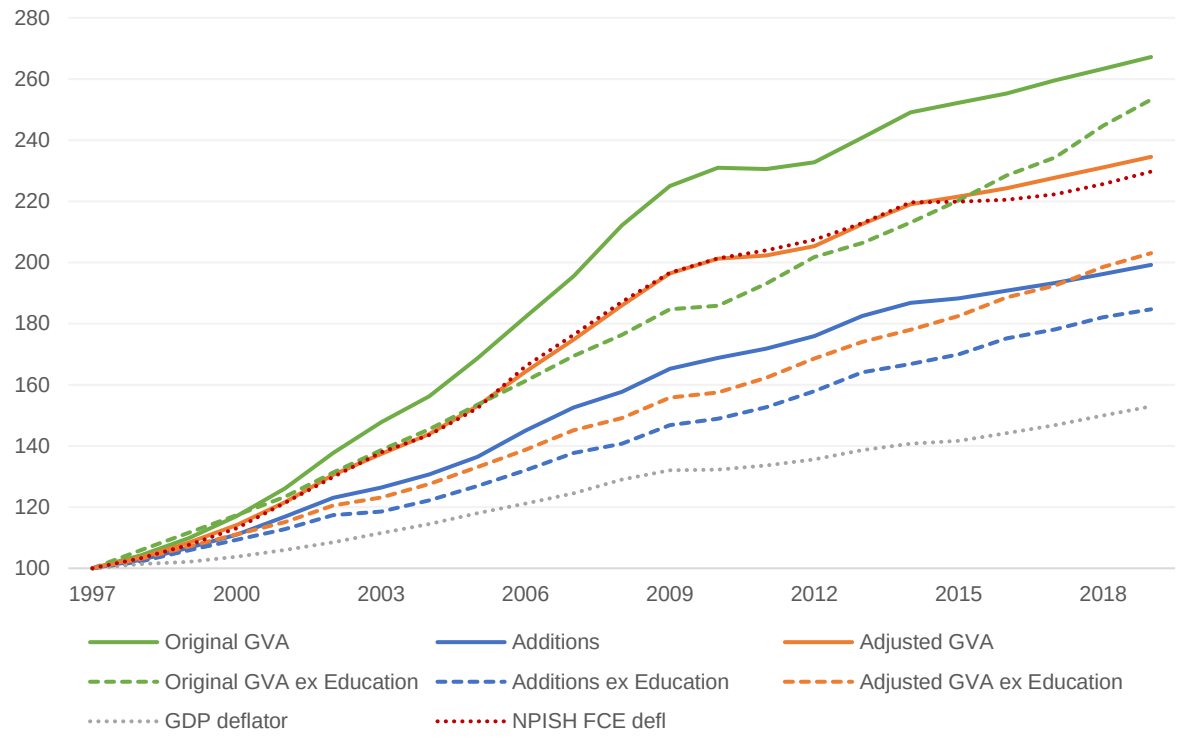
[12] Not exactly, due to rounding and the omission of net taxes on production.
[13] See for example the definitions used for the NCVO Almanac: https://www.fc.production.ncvocloud.net/ncvo-publications/uk-civil-society-almanac-2021/about/definitions/#general-charities
[14] A Paasche index uses weights in the current period, as opposed to a Laspeyres index which uses weights from the base period. A chained index means the weights are updated, in our case each year. It is typical to use Paasche indices for prices, and Laspeyres indices for volumes.

The industry GVA CVM data in the GDP low-level aggregates dataset are double-deflated estimates, meaning that different deflators have been applied to each output by product, and intermediate consumption by product. Double deflation[15] calculates volume estimates of output and intermediate consumption separately, and then deducts the real estimates of IC from the real estimates of total output. As such, the deflators implied by the CVM data reflect the balance of output and intermediate consumption.

In our framework, we increase the valuation of the output, but do not change the estimate of intermediate consumption – changing the balance of output and intermediate consumption in GVA. As such, the implied deflators from the unadjusted GVA data will not be appropriate for the new output estimates, but will continue to be appropriate for the unadjusted GVA component of our new total.

To construct a suitable output deflator, we use the ONS experimental industry output deflators, which are a mix of industry output and product deflators, reflecting the mix of products produced by each industry. We create a chained Paasche price index from these industry output deflators, using the sum of the GVA adjustment components by industry (volunteering value, non-pecuniary wage uplift, and normal net operating surplus) as weights. Figure 5 shows our constructed deflators, alongside the unadjusted versions.

Figure 5 – Various deflators for the NPISH sector and GDP, index 1997 = 100



Source: ONS – various; authors' calculations
Notes: FCE = Final consumption expenditure; GVA = Gross Value Added. Solid lines are for total NPISH (including education industry); dashed lines are for NPISH excluding education. "Original GVA" series use implied GVA deflators; "Additions" series use industry output deflators; "Adjusted GVA" series are the aggregate of "Original GVA" and "Additions".

[15] Single deflation (the pre-BB21 approach) would calculate GVA in current prices as total output less intermediate consumption, and then apply a single deflator, usually for the predominant output of the industry. See more on double deflation in ONS (2017a).

Table 1 – Sources and quality information about the relevant output deflators

Industry/product (SIC2007 industries/ CPA 2.1 products)	Share of total (average 1997-2019)	Share of total excl Education (average 1997-2019)	Deflator sources	Eurostat quality rating	Average annual growth 1997-2019
85: Education	57.2%		72% derived; 19% CPI: driving lessons; 8% SPPI: adult education	A 19% B 72% C 8%	4.2%
94: Activities of membership organisations	10.4%	24.1%	100% RPI: trade union & prof. orgs subscriptions	C	2.3%
93: Sports, amusement and recreation activities	10.1%	23.5%	60% price index: hire & repair of photographic equipment etc.; 40% derived	A 60% B 40%	3.7%
88: Social work w/out accommodation	6.1%	14.4%	100% derived	C	2.8%
86: Human health activities	3.5%	8.2%	85% derived; 15% CPI: health	B	2.6%
87: Residential care activities	2.6%	6.1%	100% derived	C	2.8%
91: Libraries, archives, museums etc	2.6%	6.0%	69% price index: hire, maintenance & repair of major durables for recreation; 31% derived	B	2.5%
75: Veterinary activities	2.0%	4.7%	100% CPI: pets, related products & services	B	2.5%
90: Creative, arts and entertainment	1.9%	4.5%	61% AWE with productivity adjustment; 39% CPI: recreational & cultural services	B	2.2%
72: Scientific research and development	1.5%	3.5%	50% AWE with productivity adjustment; 50% CPIY	B	2.1%
68.1-2: Real estate (excl imputed rental)	1.1%	2.7%	53% commercial rental price index; 47% household rental price index	A	2.1%
69.1: Legal activities	0.7%	1.7%	50% AWE with productivity adjustment; 50% CPIY	B	2.0%
81: Services to buildings and landscape activities	0.3%	0.8%	43% SPPI: cleaning services; 57% SPPI: various business services	A 43% B 57%	1.5%
Total			SPPIs etc. 14.4% CPI/RPI items 25.6% AWE 2.3% Derived 57.7%	A 18.2% B 57.6% C 24.2%	3.5%
Total excluding Education			SPPIs etc.21.6% CPI/RPI items 34.4% AWE 5.3% Derived 38.7%	A 17.1% B 38.3% C 44.6%	2.7%
Memo: GDP deflator			SPPIs etc. 59.0% CPI/RPI items 15.8% AWE 7.7% Derived 17.5%	A 33.7% B 54.4% C 11.8%	2.0%

Source: ONS – GDP(O) sources catalogue; authors' calculations
Notes: shares are for total adjusted GVA. Average annual growth is for output deflators.

The quality of the composite deflators, and thus the real GVA estimates, is clearly dependent on the quality of the underlying industry output deflators. Table 1 shows details of the make-up and quality of these industry output deflators, using information published in the GDP(O)

sources catalogue. Table 1 includes the proportion of total adjusted GVA that each industry accounts for (with and without the Education industry), the data source/method for the deflator, the associated quality rating given in the Eurostat Prices and Volumes handbook[16], and the average annual growth rate in the deflator between 1997 and 2019.

Many deflators are sub-optimal, with only 16% of the total receiving an A rating. Large fractions are "derived" deflators, meaning the deflator is not directly estimated, but derived from independent volume and current price output estimates – this is common when measuring public sector output, since most such output does not have an associated price. For instance, the implied deflator for education output is partly the difference between the growth rate in the cost of delivering education (current price output), and the growth rate in the cost-weighted number of students receiving education (volume output). While direct volume output estimates are often high quality, without adjustment for changes in quality (which is prohibited in the National Accounts) these derived deflators will tend to overstate price changes. Indeed, the average annual growth rate of the deflators tends to be higher than that of the implied GDP deflator, and especially so for those that are partly or fully "derived" deflators. This faster rate of growth in the deflator will depress the growth in real output, and may thus lead us to understate growth in real (adjusted) NPISH GVA and productivity.

The GDP deflator grows far slower than the various other deflators in Figure 5, since its composition is quite different. In covering the whole economy, the GDP deflator will reflect trends in the prices of manufactured goods and technology products, as well labour-intensive services. The manufacturing industry has seen faster productivity growth than the rest of the economy over the past two decades, and thus slower price inflation. The prices of technology products have largely fallen over this period, once accounting for quality change. These make up part of the GDP deflator, thus reducing the measure of aggregate price changes. The relevant deflators for the NPISH sector consist principally of labour-intensive services, and so do not reflect such trends.

3.2. Value of volunteering

The UK Household satellite account (produced by ONS) provides estimates of the value of formal volunteering, annually from 2005 to 2016 in the latest release (ONS, 2018). These are based on the estimated hours of regular, formal volunteering, sourced from various surveys including most recently the Community Life Survey (run by Kantar on behalf of DCMS). These hours are then multiplied by estimated hourly wage rates for appropriate professions, sourced from the Annual Survey of Hours and Earnings (ASHE). For more details on the ONS methods, see ONS (2013).

We extend these estimates in two ways.

3.2.1. Extension in time

We extend estimates back to 1997 and forward to 2019, based on a model that approximates as closely as possible the methodology in the ONS Household satellite account, using only publicly available data. Given the scope of this paper and without access to microdata, this necessarily requires additional assumptions and modelling.

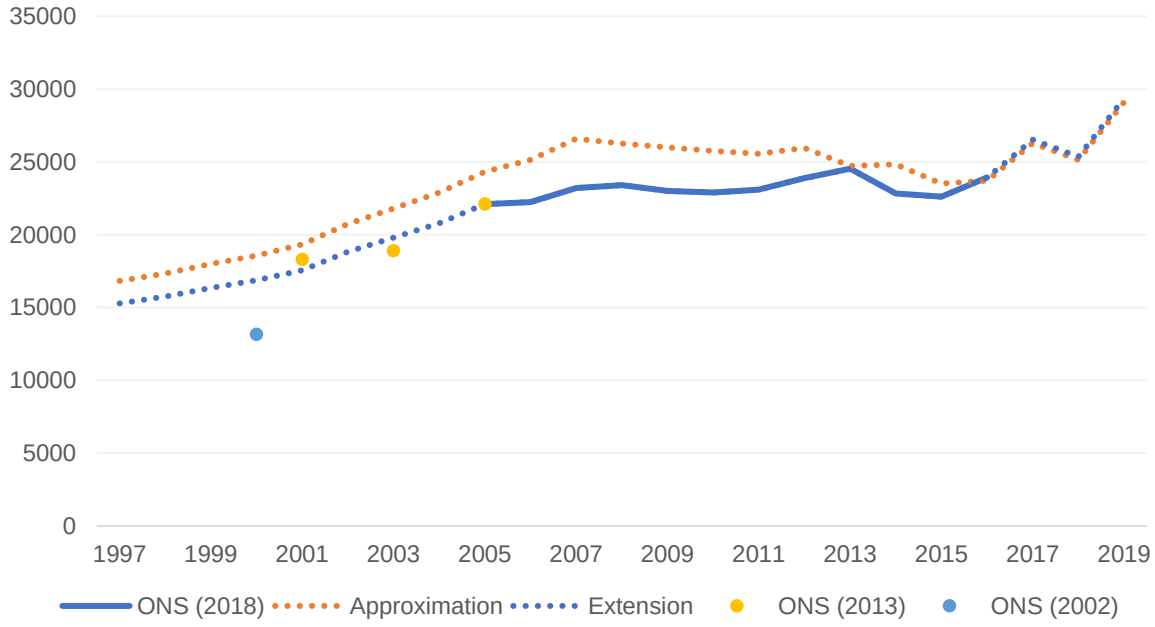
[16] This is given in the ONS GDP(O) sources catalogue (ONS, 2021); we have not checked this information with the Eurostat Prices and Volumes handbook.

Specifically, we build a model based on:

- The rate of participation in regular, formal volunteering, by age group, sourced from the Community Life Survey and earlier Citizenship Survey. Since data for earlier periods are not for every year, and the survey mode changes over time, we interpolate, splice between sources, and extrapolate as necessary.
- The size of the UK adult population by age group, sourced from nomis, based on mid-year population estimates from ONS.
- The average hours of volunteering by age group, based on information in ONS (2013), ONS (2017b) and published by DCMS in 2022 (see Data Appendix) with additional modelling and adjustments.
- The average wages of relevant occupations, sourced from ASHE, following the information in ONS (2013).

This model gives a close match for the value of volunteering reported in the household satellite account, and we use this to extrapolate official estimates. Figure 6 shows our modelled estimates come close to the official figures in both magnitude and trend, and we use our model to extend the official estimates.

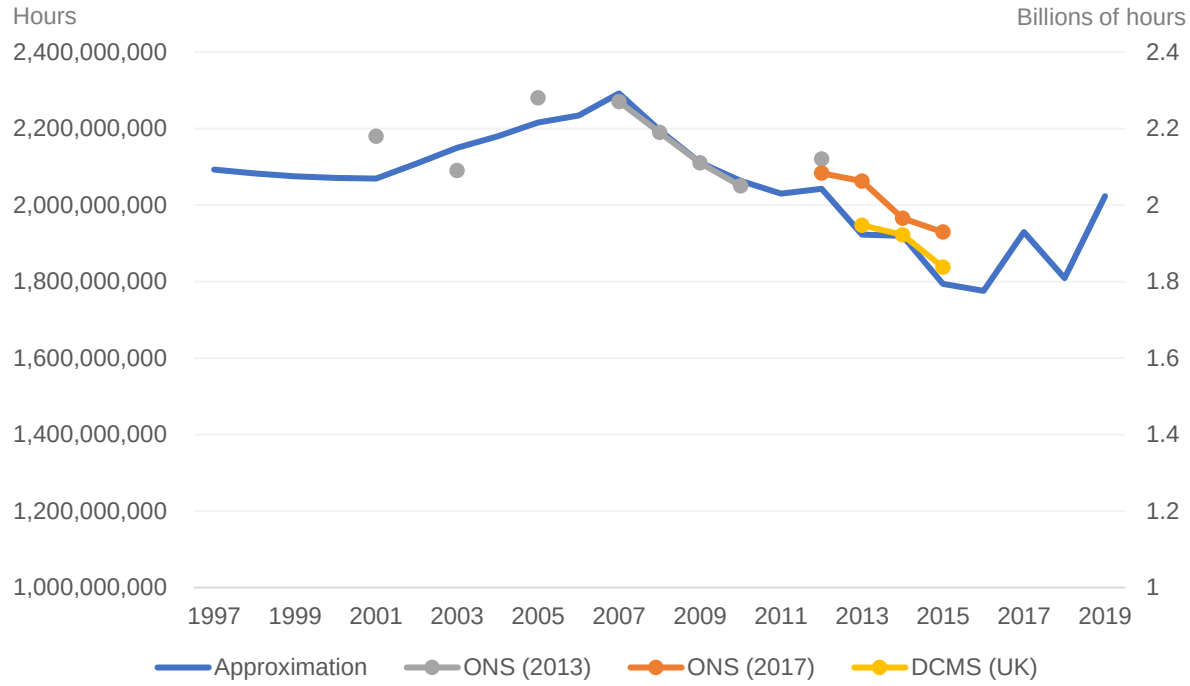
Figure 6 – Value of volunteering (£m), existing estimates and extension, UK



Source: ONS – Household satellite account (various iterations, see Data Appendix); authors' calculations using various sources (see text)

The first three factors in our model (participation, population, and average hours) provide an equivalent means to extrapolate hours of volunteering, necessary to add to labour inputs. Our estimate of hours worked is a reasonable match for the data in ONS (2013) and ONS (2017b) in most years with available comparisons. New data published by DCMS in 2022 (see Data Appendix) is also similar up to 2015, after which is suffers from a mode effect and is not comparable.

Figure 7 – Hours of volunteering per year, existing estimates and extension, UK



Source: ONS (2013), ONS (2017), DCMS (2022), authors' calculations

3.2.2. Accounting for non-wage labour costs

The ONS Household satellite account values volunteering only by a shadow wage (sourced from ASHE), which does not account for the value of non-wage labour costs that an employer would incur if the labour were paid.[17] While these non-wage labour costs are not actually incurred, they are a necessary addition to make the shadow wage for the volunteer input conceptually equivalent to that of paid employees in the sector. We use National Accounts data on "wages and salaries" and "compensation of employees" of the NPISH sector to calculate the necessary uplift factor between 1997 and 2019, and apply this to the (extended) volunteering estimates from the household satellite account, which are based on the value of (shadow) wages only. Figure 8 shows this uplift ratio for the NPISH sector, as well as for non-financial corporation, government and the whole economy. The series for NPISH is mostly between that for the whole economy (below) and government (above).[18]

3.3. Allocation of volunteering time and value to industries

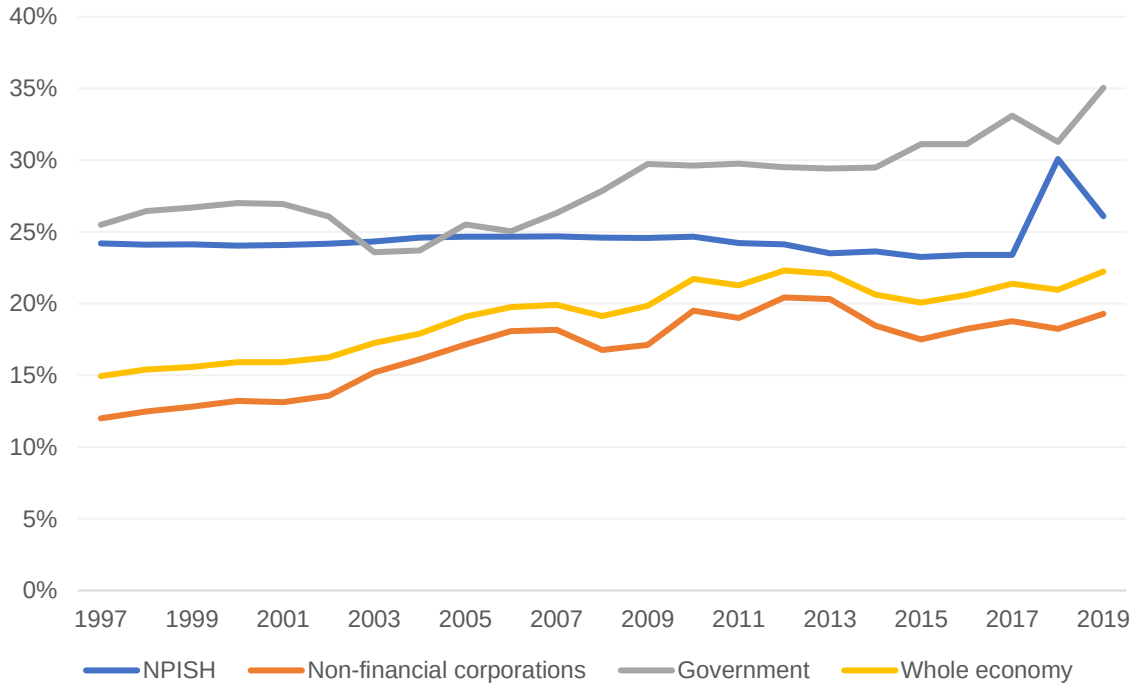
To incorporate volunteering into the output and inputs of the non-profit sector, we need to ensure that it relates to the same activity as that measured in the National Accounts. For this work, that means that it should relate to activity in the NPISH sector. The source of data for volunteering is not related to the National Accounts or business statistics, which makes strict alignment with industries difficult.

An indication is given by respondents, who report the 'field' of volunteering they participate in, on the Community Life Survey. We are grateful to DCMS for publishing a bespoke breakdown of this data, covering five years from 2016/17 to 2020/21. Given the imperfect

[17] This is our reading of ONS (2013) and ONS (2018).
[18] There is a spike in the NPISH series in 2018, due to the one-off recording of an increase in lecturers pension contributions. We are grateful to an anonymous referee for this information.

mapping of this data to industry, and to avoid some sampling error, we take a simple average across years rather than reflecting year-on-year changes.

Figure 8 – Uplift from wages and salaries to compensation of employees, various sectors



Source: ONS – various Blue Book 2021 data, see data appendix; authors' calculations
Notes: the NPISH series is much flatter than for other sectors, likely reflecting the use of assumptions or fixed proportions in the calculaction by ONS. The spike in the NPISH series in 2018 is due to the one-off recording of an increase in lecturers pension contributions.

Since respondents can volunteer in more than one 'field', we rescale the proportions to 100% and allocate deterministically to industries. We also make an assumption about the proportion of each activity that is related to an activity in GDP, and the proportion of that which relates to activity in the NPISH sector. The correspondences and proportions are given in Table 2. Where volunteering could plausibly relate to multiple industries, we divide the time equally amongst the possible industries. We then aggregate the relevant proportions, giving 58% of volunteering relating to NPISH, or 54% if excluding education.

Table 2 – Allocation of volunteering time to industries and NPISH

Field of volunteering	**Related to activity in current GDP boundary (%)**	**Of which: NPISH-related (%)**	**Industries (of NPISH-related)**
Children's education/schools (e.g. Parent Teacher Associations, School governor, supporting fairs and fundraising, Helping in school, Running pupils' clubs)	100	15	85
Youth/children's activities (outside school) (e.g. Youth clubs, Sports clubs, Hobby or cultural groups for children)	90	90	93

Education for adults (e.g. Attending or teaching classes, Mentoring, Cultural groups, Students Union, College governor)	90	90	85
Sport/exercise (taking part, coaching or going to watch) (e.g. Sports clubs or groups (e.g. football, swimming, fishing, golf, keep-fit, hiking), Supporter clubs)	75	90	93
Religion (e.g. Attending a place of worship (church, chapel, mosque, temple, synagogue), Attending faith-based groups, Saturday/Sunday School)	75	100	94
Politics (e.g. Membership of, or involvement with, political groups, Serving as local councillor)	100	75	94
Older people (e.g. Involved with groups, clubs or organisations for older people e.g. Age UK, Pensioner's clubs, visiting, transporting or representing older people)	75	75	87, 88
Health, Disability and Social welfare (e.g. Medical research charities, Hospital visiting, Disability groups, Social welfare (e.g. Oxfam, NSPCC, Samaritans, Citizens Advice Bureau), Offering respite care, Self-help groups (e.g. Alcoholics Anonymous))	100	50	86, 87, 88
Safety, First Aid (e.g. Red Cross, St. Johns Ambulance, Life Saving, RNLI, Mountain Rescue, Helping after a disaster)	90	90	86
The environment, animals (e.g. National organisations (e.g. Greenpeace, National Trust, RSPCA), Local conservation groups, Preservation societies)	90	100	75, 91
Justice and Human Rights (e.g. Special Constable, Magistrate, Legal advice centre, Victim Support, Prison visiting or aftercare, Justice and peace groups, Community or race relations, LGBT groups, National organisations (e.g. Amnesty International))	90	50	69.1
Local community or neighbourhood groups (e.g. Tenants' / Residents' Association, Neighbourhood Watch, community group, local pressure group)	25	10	94
Citizens' Groups (e.g. Rotary Club, Lion's Club, Women's Institute (WI), Freemasons)	90	100	94
Hobbies, Recreation/Arts/Social clubs (e. g. Clubs or groups for the Arts (e.g. theatres, museums, amateur dramatics, orchestras), Hobby or cultural groups (e.g. local history club, Social club)	50	90	90, 91, 93
Trade union activity (e. g. Membership of, or involvement with, a trade union.)	100	100	94
Any Other activities	50	25	Unknown
Total	**75.6%**	**58.3%**	
Total excluding Education	**64.5%**	**53.7%**	

Source: this paper

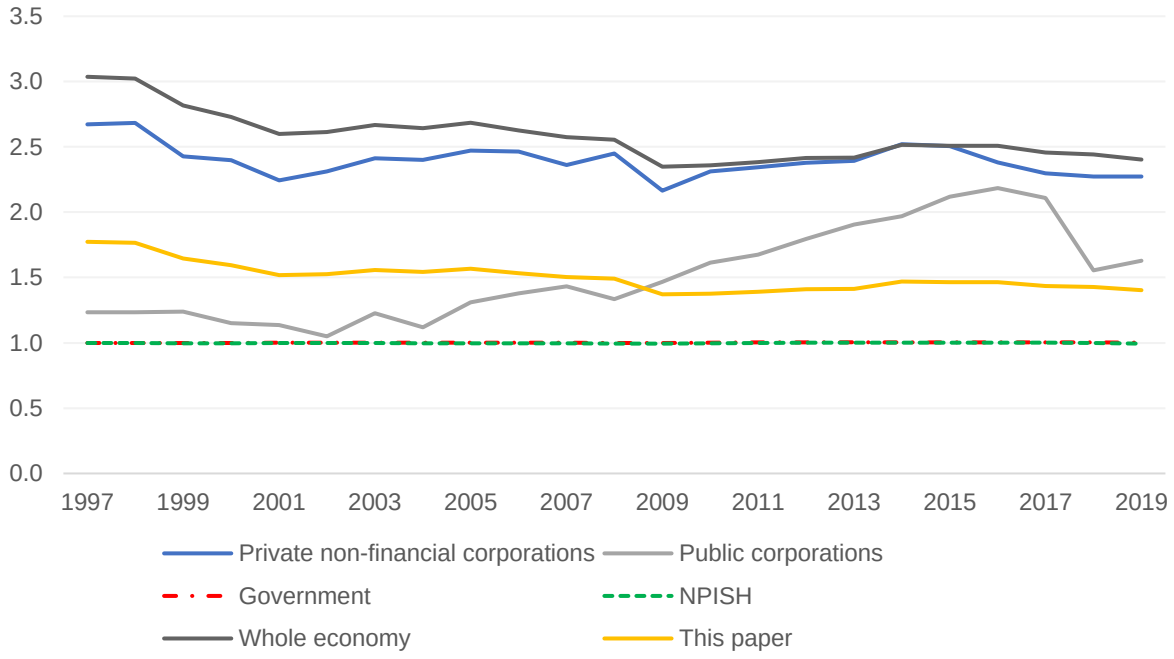
Notes: industries are divisions from the Standard Industrial Classification (SIC) 2007. For National Accounts and NPISH definitions, see section 2.1.

3.4. Uplift for Gross Operating Surplus

Using data from the National Accounts, we estimate the ratio between consumption of fixed capital and gross operating surplus by institutional sector. For NPISH and government, this ratio is 1, since gross operating surplus is only consumption of fixed capital. For the private sector, and the economy as a whole, the ratio varies between about 3 and 2.5, declining non-uniformly over time.

For the NPISH sector, we use an average uplift of 1.5, which is close to the average for the public non-financial corporations sector. Public corporations share some similarities to NPISH, in that they have a somewhat unusual mix of market and non-market characteristics and objectives. The public corporations sector is dominated by a small number of large bodies, which makes the data somewhat volatile. For our uplift ratio for the NPISH sector, we fit the trend of the ratio for the whole economy to the level from the public corporations sector. Multiplying this ratio by the known total for consumption of fixed capital gives a good first approximation to account for 'normal' NOS for the NPISH sector.

Figure 9 – Ratio of gross operating surplus (GOS) to consumption of fixed capital (CFC) for selected sectors, and that used in this paper



Source: ONS – various Blue Book 2021 data, see data appendix; authors' calculations
Notes: NPISH and government ratios can vary very slightly from 1 due to rounding differences across ONS publications.

3.5. Uplift for the value of the non-pecuniary benefit of working for non-profits

As argued in Section 4.2, it is conceptually appropriate to inflate the labour payments in the NPISH sector to put them on a "market equivalent" basis, since workers in the non-profit sector likely accept lower wages due to non-pecuniary benefits they receive from working in the sector. DCMS (2020) and Croner (2017) find that workers in the non-profit sector earn 20-30% less than workers in other sectors, although a forthcoming study (O'Halloran, 2022) that controls for individual level factors such as education and experience suggests that the

true gap could be smaller than this. We apply a conservative 10% increase, constant over time. This could be refined with microdata work that would enable analysis that controls for education and experience, amongst other factors, and allow this to vary over time.

3.6. Labour inputs

ONS does not publish estimates of workers, jobs or hours worked by institutional sector, making estimates of even the paid hours of work in the NPISH sector difficult. One approach is to use the GVA proportions from Section 3.1.1, and apply them to industry-level hours worked estimates from the ONS productivity data. This implicitly assumes that the level of labour productivity *per paid hour worked* (i.e. ignoring the contribution of volunteering, and before making the other adjustments described in earlier sections) in an industry is the same in the NPISH sector and non-NPISH sector for that industry, since the same proportion of GVA and labour inputs would be allocated to NPISH from the industry.

4. Results

The results in this Section reflect considerable uncertainty in the data and assumptions, described in Section 3. While we believe these are useful first estimates, they would benefit from further work, and should be interpreted accordingly. As such, we present a range of estimates in places, reflecting our uncertainty particularly relating to deflators.

Recall that the Education industry makes up a very large share of currently-measured NPISH GVA (around 70-80%), which primarily represents universities, which are not what most people are interested in when thinking about the non-profit sector. The output deflator for this activity (which relates to the whole education industry, including government-owned schools) is also unusual: it is derived from measures of spending, and volume output measures of cost-weighted activity indicators (number of pupils in schools, etc.), not adjusted for quality change. As such, we present estimates of NPISH including and excluding Education, with our preferred measured being the variants without Education.

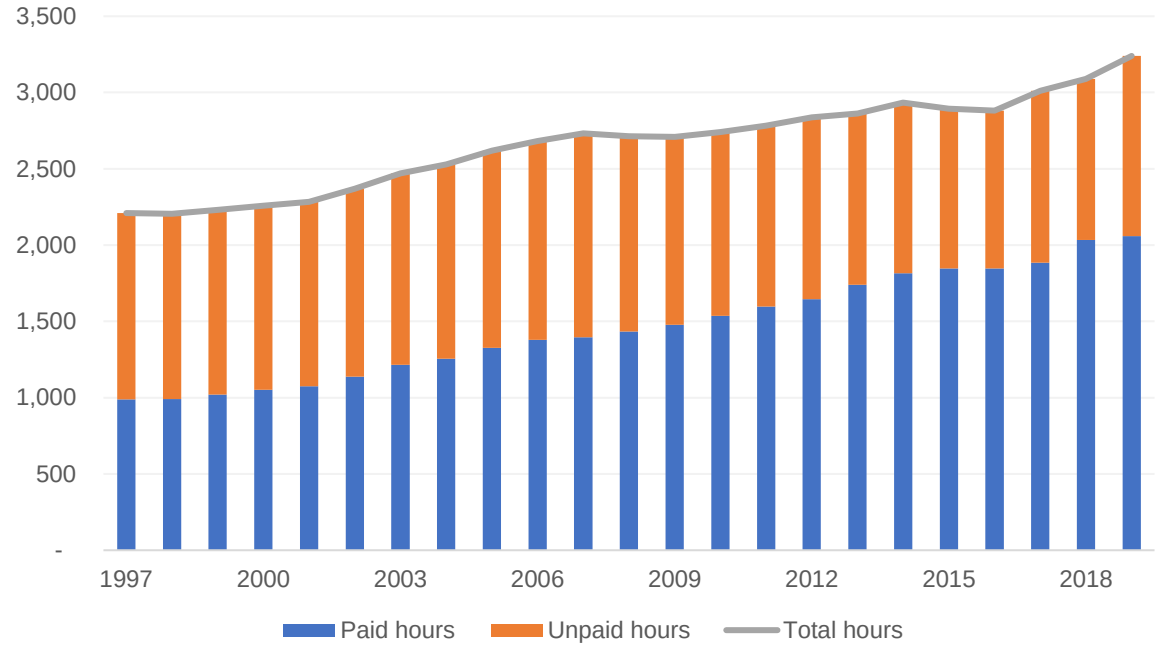
4.1. Labour inputs

Labour inputs are measured by hours worked, which are the sum of paid hours worked and volunteering hours worked.

For NPISH including Education (Figure 10), paid hours worked represent about two-thirds of the total in recent years, up from about half in early years. These shares (the ratio of volunteer to paid labour) are fairly consistent with past work from the John Hopkins Centre for Civil Society Studies (e.g. John Hopkins Centre for Civil Society Studies , 2017). The total rises quickly over time, at 1.8% per year on average between 1997 and 2019, compared with average annual growth of 0.8% in the economy as a whole. Volunteering hours increase slowly between 1997 and 2007, before falling, and finish in 2019 down slightly on 1997 levels, consistent with Figure 7.

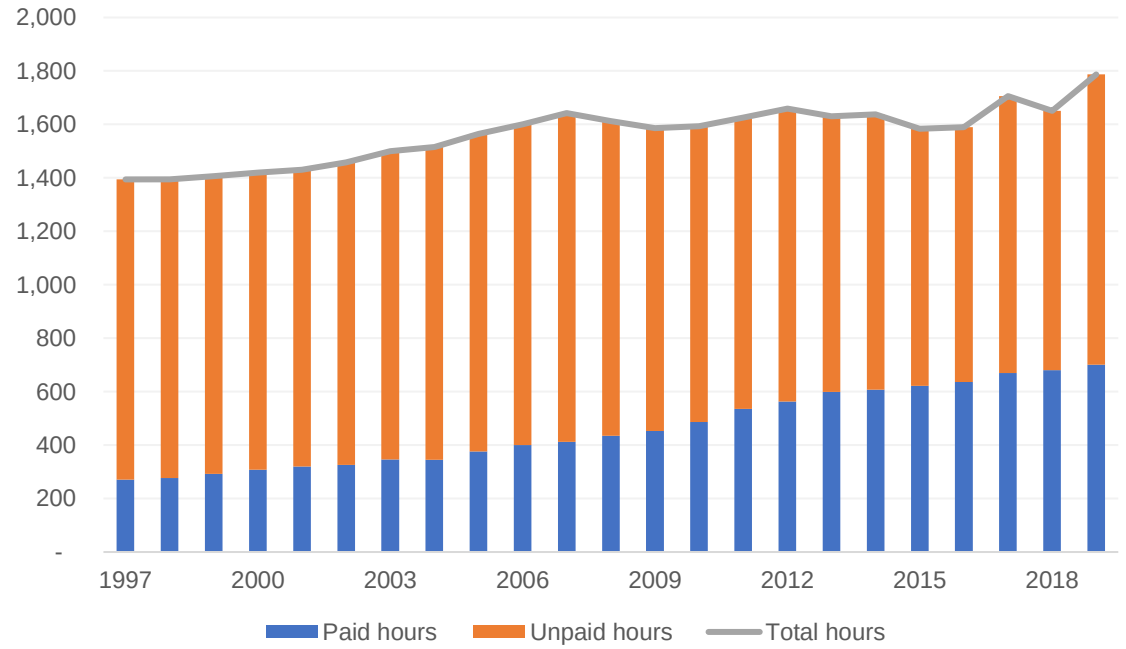
For NPISH excluding Education (Figure 11), volunteering hours represent a much larger share of the total – about 80% in the early years, falling to about 60% in more recent years, as paid hours worked have grown more quickly. Total hours worked grow at an average annual rate of 1.1% between 1997 and 2019, quicker than for the economy as a whole, despite the large slow-growing volunteering component.

Figure 10 – Hours worked in the NPISH sector (including education), millions of hours per year



Source: ONS, DCMS, authors' calculations

Figure 11 – Hours worked in the NPISH sector (excluding education), millions of hours per year



Source: ONS, DCMS, authors' calculations

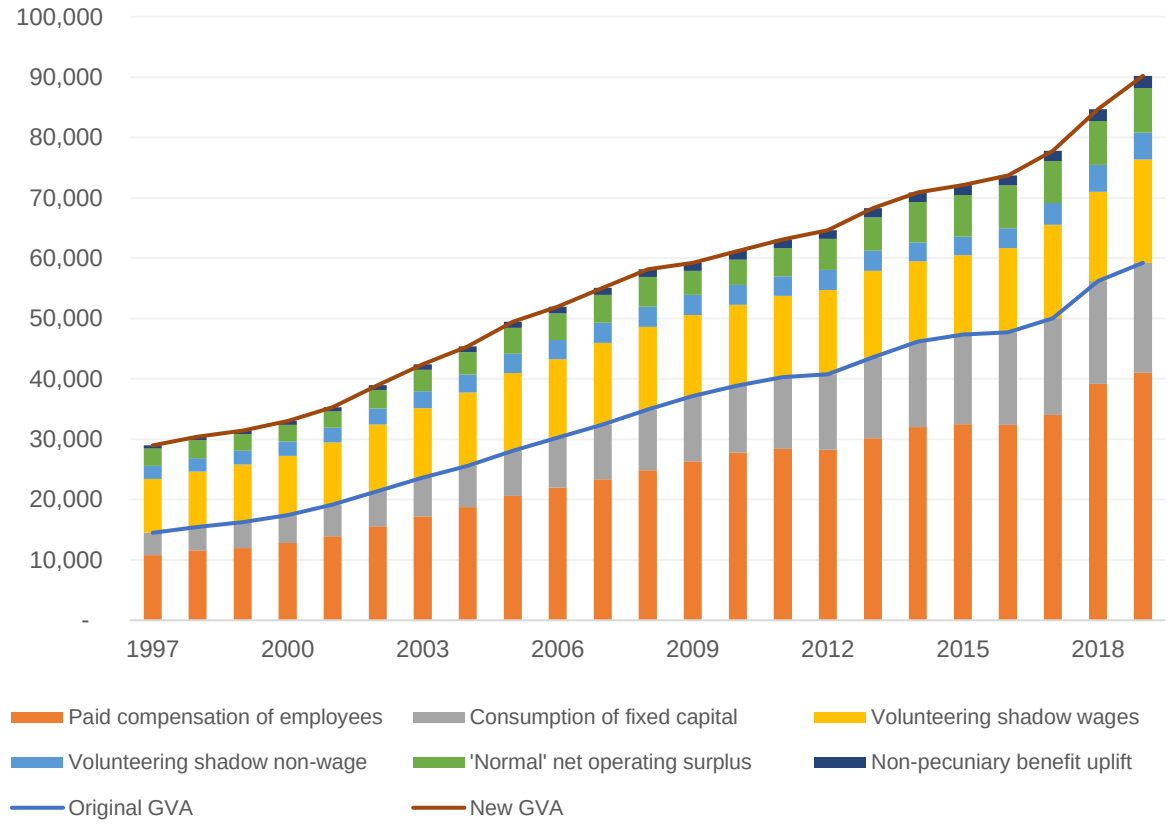
4.2. Current price output

Current price output is measured by Gross Value Added (GVA). In addition to the components in the National Accounts of compensation of employees and consumption of

fixed capital, we add the value of volunteering (including a shadow non-wage labour cost, not included in ONS household satellite account estimates), a 'normal' return on capital, and an uplift for the non-pecuniary benefit received by employees in the sector.

For NPISH including Education (Figure 12), these adjustments account for about 35-50% of the total in most years, with their relative contribution falling over time due to more rapid growth of the national accounts components. NPISH GVA goes from accounting for about 2.9% of total GVA in 2019 before adjustments, to 4.4% after adjustments[19].

Figure 12 – Current price Gross Value Added (GVA) in the NPISH sector (including education), £ million

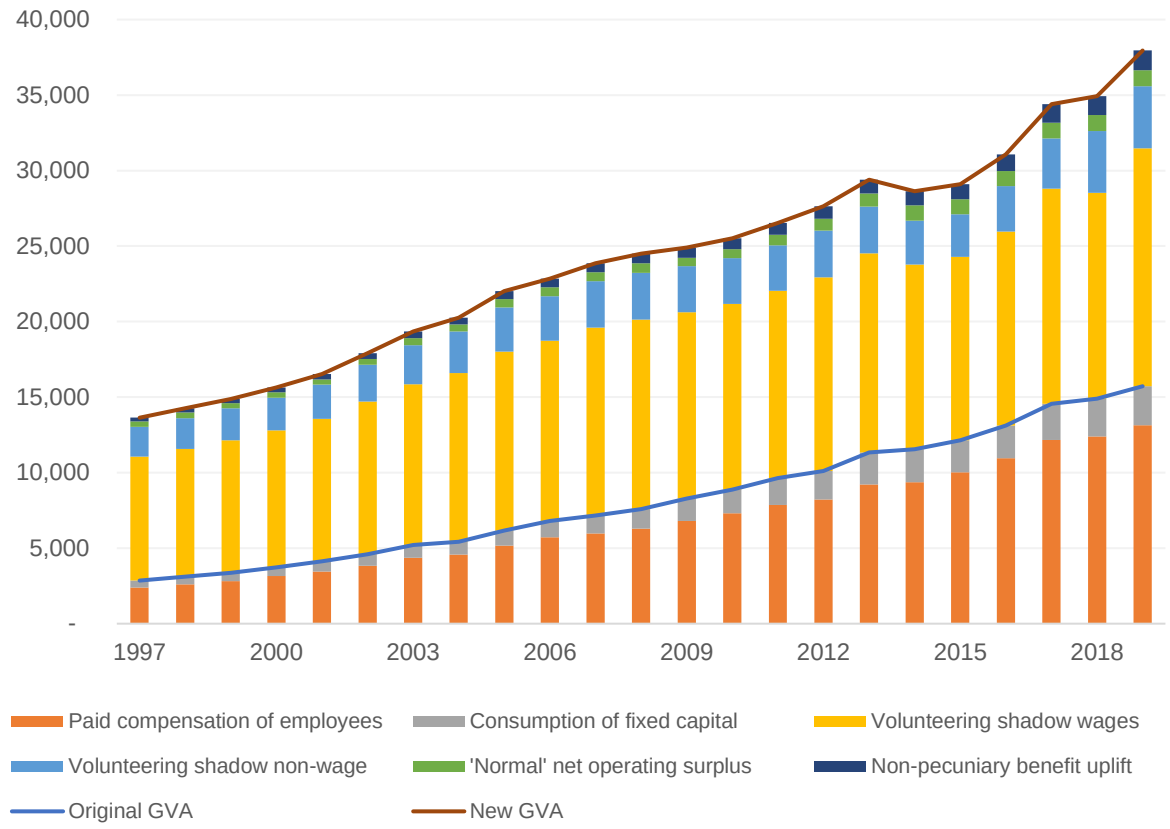


Source: authors' calculations from various sources (see text)

For NPISH excluding Education (Figure 13), the adjustments make a far larger difference, contributing about 60-80% of the total. Volunteering is the primary contribution, although this is a relatively slow growing component. This subset of NPISH accounts for about 0.8% of GDP in 2019 before adjustments, rising to 1.9% after.

[19] This also adjusts GDP for the additional value added to the NPISH sector.

Figure 13 – Current price Gross Value Added (GVA) in the NPISH sector (excluding education), £ million



Source: authors' calculations from various sources (see text)

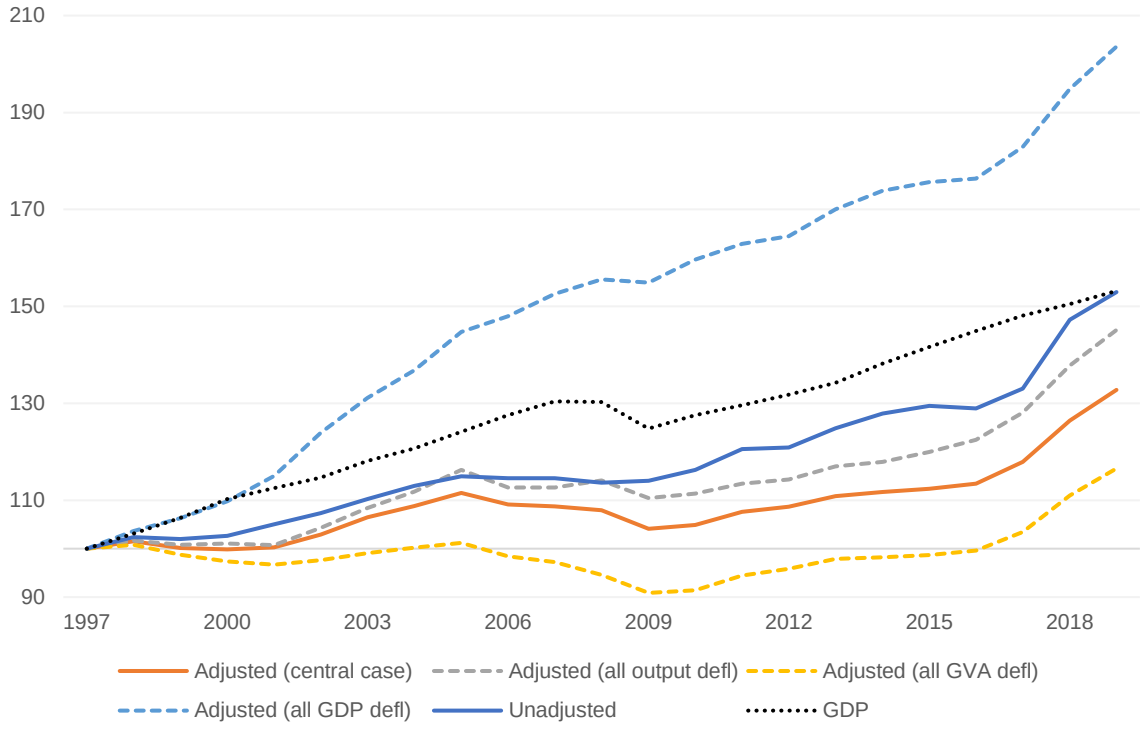
4.3. Real output

Our central estimates of real output (inflation-adjusted GVA) use a composite GVA deflator (from the implied industry GVA deflators) for the national accounts components of GVA, and a composite output deflator for the additional components of GVA (see section 3.1.3). However, there are considerable uncertainties around both components, so in this section we present various alternatives using different deflators.

For NPISH including Education (Figure 14), our central estimate (orange solid line) grows at an average annual rate of 1.3% between 1997 and 2019, with much faster growth coming between 2017 and 2019. This is slower than the growth in real GDP (black dotted line), which grew at an average annual rate of 2.0% between 1997 and 2019. Before adjustments (blue solid line), our estimate of NPISH GVA volume growth was higher, at 2.0% on average per year.

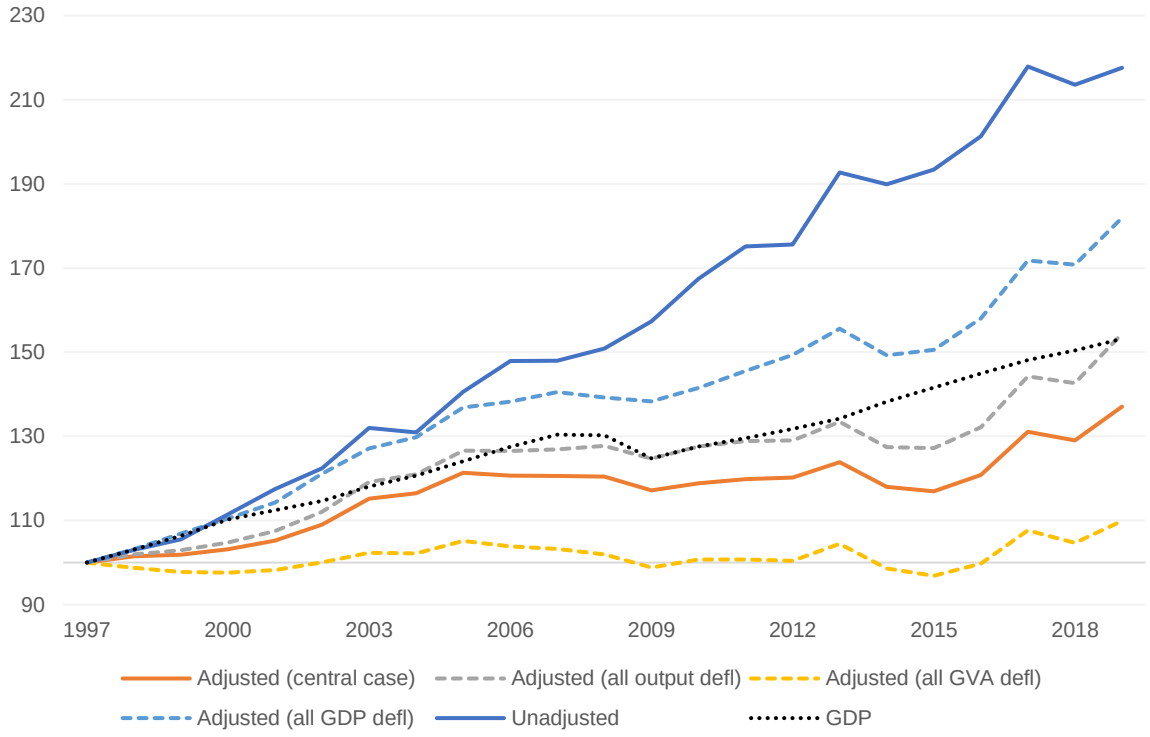
However, using different deflators gives quite different results, as shown in Figure 14. Using the implied GVA deflators for both the existing and additional components of our GVA measure yields slower growth (yellow dashed line), and using our constructed output deflator for all components yields faster growth (grey dashed line). Using the GDP deflator results in yet faster growth (light blue dashed line), in line with the far slower price inflation seen in Figure 5.

Figure 14 – Real Gross Value Added (GVA) in the NPISH sector (including education), chained volume measures (CVM), multiple variants, index 1997 = 100



Source: ONS; authors' calculations from various sources (see text)

Figure 15 – Real Gross Value Added (GVA) in the NPISH sector (excluding education), chained volume measures (CVM), multiple variants, index 1997 = 100



Source: ONS; authors' calculations from various sources (see text)

For NPISH excluding education (Figure 15), our central estimate (orange solid line) grows at an average annual rate of 1.4% between 1997 and 2019, which is slower than for the economy as a whole at 2.0% (black dotted line). The unadjusted series (blue solid line) grows much faster, at an average rate of 2.6% per year between 1997 and 2019. The adjusted series grows much slower due to the addition of the slow-growing volunteering component.

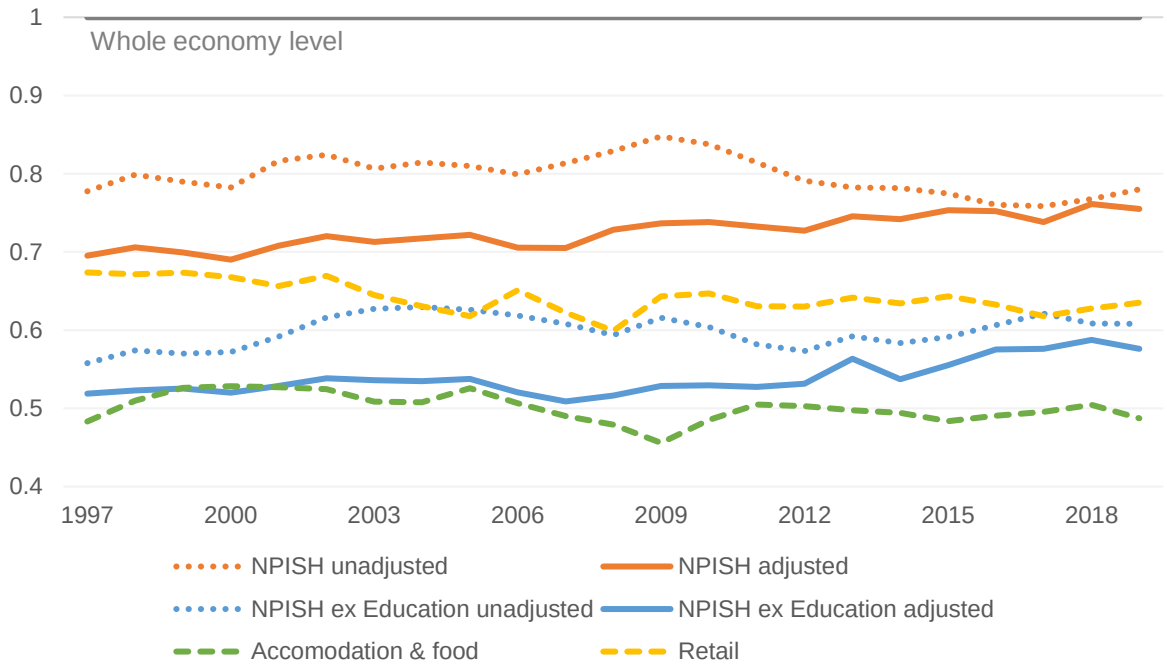
Using different deflators again gives quite varied results, as shown in Figure 15. Using the implied GVA deflators for both the existing and additional components of our GVA measure again yields slower growth (yellow dashed line), and using our constructed output deflator (grey dashed line) or the GDP deflator (light blue dashed line) for all components yields faster growth.

4.4. Labour productivity

Labour productivity is calculated as GVA divided by hours worked. For levels of productivity this uses current price GVA (section 4.2), and for the growth of productivity this uses real GVA (section 4.3).

The level of productivity in the NPISH sector is lower than the UK average before and after adjustments (Figure 16). While the adjustments increase the level of current price GVA substantially, it also increases hours worked by a larger margin, such that the level of output per hour worked falls a little.

Figure 16 – Level of output per hour worked in the NPISH sector (including and excluding education), current prices, relative to the UK average



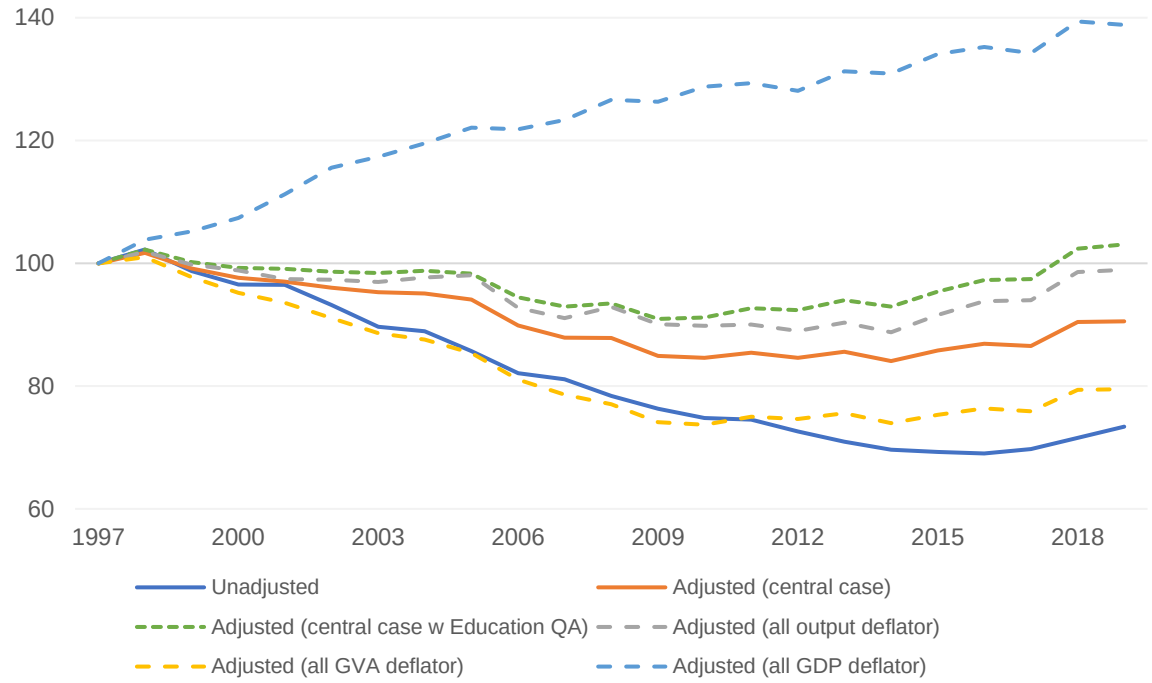
Source: ONS – output per hour worked; authors' calculations from various sources (see text)

NPISH including Education is consistently more productive in levels terms than NPISH excluding Education, associated with universities which are reasonably productive as

measured. Both variants are similar to the level of productivity in other labour-intensive industries like retail, and accommodation & food services. The UK average level includes highly productive, often capital-intensive industries such as mining and quarrying, and real estate.

In our central measures labour productivity in the NPISH sector including education falls before and after our adjustments (Figure 17). The adjustments reduce the extent of the fall in productivity substantially. Between 1997 and 2019, output per hour worked falls at an average annual rate of 0.5%, compared with 1.1% growth for the economy as a whole. Using alternative deflators, as per Figure 14, gives commensurately faster productivity growth. This is especially true when using the GDP deflator, which follow the trends in real output (Figure 14) and deflators (Figure 5).

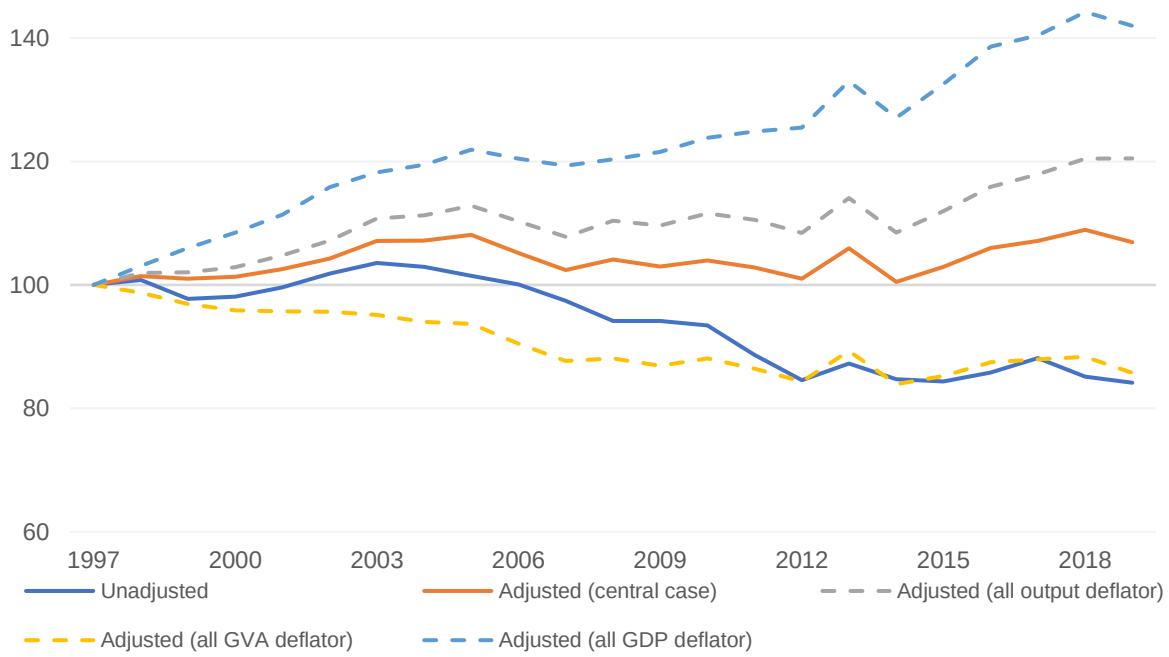
Figure 17 – Output per hour worked in the NPISH sector (including education), multiple variants, index 1997 = 100



Source: authors' calculations from various sources (see text)

However, a large fraction of this measure is education, for which the volume of output is measured without adjusting for quality changes, and hence grows very slowly. ONS public service productivity (PSP) statistics, following the framework in the Atkinson Review, includes explicit quality adjustments on the volume of output for some service areas, including education. While this relates to government-provided education, these quality improvements might nonetheless give a truer measure of the volume growth of the rest of the industry, including universities. We can apply the ONS PSP education quality adjustment growth rate to the education component of the NPISH sector, to produce an alternative measure of real GVA and thus productivity. This measure (green dashed line) grows faster than our central measure, since quality is generally improving over time (reflecting more output being produced, for the same inputs), and this leaves productivity marginally higher in 2019 than in 1997.

Figure 18 – Output per hour worked in the NPISH sector (excluding education), multiple variants, index 1997 = 100



Source: authors' calculations from various sources (see text)

Table 3 – average annual growth rates of output per hour worked, before and after the financial crisis, various variants and comparators

	1997-2007	2009-2019	1997-2019
NPISH including Education			
Unadjusted	-2.1%	-0.4%	-1.4%
Adjusted (central case)	-1.3%	0.6%	-0.5%
Adjusted (central case with Education quality adjustment)	-0.7%	1.3%	0.1%
Adjusted (all output deflator)	-0.9%	0.9%	0.0%
Adjusted (all GVA deflator)	-2.4%	0.7%	-1.0%
Adjusted (all GDP deflator)	2.1%	0.9%	1.5%
NPISH excluding Education			
Unadjusted	-0.3%	-1.1%	-0.8%
Adjusted (central case)	0.2%	0.4%	0.3%
Adjusted (all output deflator)	0.8%	0.9%	0.9%
Adjusted (all GVA deflator)	-1.3%	-0.1%	-0.7%
Adjusted (all GDP deflator)	1.8%	1.6%	1.6%
Memo items			
Whole economy	2.0%	0.7%	1.1%
Non-financial services*	1.4%	1.1%	1.1%
Retail trades, except of motor vehicles	0.6%	1.5%	0.3%
Accommodation and food services	-0.2%	-0.2%	-0.3%
Government services*	-0.4%	0.4%	-0.2%

Source: ONS – output per hour worked; authors' calculations from various sources (see text)
Notes: "non-financial services" excludes imputed rental from the real estate industry; "government services" is SIC 2007 sections O, P and Q, comprising public administration and defence, education, and health and social care, these measures are consistent with the National Accounts and not adjusted for quality change.

For NPISH excluding education (Figure 18), our central measure sees output per hour worked rising by an average of 0.3% per year between 1997 and 2019, faster than the unadjusted measure. Once again, the results are quite sensitive to the choice of deflator (and hence real GVA measure, as in Figure 15). The variants using the GDP deflator, or the output deflator across all components, see faster productivity growth than our central case.

Productivity of other labour-intensive industries, like accommodation & food services and retail, have been close to flat between 1997 and 2019 (see Table 3), so our central case is quite in-keeping with these similarly labour-intensive sectors. Unlike much of the rest of the economy, there is no evidence of a slowdown in productivity growth in the non-profit sector after the 2008 economic downturn – a phenomenon known as the "productivity puzzle".

5. Discussion

The paper introduces conceptual adjustments to National Accounts data to, we believe, better reflect the value and growth of the output, input and productivity of the non-profit sector. For now, this is limited to the coverage of the National Accounts NPISH sector, although we hope that future work will expand to cover non-profit bodies regardless of their institutional sector in the National Accounts.

While the data and estimates in this paper are tractable, and move in the right direction, they come with considerable uncertainties. In many areas, assumptions have been necessitated by lack of data or the scope of the present work. The present work has relied only on publicly available sources (and data made publicly available from ONS and DCMS, for which we are grateful) and use of microdata sources would enable refinement of the estimates and assumptions.

The results are particularly sensitive to the choice of price deflators, as showcased in Figures 17 and 18. Deflators for relevant industries tend to grow faster than for the economy as a whole, and in some cases very fast indeed. This (by identity) supresses the growth of real (inflation adjusted) output, and thus the growth of productivity. The quality of the deflators is typically low, as seen from Table 1, which might explain the rapid increase in measured prices. The low quality and fast price growth are likely due to the use of deflators based mostly on costs, without adjustment for changes in service quality over time. Factoring in improvements in quality, as in ONS public service productivity statistics, would yield slower growth of the deflators, and commensurately faster growth of real output and productivity.

Indeed, we believe the best approach for productivity measurement of non-profits would mirror that of public services, following the Atkinson Review. This involves the identification of direct measures of the volume of output, and adjustment for changes in service quality over time. For instance, in the case of public education, output is measured based on the number of pupils in schools adjusted for attendance (a direct quantity measure, employed in the National Accounts), adjusted for changes in education quality which are proxied by changes in exam attainment, post-school outcomes, and student well-being (a quality measure, used only in ONS public service productivity statistics). An equivalent approach for the non-profit sector, while methodologically and practically difficult, would be optimal.

The current work only partially addresses the important issue of "value" vs "cost". When output is not sold, as for the non-profit sector, the value of the output is very difficult to determine. We produce fuller estimates of the true economic cost of the inputs, reflecting the full labour and capital costs, but this takes us only partially towards the true value of the

output. This is principally because of the many unmeasured positive externalities that occur from much output of non-profits. The Atkinson approach to public service output and productivity measurement partially overcomes this issue for public services by accounting for changes in the quantity and quality of the output, where quality adjustments are crucial to assess the degree to which the output meets the desired outcomes. Following this path for the non-profit sector would allow better reflection of the true value of the output. However, neither the Atkinson approach, nor this paper, fully measure the social value of the output. Doing so would require the valuation of all the associated positive and negative externalities, which is well beyond the scope of this paper.

This paper is a proof of concept of the measurement of the non-profit sector, and a first step in the right direction, leaving many avenues for further work. First, there would be considerable benefit for understanding the sector as a whole from extending the current approach to non-profit organisations outside the NPISH sector. These organisations are an important part of the "third sector", and the delineation based on institutional sector classification will be meaningless to most operating in this area. However, the non-profits operating outside the NPISH sector will be much harder to capture, and cannot be identified from aggregate data. It will therefore be necessary to use microdata analysis and data linkage to identify the relevant organisations and estimate their value added. One option would be to link the Charities Register (maintained by the Charity Commission for England and Wales) to the Inter-Departmental Business Register (IDBR) to identify registered charities across all institutional sectors. However, some third-sector organisations will also not be registered charities. Analysis using the Annual Business Survey might allow identification of non-profit organisations by "revealed activity" – that is, the making of little to no profit for many years without exiting the market. Microdata analysis of the Community Life Survey would also likely improve the volunteering estimates, which are important.

Second, the government announcement that it will work to develop a full non-profit satellite account should provide a sharper, more regular focus on the data limitations in the sector (and several of the potential building blocks for such a satellite account are contained within this paper).

Finally, to generate the more robust estimates of real output and productivity will require exploration of sources for direct output volume estimates and quality adjustments, in the spirit of the Atkinson Review. Given the heterogeneity of activity in the non-profit sector, this will likely entail research into a diverse range of domains, such as social care, museums and galleries, and R&D. The data may not yet exist, or be collected and consistent – some harmonisation and collection will likely be necessary before it would be suitable for use in output measurement.

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Appendix A – Extensions and alternative concepts

NPISH final consumption expenditure

A similar concept to NPISH GVA is NPISH final consumption expenditure (FCE) – one of the components of the expenditure measure of GDP. By National Accounts convention, non-market output (including that produced by the NPISH sector) is assumed to be consumed by the sector that creates it. So NPISH consumes non-market output produced by the NPISH sector. However, the NPISH sector also creates market output and output for own-final use (for instance, research and development) which have other uses – either as household final consumption expenditure, businesses' intermediate consumption, or gross fixed capital formation. By contrast, GVA is all NPISH output less intermediate consumption. For productivity analysis, we are interested in GVA rather than FCE.

$$NPISH\ FCE\ =\ NPISH\ non-market\ output$$
$$=\ NPISH\ total\ output\ -\ NPISH\ market\ output\ -\ NPISH\ output\ for\ own\ final\ use$$

$$NPISH\ GVA\ =\ NPISH\ total\ output\ -\ NPISH\ intermediate\ consumption$$
$$=\ NPISH\ FCE\ +\ NPISH\ market\ output$$
$$+\ NPISH\ output\ for\ own\ final\ use\ -\ NPISH\ intermediate\ consumption$$

It transpires that NPISH FCE and NPISH GVA are similar in magnitude and follow similar trends over time, although they are not exactly the same. NPISH GVA can be expressed as NPISH FCE, plus NPISH market output and output for own-final use, less NPISH intermediate consumption. These additions and subtractions roughly balance out.

NPISH on the IDBR

Another approach would be to use "legal status" breakdowns of data from the Inter-Departmental Business Register (IDBR) – a huge database of businesses and other bodies in the UK, which either pay employees via PAYE, or are registered for VAT. Using data from the IDBR (accessed via nomis), we estimate the proportion of turnover and employment in each industry that is due to units with the NPISH "legal status", annually from 2010 to 2020.

These proportions are mostly higher than the equivalents for GVA, and there are NPISH units in many more industries than the 13 present in the GVA proportions. There are two main reasons for this:

1. The NPISH "legal status" on the IDBR is not the same as the NPISH institutional sector in the national accounts. It is likely that many NPISH units on the IDBR are non-profit in nature, but fall in the private corporations sector from a National Accounts perspective.
2. Because of the conceptual issues with NPISH GVA set out in earlier sections, NPISH GVA proportions would tend to be lower than they 'should be'. Employment and turnover estimates would after be affected, but not to the same degree as for GVA. This could result in NPISH accounting for a larger share of employment and turnover than of GVA, giving the impression of low productivity levels.

Table A1 shows a comparison of the shares of GVA, employment and turnover accounted for by NPISH, according to these two sources. As a result of these differences, we cannot use the IDBR data to produce estimates of labour inputs consistent with the NPISH sector in the National Accounts. However, they may become useful if expanding beyond the NPISH sector to non-profits in all sectors, as we hope to do in future work.

Table A1 – NPISH proportions of turnover, employment and GVA from different sources, 2019

Selected industries	**NPISH share of turnover (IDBR)**	**NPISH share of employment (IDBR)**	**NPISH share of GVA (National Accounts)**
85 : Education	17%	25%	33%
88 : Social work activities without accommodation	34%	41%	21%
94 : Activities of membership organisations	42%	73%	19%
75 : Veterinary activities	0%	1%	15%
90 : Creative, arts and entertainment activities	7%	18%	12%
91 : Libraries, archives, museums and other cultural activities	14%	22%	8%
72 : Scientific research and development	3%	11%	7%
87 : Residential care activities	18%	26%	5%
93 : Sports activities and amusement and recreation activities	10%	23%	3%
81 : Services to buildings and landscape activities	0%	0%	2%
86 : Human health activities	2%	4%	1%
69 : Legal and accounting activities	1%	1%	1%
68 : Real estate activities	6%	13%	0%
65 : Insurance, reinsurance and pension funding, except compulsory social security	3%	9%	0%
82 : Office administrative, office support and other business support activities	2%	3%	0%
56 : Food and beverage service activities	2%	3%	0%
01 : Crop and animal production, hunting and related service activities	1%	1%	0%
Total	**1.7%**	**6.7%**	**2.7%**

Source: ONS – NPISH GVA proportions (see section 3.1 for more), and IDBR (via nomis); authors' calculations

Appendix B – Data appendix

ONS data

GDP(o) low level aggregates [industry GVA] - https://www.ons.gov.uk/economy/grossdomesticproductgdp/datasets/ukgdpolowlevelaggregates

NPISH GVA proportions - https://www.ons.gov.uk/economy/grossvalueaddedgva/adhocs/14480nonprofitinstitutionsservinghouseholdsnpishgrossvalueaddedgvaproportions

NPISH compensation of employees - https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/haag/bb?referrer=search&searchTerm=haag

NPISH gross operating surplus - https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/habv/ukea?referrer=search&searchTerm=habv

NPISH wages and salaries - https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/haah/bb?referrer=search&searchTerm=haah

NPISH consumption of fixed capital - https://www.ons.gov.uk/economy/nationalaccounts/uksectoraccounts/timeseries/mk2e/capstk?referrer=search&searchTerm=mk2e

NPISH final consumption expenditure - https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/abnv/ukea?referrer=search&searchTerm=abnv

Industry output deflators - https://www.ons.gov.uk/economy/inflationandpriceindices/datasets/experimentalindustrydeflatorsuknonseasonallyadjusted

Household satellite account dataset - https://www.ons.gov.uk/economy/nationalaccounts/satelliteaccounts/datasets/householdsatelliteaccountfullukaccounts2005to2014

Mid-year population estimates by age group, via nomis - https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=2002

Hours worked by industry (productivity) - https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/datasets/outputperhourworkeduk

ASHE wage data by occupation – https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/ashe1997to2015selectedestimates

Volunteering data

Table A1 – Details of volunteering participation rates use in modelling

Year	Mode	Source	Data available	Reported in
2001	Face-to-face	Citizenship Survey	Total participation	Community Life Survey 2016/17 reference tables
2003	Face-to-face	Citizenship Survey	Total participation	Community Life Survey 2016/17 reference tables
2005	Face-to-face	Citizenship Survey	Total participation	Community Life Survey 2016/17 reference tables
2007-08	Face-to-face	Citizenship Survey	Total participation	Community Life Survey 2016/17 reference tables
2008-09	Face-to-face	Citizenship Survey	Total participation	Community Life Survey 2016/17 reference tables
2009-10	Face-to-face	Citizenship Survey	Total participation	Community Life Survey 2016/17 reference tables
2010-11	Face-to-face	Citizenship Survey	Total participation, and age breakdown	Community Life Survey 2016/17 reference tables
2012-13	Face-to-face	Community Life Survey	Total participation, and age breakdown	Community Life Survey 2016/17 reference tables
2013-14	Face-to-face	Community Life Survey	Total participation, and age breakdown	Community Life Survey 2016/17 reference tables
2014-15	Face-to-face	Community Life Survey	Total participation, and age breakdown	Community Life Survey 2016/17 reference tables
2015-16	Face-to-face	Community Life Survey	Total participation, and age breakdown	Community Life Survey 2016/17 reference tables
2013-14	Online/ paper	Community Life Survey	Total participation, and age breakdown	Community Life Survey 2016/17 reference tables
2014-15	Online/ paper	Community Life Survey	Total participation, and age breakdown	Community Life Survey 2016/17 reference tables
2015-16	Online/ paper	Community Life Survey	Total participation, and age breakdown	Community Life Survey 2016/17 reference tables
2016-17	Online/ paper	Community Life Survey	Total participation, and age breakdown	Community Life Survey 2016/17 reference tables
2017-18	Online/ paper	Community Life Survey	Total participation, and age breakdown	Community Life Survey 2019/20 reference tables
2018-19	Online/ paper	Community Life Survey	Total participation, and age breakdown	Community Life Survey 2019/20 reference tables
2019-20	Online/ paper	Community Life Survey	Total participation, and age breakdown	Community Life Survey 2019/20 reference tables
2020-21	Online/ paper	Community Life Survey	Total participation, and age breakdown	Community Life Survey 2020/21 reference tables

Community Life Survey 2020-21 - https://www.gov.uk/government/statistics/community-life-survey-202021

Community Life Survey 2019-20 - https://www.gov.uk/government/statistics/community-life-survey-201920

Community Life Survey 2016-17 - https://www.gov.uk/government/statistics/community-life-survey-2016-17

Ad hoc estimates from the Community Life Survey: Further estimates on volunteering trends in England - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1083081/CLS_ad_hoc_Volunteering__Final__220609_.ods (data download starts automatically)

Volunteering extension methodology notes:

- All calculations by age group, based on participation rates by age group.
- For years before age breakdown in participation are available, the trend in the overall participation rate is used as the trend for the participation rates of all age groups.
- For most years without overall participation rate (2002, 2004, 2006), midpoints between adjacent years are used. For 2011 (in the absence of a 2011-12 datapoint), the 2010 participation rates are rolled forward, since the 2012 rates (from 2012-13 data) are influenced by the 2012 Olympics, which increased participation, and would therefore be inappropriate for 2011 estimates.
- For years before 2000, participation rates held constant.
- All financial year participation rates are treated as representative of their predominant calendar year (e.g. 2010-11 used for 2010) consistent with approach in ONS Household Satellite account (see ONS, 2013).
- For years with multiple participation rates from survey modes (2013-14, 2014-15, 2015-16), we use the face-to-face estimates for consistency with ONS household satellite account measures. We splice on the estimates from the online/paper mode from 2016 onwards to avoid a discontinuity in 2016 driven by a mode effect.
- For average hours of volunteering per volunteer, we use estimates from 2013-14 onwards from the ad-hoc DCMS publication in 2022, adjusting for a mode effect from 2016-17 onwards. We calculate a mode effect on volunteering participation rates by age group, and apply the same effect to the average hours estimates by age group.
- For 2012 we use average hours of volunteering reported in ONS (2013), which is affected by the London 2012 Olympics which led to a large increase in participation.
- For years before 2012 we use a range of modelling by age group, drawing on ONS (2018), participation rates, and other methods. We loosely target total hours of volunteering from ONS (2013), while keeping the approach relatively parsimonious.