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Article

Human capital workplan: 2018

Plans to improve and expand upon the current human capital estimates.

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1 . Overview

This workplan follows on from our recent Human capital estimates: 2004 to 2017 article and sets out our plans to improve and expand upon the current human capital estimates to better meet users' needs. The projects outlined in this article have been developed through discussions with users on immediate and longer-term policy needs. Therefore, some aim to increase our insights on particular topics in the shorter-term, while other developments should provide the groundwork for developing a wider conceptual framework and evidence base. This is in keeping with our aspirations to keep pace with and proactively expand upon the international debate on the topic of the value of skills and knowledge of the workforce. We aim to achieve these goals through compilation and development of new statistics and analysis.

The first section of this document outlines the concept of human capital and summarises the current measurement approach. The subsequent sections set out the main activities proposed under three workstreams:

- developing and expanding the current methodology
- exploring alternative approaches to measuring human capital
- delivering wider, one-off analyses on specific topics of interest

The final section provides a high-level timetable for the different workstreams. We welcome users' feedback on these proposed developments and investigations, as well as other potential improvements that may be useful to inform citizens and help policymakers to make informed decisions.

We are working collaboratively on this topic with other government departments, academics and international organisations. As part of this, we will launch an open consultation in early 2019 providing more thoughts and options on some of these improvements to get wider feedback and engagement. In addition, through our Economics Statistics Centre of Excellence, we are holding a workshop with international experts on 22 November 2018.

2 . Definitions

Human capital has been defined as "the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being". It sees education and training as investment into individuals' value and how much potential they gain.

Measuring the stock of human capital can help us better understand what drives economic growth, as well as help measure the productivity performance of the educational sector and add to the evidence base of skills and educational policy interventions more generally. Looking at changes over time can also provide important information for assessing the long-term sustainability of economic progress.

At the individual level, a person's labour market outcomes are strongly linked to their human capital (e.g. Steedman, 1996). Additionally, human capital has also been related to improved health outcomes (e.g. Grossman and Kaestner 1997), lower crime rates (Grogger, 1998 and Lochner and Moretti, 2004) and measures of social capital, trust and social participation (Helliwell and Putnam, 1999; Milligan et al., 2003 and Schuller, 2001).

We currently measure human capital stock in monetary terms based on the estimated value of all discounted potential future earnings that individuals in the working age population might expect in their lifetime. This is often referred to as the output- or income-based approach to measuring human capital stocks and is fully in line with the best practice set out in the United Nations Economic Commission for Europe (UNECE) Guide on Measuring Human Capital (PDF, 2.8MB).

The UNECE Guide sets out two further broad approaches to human capital measurement: an indicator-based approach and a cost-based approach. Plans for exploring the first of these are discussed in the “Exploring alternative approaches to measurement” section of this article. The cost-based approach calculates the value of human capital stock based on the amount spent on investment in education and skills. This approach has several limitations, including the implicit assumption that a given level of spending will provide the same value of skills and knowledge across individuals and education providers. For this reason, this is not a method we are looking to develop further at this time.

3 . Developing and expanding the current methodology

The current estimates allow a combined explanation of labour market, education and demographic trends to consider impacts to the economy. Despite this, it is important to further develop these human capital statistics to better inform policy, and to expand upon our understanding of the drivers to long-term economic growth.

There are a number of ways in which it may be possible to enhance the existing approach to measure human capital stock. Depending on their feasibility, each of the investigations in this section should improve the measurement of our human capital stock, incorporate new data sources into the analysis and allow more detailed analyses to be conducted across sub-populations and different parts of the economy. In addition, it will allow users to examine more granular trends over time to inform labour market, education, and skills policies, as well as creating a solid foundation to consider further expansions, as in the latter two workstreams.

3.1 Accounting for further earnings premium differences

The current method of estimation of human capital stock using the lifetime labour income (LLI) approach is consistent with the latest United Nations Economic Commission for Europe (UNECE) Guide on Measuring Human Capital (PDF, 2.8MB), to which we contributed. However, there are various ways to more accurately account for earnings differences between individuals, and we will investigate these to see if more precise and granular earnings premiums can be calculated and incorporated into the estimation approach.

Building on the analysis of the last Human Capital estimates release, we will make further investigations to consider how occupations impact on earnings within a gender, highest qualification and age population combination, to see if these should be incorporated into the main model. This could also make our human capital estimates more consistent with related measures of labour productivity, such as Quality Adjusted Labour Income (QALI). This could allow more granular analysis to policymakers of labour market policies. As different regions may have different shares of occupations for similar levels of the qualified workforce, accounting for differing occupations would more accurately distinguish the relative stock values.

Additionally, earnings income differences between and within gender, qualification and age combinations will try to be empirically measured. For a specific population combination, it is possible that a different projected rate in nominal earnings should be applied, if this can be measured reliably. In addition, we will consider if it is possible to take into account the different earnings captured within a sub-population combination. It is likely that higher earnings translate to higher earnings in the future, and vice versa, and both of these investigations will look to incorporate that information to provide more granular and local breakdowns of stock values.

Linking together existing data sources may be necessary for this analysis, while potential additional sources, such as the Longitudinal educational outcomes (LEO) dataset recently developed by the Department for Education, or other administrative sources such as individuals’ taxable earnings and income data, may also provide relevant insights. Depending on data availability, this may allow for granular, longitudinal analysis of how the same individual’s earnings progress over time, given their qualifications and age. Note, this analysis would reflect individual level dynamics, while economy-wide dynamics may separately need to be accounted for, for which we will collaborate with others on appropriate methodologies.

3.2 If possible, expand estimates to account for differential earnings per hour, further incorporating elements of related ONS measures of labour outcomes

Office for National Statistics (ONS) Labour productivity estimates consider differential earnings by hour. It is well documented that as people age in the workforce, average hours worked decrease. In addition, as older individuals have fewer productive years left in the labour market, their stock estimates will be naturally lower than equivalent younger individuals. We will therefore conduct analysis to test the feasibility of human capital stock estimates “per productive hour”, and relate that to the current method. This will provide information on the efficiency of different parts of the workforce, helping inform on policies to improve productivity and to assess the nature of an ageing workforce. It will also better reflect and consider the potential impact of changes in the work week, increasing retirement ages, as well as recent rises in self-employment and part-time working.

3.3 Accounting for on-the-job training and treating masters and doctorate qualifications separately in the model of lifetime income

Currently, the highest qualification that an individual can obtain in our model is a degree or equivalent level. After this, no further education is assumed to be obtained that would result in an earnings premium. For individuals with a lower qualification, their future qualification prospects are assumed to follow a linear hierarchy.

In both scenarios, obtaining on-the-job training or a lower level of qualification than currently obtained is implicitly assumed to not give an earnings premium. The UNECE Guide encourages countries to explore the impact of on-the-job training, so we will investigate this to see if there is a premium over and above the one obtained by the current highest qualification. This development will potentially interact with the first point , if the labour market is accounting for those with other qualifications contributing to a higher marginal product and hence rewarding them with higher earnings, but the timeline of receiving on-the-job training throughout a working life is unlikely to be uniform across an individual’s working life.

This analysis should help assess the benefit gained by workplaces of on-the-job training provision to its staff, and allow decision makers to consider alternative investments in upskilling the workforce.

Separately, as more people undertake post-graduate qualifications, it is important to understand the differential stock premium associated with such qualifications. We will conduct feasibility analysis to see how robust such a breakdown would be.

3.4 Investigating the “price” of human capital to deflate to get an accurate measure of real human capital.

Choosing an appropriate price of human capital stock allows consideration of changes in the volume of stock over time. “Real” estimates of stock, as they are referred to, are important to policymakers in considering how to invest in human capital accumulation. For example, given the current methodology of lifetime labour earnings, a wage increase in the economy may be unrelated to an increase in the quality of labour, so removing this effect appropriately is critical to understanding the trends of skills and knowledge in the economy. As the Eurostat Handbook on prices and volume measures in national accounts states, “Changes in quality over time need to be recorded as changes in volume and not as changes in price.” While the current statistics use the Consumer Prices Index for this purpose, we will investigate appropriate alternatives, to identify the approach to best account for pure human capital price changes.

3.5 Researching and investigating the incorporation of human capital into a National Accounts framework

Currently, human capital does not feature in standard economic statistics such as gross domestic product (GDP), or the Quarterly National Accounts, though it is recognised internationally as an increasingly important concept to measure. Currently, we are involved in an international UNECE task force to develop guidance on a satellite account on education and training, which can start to clarify where national accounts would need to expand to account for human capital investment.

Once this guidance has been finalised, which should be in 2019, it should then be possible to start to incorporate all the points above into a conceptual framework. From this, we can assess the integration of human capital stock, as well as its price revaluation, depreciation, flows, investment and other relevant national accounts concepts, as well as ultimately linking more formally to other related Office for National Statistics (ONS) statistics on education and the quality of labour in a consistent approach.

4 . Exploring alternative approaches to measuring human capital

We will explore the feasibility and value of deriving new types of human capital estimates, as well as expanding the definition of human capital to account for non-economic benefits, through a number of approaches. We will expand on the details of these investigations in the upcoming consultation.

4.1 Indicator-based decomposition of human capital

The current income-based approach is one of three groups of methods recommended by the United Nations Economic Commission for Europe (UNECE) Guide on Measuring Human Capital. The second of these is the indicator-based approach that, in the UNECE Guide, is focused solely on educational output indicators. However, given the central principle of human capital embodying the productive capacity of all skills and knowledge, we should arguably consider wider measures than purely educational indicators. We will therefore explore the potential and value of a broader indicator-based approach. These indicators could be grouped into themes such as qualifications, skills, health or labour market engagement, similar to the approach used by the World Economic Forum's Human Capital Report and considering the World Bank's Human Capital index.

The main benefit of developing such an indicator-based approach is that it will help contextualise how investment in different forms of human capital accumulation impact it, from formal education to private investment in learning on-the-job.

We will conduct an overview of existing approaches internationally, considering the use of publicly available indicators as well as derived new variables from available sources. In addition, we will consider various approaches for presenting the indicators. These will include consideration of dashboards as well as examining the feasibility and desirability of combining indicators within and across dimensions of human capital. The results of the forthcoming consultation will largely shape the identification and selection of appropriate indicators. Note, there are multiple aspects to consider when producing an indicator-based approach, such as outlined in the Organisation for Economic Co-operation and Development (OECD) Handbook on constructing composite indicators (PDF, 2.95MB).

4.2 Skills hierarchy of human capital

Currently, the breakdown of the existing human capital stock estimates is limited to those variables available on the Annual Population Survey and the Labour Force Survey, as well as by the sample sizes of those surveys. However, incorporating different sources which allow for the analysis of the relationship between earnings and skills could allow us to break down and value specific skills and their contribution to the economy. Additionally, measuring skills can be seen as the demand side of human capital, while qualifications and training provide the supply of human capital accumulation. Creating separate measures for both is important for analysis of the level of efficient allocation and mismatch within the labour market.

For example, applying statistical and data science techniques to administrative data, such as on vacancies, can allow us to consider the relationship between skill requirements and proposed salaries. There are multiple data sources that we are considering for such an approach and other sources may be suggested by the consultation. In addition, there are a variety of different techniques that could subsequently be applied. These include neural network algorithms, regression analysis and hedonic pricing that could in principle generate a market price for a particular skill, such as the knowledge of a computing language, or leadership skills. To note, within this analysis, both cognitive and non-cognitive skills will be considered, as long as they are relevant for the fulfilment of a job.

These derived relationships between salaries and skills can then be applied to our estimates of human capital stock to work out a current stock of different skills, and these data can help users understand which skills are important for particular sectors of the economy. The analysis can also be used to see trending and growing skills as valued by the economy and use that information to help inform policy on investment in people at a more granular level, as well as to inform curriculum design in our education systems.

4.3 Relationship of health and human capital

Human capital in its wider sense should account for more than the benefits to the economy. One area of particular interest is the impact of human capital on the health system and also how human capital is impacted by the health of the workforce. We will build on academic research and assess how some of the concepts potentially link to each other. For example, this may focus on aspects of physical and mental health status and resulting wages, as well as short-term labour market impacts following a disability. This should help policymakers to consider wider non-economic benefits of human capital such as spillover effects, as well as the feedback relationship one has on the other. As a consequence, this may allow labour market, education and health policy cross-overs to be more explicitly considered in one analytical framework.

4.4 Sourcing skills and knowledge

All the approaches mentioned up to now will tend to rely on a mixture of existing survey and administrative data sources, even if some have not currently been combined. We will also consider supplementing the analysis with potential new sources that may capture the value of individual investment into education and training more directly. These options could include changes to existing surveys, both business and social, as well as more innovative open-source information that may be available. This is because there may be an increasing de-coupling between the value of the skills and knowledge of an individual and the earnings they receive. Hence, a non-earnings-based approach to valuing human capital can be used to track this relationship, and give an alternative focus, complementing point 4.2 around the creation of a skills hierarchy, mentioned earlier.

5 . Delivering wider, one-off analyses on specific topics of interest

This section outlines the consideration of important labour market and skills trends, as well as policy topics, and their impact on the value of human capital. Rather than being methods for future regular releases, these investigations should lead to specific publications.

5.1 Explore how current and future earnings are impacted by different backgrounds

Subject to data availability and accessibility, being able to measure the impact of current and future earnings from different factors could benefit measurement of human capital stock in several ways. This could be in its assumptions and fixed factors (as explored earlier in the article), or directly into the estimation of the stock value using an equivalent methodology. By using data sources such as the Longitudinal Education Outcomes (LEO) data developed by the Department of Education (DfE), this may currently be possible for the younger workforce but not for the older workforce, though in time, as the LEO dataset expands, new estimates can hopefully be incorporated. We will be looking to collaborate with other researchers making use of these datasets in a similar context both in government and academia. If successful, this would allow much more granular representation of stock values and the impacts from more specific qualifications obtained may be taken into account. For example, the subject and university of study may be differentiated in accounting for lifetime earnings.

5.2 Earnings progression by education level expanded, building upon earlier experimental work presented in a previous paper on Inclusive Growth

This analysis can inform how different parts of the population are experiencing a slow-down in real wages as presented elsewhere, and how this impacts on new entrants into the labour market, as well as those who may decide to change careers. Analysis of this over time would also be useful to consider whether there has been a change in progression in recent years.

5.3 Investigations into changes of shares of workforce with low or no qualifications, as well as those with a degree or above.

As shown in the latest human capital release, the changing demographic make-up of the workforce has a big impact on aggregate human capital stock estimates. Understanding the reasons for different changes in shares for different age groups can help inform policy on preparing future labour markets; considering capacity and availability for the labour market to evolve in a changing environment. For example, the UK's response to a more autonomous, artificial intelligence (AI)-driven economy in the future will relate to the share of workers with particular skills and qualifications, so evaluating previous changes in these shares will help give insight into future trends.

5.4 Investigation into the relationship between skills and earnings outcomes, using sources such as the Organisation for Economic Cooperation and Development (OECD) survey of adult skills (PIAAC)

As stocks are estimated as the present value of lifetime labour income, a closely related topic is the factors that lead to particular levels of earnings. Due to data limitations, in the current methodology, the impact of qualifications is considered on earnings. However, arguably, it is the skills gained through learning and training that impact more directly on individuals' earnings. Hence, being able to analyse how skills and earnings are related, and comparing this relationship with other countries, will provide useful insight both into the eventual incorporation of a human skills stock and to highlight the relative value of specific skills that may be important to the economy's development.

5.5 Investigation into more granular breakdowns of human capital

In the current human capital stock figures, regional data is currently provided at Nomenclature of Territorial Units for Statistics (NUTS) 1 level, with a slightly modified methodology of merging age groups to have more data content per region. With further investigations into linked non-survey sources, including Census and Pay As You Earn data, we will evaluate whether it is possible to produce more granular measures of human capital that would be sufficiently robust to provide relevant information to those focused on supporting economic and labour market policy at the regional and local level.

6 . High-level timeline of developments

We intend to deliver iteratively on these developments, prioritising different aspects based on user needs and feedback. Consequently, plans may change in response to both initial research findings and the user feedback to the written consultation. Some of the larger scale developments will also necessarily be dependent on resource availability in later periods. However, the main tasks from the workstreams described in this document can broadly be aligned to three main dates.

By early 2019:

- begin consultation on developments for indicator-based approach to human capital and skills hierarchy of human capital, supported by some additional experimental statistics on indicator-based approaches
- hold Office for National Statistics and Economic Statistics Centre of Excellence workshop on human capital measurement with academics and other international experts
- expand on existing experimental analysis on earnings progression
- aim to agree access to appropriate administrative based data sources
- where possible, identify and agree access to appropriate sources in measuring skills' breakdowns
- investigate the relationship between skills and earnings, as well as looking at changes of shares of the workforce with differing qualifications

By mid-2019:

- deliver public response from consultation on developments of indicator-based approach to be released
- deliver analysis to assess feasibility of improving existing human capital stock estimates to account for the effect of on-the-job training, selecting an appropriate price index, incorporating occupation and hours, and reflecting differential earnings
- produce discussion paper using one of the preferred methods from the consultation on the indicator-based approach
- subject to data availability, conduct initial analysis aimed to be conducted of lifetime earnings of younger population to assess feasibility of incorporation into human capital stock estimation
- subject to data availability, conduct analysis on progression of labour income to feed into review of the assumption of a standard income growth rate
- consider potential for new sources and/or changes to existing survey sources, to value human capital skills more directly; this may result in a future consultation, or be embedded in the forthcoming one

Beyond mid-2019:

Some of these projects reflect longer-term aspirations and will require a larger time frame and further international collaboration, so are presented with understanding that we will monitor progress and update priorities according to user needs and available resources.

- deliver feasibility analysis of more granular regional data on human capital
- aim to incorporate results from the consultation on the indicator-based approach into regular production and analysis of new human capital estimates
- aim for regular releases of human skills stock supply into the economy, consistent with improved human capital estimates from earlier analysis
- deliver analysis on possible effects of health on human capital, by building on academic research into decomposing the stock by health status, as well as the health benefits from human capital accumulation, quantifying the impact on health costs from the different health status of those investing in human capital
- research conceptual framework for integrating human capital between ONS statistics and into national accounts, following United Nations Economic Commission for Europe (UNECE) guide on satellite account on education and training, as well as other international guidelines such as updates to system of national accounts (SNA) frameworks