Human Capital Estimates, 2012

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Abstract

This article presents experimental statistics on the valuation of the UK’s Human Capital Stock from 2004 to 2012. This release is part of a programme of work within the Measuring National Well-being Programme and updates previous estimates released by ONS in December 2011.

Key points

• Following substantial falls in 2010 and 2011, the value of the UK’s human capital stock began to stabilise in 2012.
• In 2012 the value of the UK’s employed human capital was £17.15 trillion; £68 billion lower than in 2011 (a fall of 0.4%).
• The gap between the UK’s full human capital and employed human capital was the largest since estimates began in 2004 at £754 billion.
• 34.7% of the human capital stock was embodied in the 25.3% of the population whose highest educational attainment was a degree or equivalent.
• The total value of women’s human capital was around 59% of men’s.
• The stock of human capital is disproportionately concentrated in younger workers.

What is Human Capital?

‘The most valuable of all capital is that invested in human beings’, Alfred Marshall - Principles of Economics (Marshall, 1890).

Human capital is most easily understood when put in the context of its contribution to economic output. Growth in an economy can be driven by increases or improvements in either:

• land - the natural resources that we have at our disposal, for example coal, wood etc;
• labour - our workforce; and
• capital - the buildings and machines we use to produce goods and services.

In this context human capital refers to the labour, one of the factors used in the production process, and captures both the number of people in the workforce and the abilities they bring with them.
At the individual level we can think about human capital as measuring a person’s competencies, knowledge, social attributes, personality and health attributes, including creativity. All of these factors enable them to work, and therefore produce something of economic value.

We place a value on the machines that we use to produce goods and services. However, these machines would be almost useless without the knowledge of how to use and maintain them; this is human capital and also needs to be valued.

In general, human capital is considered to be linked to education, although this is not the only influence on human capital. The technical definition adopted by ONS is that provided by the Organisation for Economic Co-operation and Development (OECD). It defines human capital as: “the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being”.

These activities can take place throughout an individual’s life and in a range of environments. OECD (2001) identifies four main ways human capital can be developed:

- Learning within family and early childcare settings.
- Formal education and training.
- Workplace training.
- Informal learning (e.g. through daily living, civic participation and on the job training).

Although a consensus on this definition of human capital is beginning to be formed by the international statistical community, it is a concept that is difficult to measure. The concept of human capital is broad and encompasses a range of personal attributes, such as people’s health conditions. However, in practical terms the focus of measurement has been limited to people’s skills, knowledge and competencies, and in particular on the role of formal education and training in enhancing them.
The value of Human Capital

Figure 1: Employed and Full Human Capital 2004 - 2012
United Kingdom

Figure 1 illustrates the effect of the economic downturn on the UK’s employed human capital stock. In the years 2004 to 2007 the value of the UK’s human capital stock increased steadily, at an average of 3.1% per year. This was driven by an increase in the employed working-age population and an increase in the skills level of the population (with the proportion of the working age population with a degree qualification or higher increasing and the proportion of the population with no qualifications decreasing). Other things being equal, this would have been expected to increase the human capital stock as higher educational attainment tends to be associated with higher productivity and higher earnings. Another important driver of the increase in the value of the

Source: Annual Population Survey (APS) - Office for National Statistics

Notes:
1. Figures in 2012 prices.
2. Labour productivity growth rate = 2%.
3. Discount rate = 3.5%.

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UK’s human capital stock is earnings growth, which generally grew in real terms between 2004 and 2007.

Growth in employed human capital slowed into 2008 (0.2%) before falling slightly in 2009 (-0.7%) beginning to reflect the effect of the economic downturn on the UK’s human capital stock. With falling employment rates and falls in real earnings, 2010 and 2011 saw further falls in the value of the UK’s human capital stock (of 2.0% and 2.8% respectively). Following these substantial falls in 2010 and 2011, the value of the UK’s human capital stock began to stabilise in 2012. In 2012 the value of employed human capital was £17.15 trillion. This is a fall of £68 billion from £17.22 trillion in 2011.

The value of the UK’s full human capital stock (including the unemployed) was £17.50 trillion in 2012. Both employed and full human capital show a similar trend since 2004. In recent years, the decline in the UK’s full human capital stock has not been as severe as the decline in the UK’s employed human capital stock reflecting the impact of unemployment on the estimates of employed human capital. As a result, in 2012 the gap between the UK’s full human capital and employed human capital was the largest since estimates began in 2004 at £754 billion.

**Figure 2: Employed and Full Human Capital Per Head (working age population) 2004-2012**

United Kingdom

Source: Annual Population Survey (APS) - Office for National Statistics

**Notes:**
1. Figures in 2012 prices.
2. Labour productivity growth rate = 2%. 
3. Discount rate = 3.5%.

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**Figure 2** shows the evolution of the stock of human capital per head of working-age population (for both full and employed human capital). Similar to the results for the total stock, there was a steady accumulation of human capital per capita between 2004 and 2007. In 2008, the per capita figure began to decline, and has been in decline ever since. This is despite growth in the total stock of human capital. This is a result of growth in the size of the working age population. In 2012, the average full human capital stock per head of working age population was £445,479, a decrease of £1,922 on the 2011 estimate.

**The distribution of Human Capital**

This section considers the distribution of employed human capital in 2012 by age, highest qualification and gender.

**Figure 3: Employed Human Capital by Highest Qualification - 2012**

Source: Annual Population Survey (APS) - Office for National Statistics
Figure 3 shows that in 2012 34.7% of the human capital stock was embodied in the 25.3% of the population whose highest educational attainment was a degree or equivalent. In contrast, only 5.5% of the UK’s human capital stock was embodied in the 9.9% of the working age population who have no formal qualifications.

Less time in paid employment over their lifetime and lower average labour market earnings means that the total value of women’s human capital (£6.35 trillion) was around 59% of men’s (£10.80 trillion).

Figure 4: Employed Human Capital by Age Group - 2012

United Kingdom

Source: Annual Population Survey (APS) - Office for National Statistics

Notes:
1. Components may not sum to total due to rounding.
2. Labour productivity growth rate = 2%.
3. Discount rate = 3.5%.

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**Figure 4** shows that the stock of human capital is disproportionately concentrated in younger workers. For example, 41.2% of the working age population are aged between 16 and 35 but this group embodies 65.9% of the human capital stock, showing that being relatively young and having more years of paid employment remaining more than offsets the effect of having higher earnings whilst being relatively old.

**Sensitivity analysis**

Estimates of human capital are sensitive to a number of assumptions. Holding everything else constant, each assumption can be varied individually to show the impact. The three key assumptions analysed here are:

- the discount rate
- the labour productivity growth rate
- the upper age boundary

The results are shown in **Table 1**.
Table 1: Employed Human Capital in 2012 (£ trillion, current prices)

United Kingdom

<table>
<thead>
<tr>
<th>Labour Productivity Growth Rate</th>
<th>Discount rate</th>
<th>Upper Age Limit</th>
<th>Employed Human Capital in 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.5</td>
<td>64</td>
<td>14.94</td>
</tr>
<tr>
<td>1.5</td>
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<td>15.99</td>
</tr>
<tr>
<td>2</td>
<td>3.5</td>
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<td><strong>17.15</strong></td>
</tr>
<tr>
<td>2.5</td>
<td>3.5</td>
<td>64</td>
<td>18.43</td>
</tr>
<tr>
<td>3</td>
<td>3.5</td>
<td>64</td>
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<tr>
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<td>4</td>
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<td>14.99</td>
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<td>5</td>
<td>64</td>
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<td>64</td>
<td><strong>17.15</strong></td>
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<tr>
<td>2</td>
<td>3.5</td>
<td>69</td>
<td>17.57</td>
</tr>
</tbody>
</table>

Table source: Office for National Statistics

Table notes:
1. Labour productivity growth rate in main estimates = 2%.
2. Discount rate in main estimates = 3.5%.
3. Upper age limit in main estimates = 64 years old.

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Sensitivity analysis shows that increasing the discount rate by one percentage point, to 4.5 per cent, reduces the estimated value of the human capital stock by almost £2.16 trillion. Conversely, reducing the discount rate to 2.5 per cent increases the value of the human capital stock by almost £2.70 trillion. Changing the labour productivity growth rate by one percentage point, leads to
changes of a similar magnitude but in the opposite direction in the estimates of the human capital stock.

Restricting the sample to individuals aged between 16 and 64 years is a somewhat arbitrary assumption particularly at the higher end of the age range. **Table 1** illustrates the effects of changes in the upper age bound on estimates of the human capital with a discount rate of 3.5 per cent and a labour productivity growth rate of 2 per cent. As would be expected, increasing the upper age bound increases the estimates of the human capital stock since the human capital of additional workers is included in the estimate and the expected working lives of individuals already in the sample is extended, raising the value of their human capital. The increases become smaller as the upper age bound is increased because the employment rate and total income is lower in each age-year cohort added to the sample.

### Revisions

There have been a number of developments since the previous publication of Human Capital in December 2011 which have resulted in revisions. These are:

- Changing the main data source from the Labour Force Survey to the Annual Population Survey (APS). The APS is an annual version of the LFS with annual sample boosts. The larger sample sizes improve the robustness of the estimates. This is expected to have a limited effect.
- Implementation of a new system to estimate Human Capital consistently on an annual basis and improving the robustness.
- In addition, a full review of the methodology has been carried out and a number of procedures have been improved and standardised:
  - Three year moving averages have been used for employment rates to reduce the exposure of the human capital estimates to the business cycle.
  - Improved consistency in the treatment of outliers when cleaning the micro-data.
  - Ten year average transitional rates have been used due to small sample sizes coming from the longitudinal LFS. This replaces the use of the whole dataset in the original methodology, reducing the likelihood of revisions in future.
  - Employment rates and earnings by gender, age and highest qualification have been smoothed to reduce the impact of any outliers.

These revisions have not been quantified individually; however, together they have resulted in an average revision to the estimate of the value of the UK’s employed human capital stock of less than 2% between 2004 and 2010.
Table 2: Revisions to Employed Human Capital

United Kingdom

<table>
<thead>
<tr>
<th>Year</th>
<th>Previously Published Employed Human Capital</th>
<th>Employed Human Capital</th>
<th>Revision</th>
<th>Revision (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>14.46</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>15.00</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>15.32</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>15.82</td>
<td>15.44</td>
<td>-0.38</td>
<td>-2.0%</td>
</tr>
<tr>
<td>2005</td>
<td>16.37</td>
<td>16.19</td>
<td>-0.18</td>
<td>-1.0%</td>
</tr>
<tr>
<td>2006</td>
<td>16.71</td>
<td>16.41</td>
<td>-0.30</td>
<td>-2.0%</td>
</tr>
<tr>
<td>2007</td>
<td>17.01</td>
<td>16.90</td>
<td>-0.11</td>
<td>-1.0%</td>
</tr>
<tr>
<td>2008</td>
<td>17.12</td>
<td>16.94</td>
<td>-0.18</td>
<td>-1.0%</td>
</tr>
<tr>
<td>2009</td>
<td>17.25</td>
<td>16.82</td>
<td>-0.43</td>
<td>-3.0%</td>
</tr>
<tr>
<td>2010</td>
<td>17.12</td>
<td>16.48</td>
<td>-0.64</td>
<td>-4.0%</td>
</tr>
<tr>
<td>2011</td>
<td>-</td>
<td>16.03</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>-</td>
<td>15.96</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Table source: Office for National Statistics

Table notes:
1. Figures in 2010 prices.
2. Labour productivity growth rate = 2%.
3. Discount rate = 3.5%.

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Users and uses of Human Capital estimates

Responses to the recent ONS consultation on measurement of human capital identified that this measure of human capital has several potential policy applications. First, it can be used as a measure of an economy’s future well-being as the empirical work on economic growth suggests that countries with higher levels of human capital, other things being equal, have greater potential output and income in the future. The measures can also be used in the assessment of the impact of
an ageing population, changes in retirement ages and in the evaluation of the economic benefits of different levels of education.

Background notes

1. The statistics presented in this release are experimental in nature.


3. The sources of data used in the analysis are the Annual Population Survey (APS), which is an annual version of the Labour Force Survey (LFS), and the longitudinal LFS. Both surveys are conducted by the Office for National Statistics. The APS and LFS collect household and individual data from a nationally representative sample.

4. Details of the policy governing the release of new data are available by visiting www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html or from the Media Relations Office email: media.relations@ons.gsi.gov.uk

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References


