3

Does studying an undergraduate degree make you wealthier and happier?

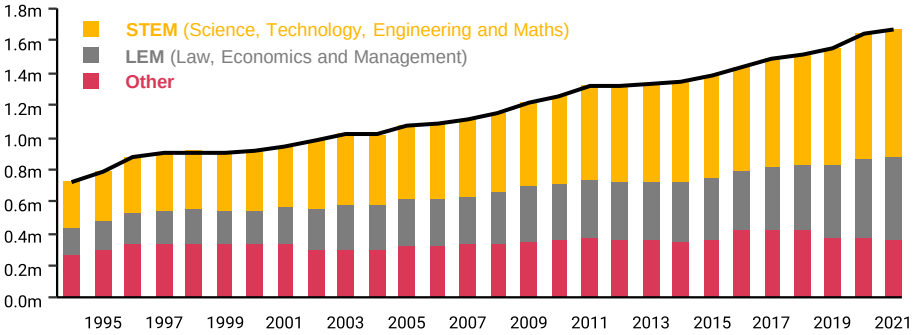
Section 3 - Does studying an undergraduate degree make you wealthier *and* happier?

Introduction

In 1999, the UK government set a target for at least 1 in 2 young people to participate in higher education. Since then, there has been a rapid expansion of the sector, as Figure 3.1 below illustrates. As a result, the proportion of young people enrolled in higher education hit 50% for the first time in 2017/18. This means it is more important than ever for undergraduate degrees to generate value both for the students and wider society. This chapter adds to the evidence base on the topic by evaluating the earnings and wellbeing benefits to individuals who study and are awarded an undergraduate degree relative to non-graduates.

We structure the article as follows: After we outline our methodology, we present our headline estimates for the impact on earnings and wellbeing of being awarded a degree by field of study. Finally, we bring together both parts of the analysis to provide a holistic view of the value generated by each of the undergraduate courses.

Figure 3.1: Number of full-time students studying an undergraduate degree in the UK for the first-time



UK Economic Outlook Sources: PwC analysis, Higher Education Statistics Agency (HESA)

Key points

- **All of the undergraduate degrees in our sample boost earnings.** Our econometric analysis shows that graduates from all of the undergraduate courses in our sample have higher earnings than their counterparts without a degree, while controlling for other factors. The average graduate earns around 57% more than non-graduates with similar demographic characteristics.
- **We also find strong evidence for a graduate wellbeing premium.** Most undergraduate courses also have a positive impact on self-reported life satisfaction. The top performing courses increase life satisfaction by around 5%, providing the same boost to life satisfaction as just over £5,000 in additional earnings every year.
- **Higher earnings are a key channel through which studying a degree affects wellbeing, but there are also other factors at play.** Many of the courses with the largest wellbeing premiums, such as sports sciences and education, have relatively low earnings premiums compared to other courses. Vocational courses in particular, such as nursing, score highly for their wellbeing premiums.

We conduct a holistic assessment of the value provided by undergraduate degrees, looking at earnings and wellbeing effects

Different approaches to assessing the value of undergraduate degrees

Typically, undergraduate degrees are evaluated based on their unadjusted outcomes-- this usually includes financial considerations such as the share of people that enter employment after graduating as well as the average earnings of graduates. However, there are two main limitations to this approach, which we outline below.

First, this type of analysis often does not capture the non-financial impacts of undergraduate degrees. When students are asked for their most important reasons for "wanting to go to university", many of the factors they list are not related to their finances. For instance, close to 6 in 10 students report that their passion for the subject was one of their top three reasons for wanting to go to university. While around 1 in 5 said they wanted to experience university life and have a good time.[10] Prior research by PwC also shows that education has a key role to play in driving future health outcomes.[11] Assessing courses based only on their financial outcomes is therefore likely to not account for the non-financial factors that are also important for future workers.

Second, as these are *unadjusted* outcomes, there is a risk that the analysis will be skewed by demographic differences between courses. For instance, many of the courses with the poorest unadjusted financial outcomes have a high share of female students. As a result, it is not clear whether these courses have poorer unadjusted outcomes due to the market dynamics on workers in that particular field of study or because of the gender pay gap.

Our approach captures both financial *and* non-financial impacts of undergraduate degrees

Our approach addresses both of these limitations. First, we assess both the financial *and* non-financial impacts of studying an undergraduate degree using the following two variables as proxies:

- Gross hourly earnings (proxy for financial impact)
- Self-reported life satisfaction (proxy for non-financial impact)

Second, throughout our analysis we leverage econometric modelling to evaluate the *adjusted* outcomes of graduates relative to non-graduates. This enables us to hold constant a selection of personal and work-related characteristics (e.g. gender) that the literature has shown also affect earnings and wellbeing. Doing so, we estimate the:

- Graduate earnings premium: gross earnings of working-age graduates relative to non-graduates with similar personal & work-related characteristics.
- Graduate wellbeing premium: Self-reported life satisfaction of working-age graduates relative to non-graduates with similar personal characteristics.

Our analysis still has some limitations. First, as we estimate the impact on gross earnings, we do not account for the costs of provision to the individual (either upfront or via student finance). Though the advantage of our approach is that our analysis will not be affected by future changes to tax policies.

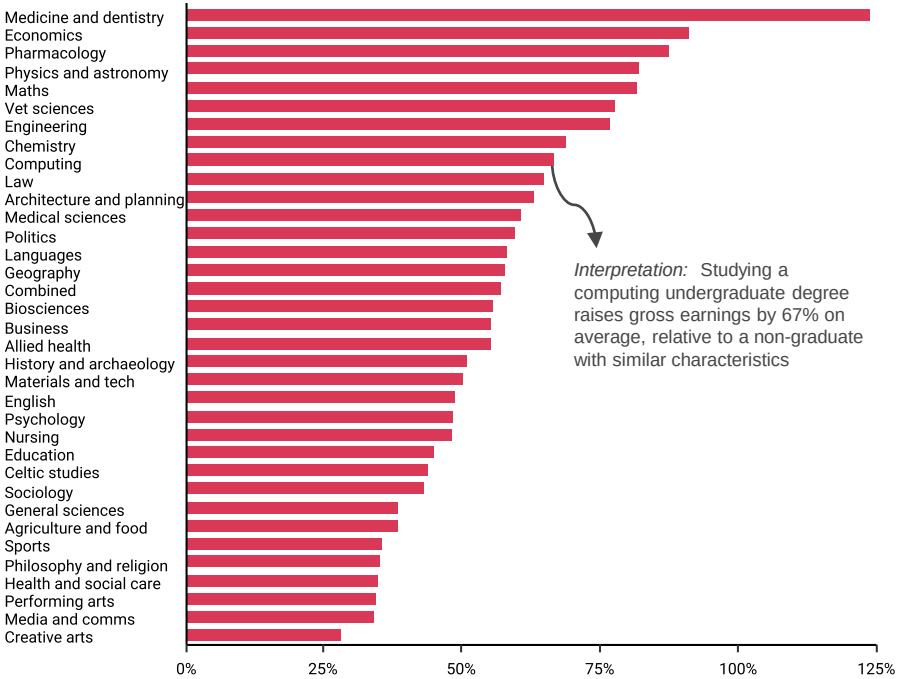
Second, we estimate the effect of studying an undergraduate degree on the individual, rather than wider society. We do not estimate the potentially positive economic and social externalities that could arise from more people studying degrees (e.g. higher GDP growth, cultural contribution).

We show our key findings in the following pages.

Sources: PwC analysis, Times Higher Education

Our econometric analysis shows that all of the courses in our sample raise the earnings of graduates relative to non-graduates, all other things remaining equal

Figure 3.2: The average impact of undergraduate degrees on the gross earnings of working-age graduates, relative to non-graduates with similar personal and work-related characteristics (graduate earnings premium)



All courses lead to higher future earnings

We use econometric analysis to calculate the graduate earnings premium, i.e. gross earnings of working-age graduates relative to non-graduates with similar personal and work-related characteristics (see appendix for further details).

Our results show that all of the undergraduate courses in our sample result in higher earnings for graduates. The earnings premium is substantial, with the average graduate earning around 57% more than non-graduates with similar characteristics.

These findings are consistent with the existing literature. For instance, the rank order of courses is broadly similar to estimates by the Institute for Fiscal Studies.[12] The primary difference is we focus on the impact on gross earnings (i.e. before payroll deductions), so that the results are not affected by future changes to tax policies.

STEM courses tend to generate the largest earnings premiums

We find that the undergraduate degrees that generate the highest earnings premiums are either STEM, LEM or Medicine allied. For instance, medicine and dentistry graduates have an earnings premium of 124% relative to non-graduates. This means that graduates from these courses earn more than twice as much on average as their counterparts with similar personal characteristics that do not have a degree.

These earnings differentials suggest that in some cases it could be advantageous for prospective students to consider alternative courses, where appropriate for their skillset and interests. For instance, switching from creative arts to english could potentially raise graduate earnings by 16%.

However, it is important to note that these findings could be a reflection of the career choices of graduates, rather than the merit of the courses themselves. For instance, creative arts students may choose to work in industries or occupations where earnings are lower on average than those chosen by english graduates.

This analysis has provided strong evidence for a “Graduate earnings premium” across all of the courses in our sample. Though as we explained earlier in the chapter, non-financial benefits are also valued by students. To this end, on the next page we complement this analysis with an estimate of the “Graduate wellbeing premium”.

Sources: PwC analysis, ONS. Analysis was carried out in the Secure Research Service, part of the Office for National Statistics.

We also find strong evidence for a graduate wellbeing premium, including for many of the courses with relatively lower earnings premiums

We supplement our analysis with an estimate of the wellbeing effects

We also use econometric analysis to calculate the graduate wellbeing premium, i.e. self-reported life satisfaction of graduates relative to non-graduates with similar personal and work-related characteristics (see appendix for further details).

Undergraduate degrees generally have a positive impact on life satisfaction

28 of the 35 courses we evaluate boast a positive graduate wellbeing premium. This means that working-age graduates from these courses report better levels of life satisfaction than their counterparts without an undergraduate degree with similar demographic characteristics. In other words, it indicates that studying an undergraduate degree generally has a positive impact on wellbeing.

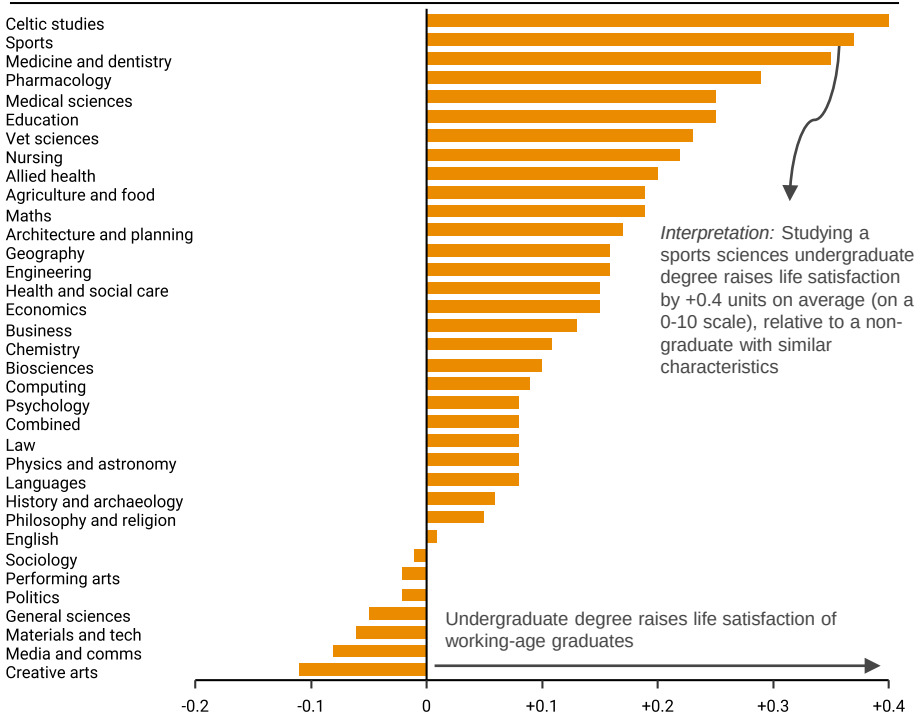
These life satisfaction effects are relatively substantial in some cases. Overall, they range from around -0.1 to +0.4 units (on a 0-10 scale, where 10 = completely satisfied), with an average wellbeing premium of +0.1 units relative to non- graduates. For the top performing courses, this is equivalent to around a 5% boost to life satisfaction for the average person (as at FY23). This provides the same boost to life satisfaction as just over £5,000 in additional earnings every year.

Vocational courses score highly, particularly those that are medicine allied

Many of the courses with the highest wellbeing premiums are vocational or medicine allied. They also generally lead to employment in public sector dominated industries. This includes both courses with high earnings premiums (e.g. medicine and dentistry) and relatively lower earnings premiums (e.g. education, nursing). This could indicate that public sector workers gain a greater sense of life satisfaction from their degrees and careers than private sector workers.

As expected, generally courses that have high earnings premiums also have high wellbeing premiums. This is likely due to the well established link between earnings and wellbeing in the economic literature.[13] However, there are some nuances to this finding which we discuss in more detail on the next page.

Figure 3.3: The average impact of undergraduate degrees on self-reported life satisfaction of working-age graduates on a 0-10 scale (graduate wellbeing premium), where 0 = not at all satisfied and 10 = completely satisfied



Sources: PwC analysis, ONS. Analysis was carried out in the Secure Research Service, part of the Office for National Statistics.

Higher earnings are a key channel through which studying an undergraduate degree affects wellbeing, but there are also other non-financial factors at play

Earnings clearly a key driver, but there are other factors at play

In Figure 3.4, we plot the graduate earnings premiums (from page 5) against the graduate wellbeing premiums (from page 6). Overall, there is a 0.4 correlation between the two estimates. This suggests that higher earnings are an important channel through which studying an undergraduate degree affects the wellbeing of graduates.

However, there are clearly other factors at play, which are not related to financial effects. Many of the courses with the largest wellbeing premiums, such as education and sports sciences, have relatively low earnings premiums compared to other courses. This indicates that there are other channels, outside of earnings, through which studying an undergraduate degree can impact overall wellbeing.

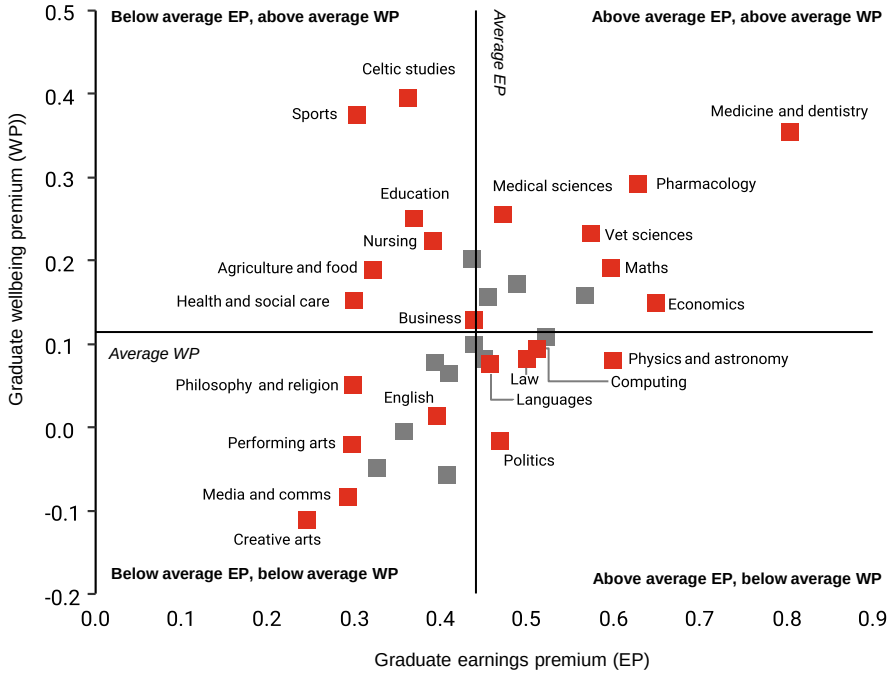
Occupation also plays an important role

Though many large employers now accept a wide variety of undergraduate degrees, the choice of course still plays an important role in shaping careers, which has knock-on implications for wellbeing. For instance, as we highlighted in the last page, vocational courses that lead to employment in the public sector generally have higher life satisfaction effects. This is true both for courses with high earnings premiums (e.g. medicine and dentistry) and lower earnings premiums (e.g. nursing, education).

At the other end of the spectrum, there are also a number of courses with high earnings premiums that have low or negative life satisfaction effects. Examples include politics, computing and law. Our analysis suggests that politics graduates may even have marginally poorer life satisfaction than non-graduates with similar characteristics. This could be a reflection of the careers they choose to go into.

These findings present an opportunity for employers to increase the attractiveness of their overall employee proposition. For instance, employers that primarily recruit graduates from courses with high earnings premiums and low wellbeing premiums may need to work on improving non-financial factors (e.g. team culture).

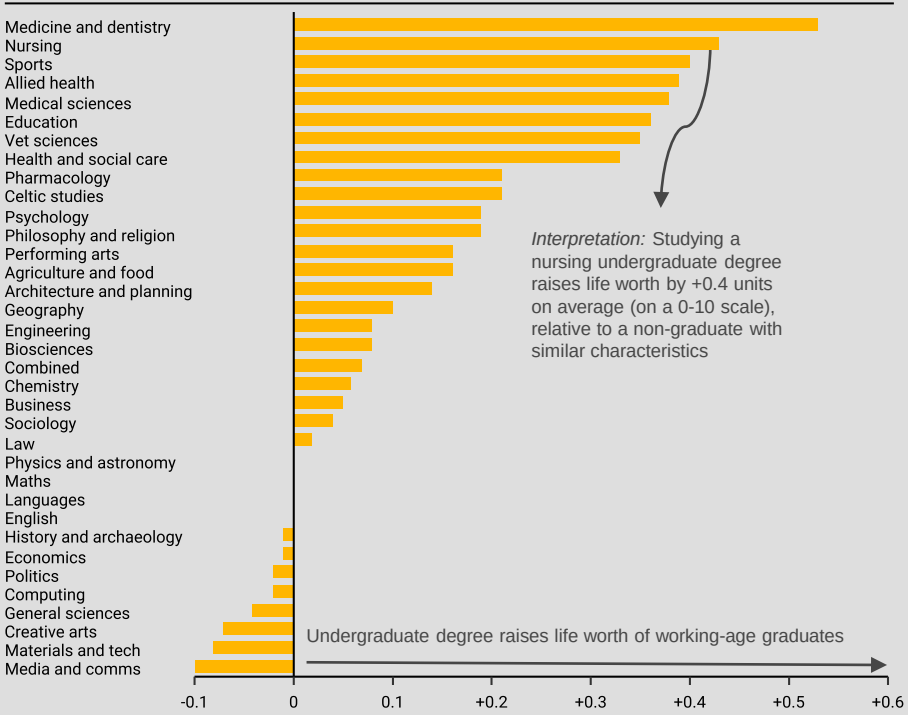
Figure 3.4: Graduate earnings premium (EP) vs graduate wellbeing premium (WP)



Sources: PwC analysis, ONS. Analysis was carried out in the Secure Research Service, part of the Office for National Statistics.

Box C: We also find that most undergraduate degrees have a positive effect on self-reported life worth

Figure 3.5: The impact of studying undergraduate degrees on self-reported life worth of working-age graduates on a 0-10 scale, where 10 = things they do in life are "completely worthwhile" and 0 = "not at all worthwhile"



Most undergraduate degrees also have a positive impact on life worth

We have shown that undergraduate degrees generally have a positive impact on earnings and life satisfaction. However, life satisfaction is just one measure of wellbeing. We add to our analysis in this box by assessing the impact of undergraduate degrees on self-reported life worth, where a score of 10 indicates that the respondent says the things they do in life are "completely worthwhile"

Our findings suggests that studying an undergraduate degree also has a notable impact on life worth. Overall, the life worth effects range from around -0.1 to +0.5 units (on a 0-10 scale, where 10 = completely worthwhile), with an average effect of +0.1 units. For the top performing courses, this is equivalent to around a 7% boost to life worth for the average person (as at FY23)

Interestingly, the link between the life worth estimates and the earnings premiums (correlation coefficient of +0.1) is less strong than with life satisfaction (+0.4 correlation). This implies that the earnings channel, through which studying an undergraduate degree affects wellbeing, is less important when it comes to life worth.

This may explain why some of the arts and humanities courses score relatively highly for their life worth effects. For instance, performing arts has the 13th highest life worth effect (+0.2 units), despite having the third lowest earnings premium.

Arguably to an even greater extent than with the life satisfaction estimates, we find that many of the vocational courses that generally lead to employment in public sector dominated industries account for most of the courses with the highest life worth effects. For instance, nursing has the second highest life worth effect, compared to the eight highest life satisfaction effect. It is intuitive that people working in the medical field have a sense that the things they do in life are worthwhile.

Sources: PwC analysis, ONS. Analysis was carried out in the Secure Research Service, part of the Office for National Statistics.

Appendix

Appendix A – Our approach to projecting UK national real GDP

Model structure

There are several classes of models that are commonly used to project forward macroeconomic aggregates, such as real GDP growth. We implement a Vector Autoregression (VAR) model, given they provide excellent short-term forecasting performance in a relatively simple framework. These models rely on empirical relationships between variables, often not imposing an assumption-based structure on these variables. Other models (e.g. structural simultaneous equations, DSGEs) are more resource intensive to maintain, require many assumptions, or tend not to forecast as well.

Mixed frequency data

Given the fast-moving nature of the economy, it is important that any forecasting model can use the latest-breaking data releases. Monthly data released through a quarter can pin-down real GDP forecasts far before official quarterly estimates are published by the ONS.

As a result, we utilise mixed-frequency data in our model. While our real GDP growth variable is quarterly, we can incorporate monthly series into our model. There are several approaches to this in the literature; we follow Ghysels (2016) and McCracken et al. (2021) in splitting monthly series into three quarterly series and 'stacking' these series together to estimate a VAR at quarterly frequency.

For example, stacking in terms of 'economic time' puts together the quarterly real GDP variable (y), with three quarterly series made from a monthly variable (x), relating to the first, second, and third month of each quarter respectively.

$$Y_t = [x_{t,1}, x_{t,2}, x_{t,3}, y_t]$$

A model is then estimated where the components of this vector depend on p lagged values of these series.

$$Y_t = \alpha + \beta_1 Y_{t-1} + \cdots + \beta_p Y_{t-p} + \epsilon_t$$

By stacking the series this way, we can impose actual data points released part way through the quarter to construct a 'conditional' forecast, using the framework of Waggoner and Zha (1999). This allows us to incorporate information through the quarter, constantly refining the forecast.

Bayesian estimation

Including multiple monthly series means the number of parameters to be estimated grows large very quickly. We therefore use the Bayesian methods, including the hierarchical prior selection methods of Giannone et al. (2015).

Variable selection

We collected data on over 100 macroeconomic series. To select the most suitable variables for our model, we conducted several 'live data' backtesting exercises, testing performance of various models in out of sample forecasts. Chosen variables include the BoE base rate, unemployment rate and consumer spending.

Scenario construction

Bayesian estimation recovers the entire posterior distribution of our model parameters, therefore giving a distribution of GDP forecasts. This gives an indication by percentile, of the range of possible outcomes for real GDP. We construct our downside scenario by combining points on this distribution of forecasts, with expert judgement and our scenario narrative. Given certain values for our initial negative shocks, we then use the conditional forecasting feature of our model to construct a path where growth returns to trend.

Ghysels, E. (2016), 'Macroeconomics and the reality of mixed frequency data', Journal of Econometrics

Giannone, D., et al. (2015), 'Prior Selection for Vector Autoregressions', Review of Economics and Statistics

McCracken, M., et al. (2021), 'Real-time Forecasting and Scenario Analysis Using a Large Mixed-Frequency Bayesian VAR', International Journal of Central Banking

Waggoner, D. and Zha, T. (1999), 'Conditional Forecasts in Dynamic Multivariate Models', The Review of Economics and Statistics

 Sources: Refinitiv Eikon, PwC analysis

Appendix B – Evaluation of earning and wellbeing returns to undergraduate degrees - Methodology

Scope of analysis

We use econometric analysis to estimate the earnings and wellbeing returns to undergraduate degrees. Our analysis holds constant a selection of personal and work-related characteristics in order to try to isolate the impact of the undergraduate degree on earnings and wellbeing.

To streamline the analysis, we group specific undergraduate courses into wider course classifications following Level 2 Common Aggregation Hierarchy (CAH) groupings, as developed by HESA.

Data source

We use data from the Annual Population Survey over the 2013 to 2022 period. This is the largest ongoing household survey in the UK, based on interviews with randomly selected households. The survey covers individual and household responses to questions on a diverse range of topics, including personal characteristics, labour market status, work characteristics, education and health. We restrict our sample to working-age people (16-64).

Model structure

We implement a Pooled Ordinary Least Squares regression. This enables us to increase our sample size, by using ten years of data, so that we produce robust estimates for relatively granular degree courses. In total, we estimate three regressions:

- Earnings
- Life satisfaction
- Life worth

In each case, we control for a selection of personal and work-related characteristics that the literature has shown to be linked to earnings and wellbeing. For more details on our regression specifications, please refer to the following page.

Limitations

First we do not control for ‘ability’, which could add upwards bias to our estimates for the earnings regressions. This limitation is widely covered in the academic literature. The hypothesis is that individuals with higher ability are more likely to end up in higher education. Thus, estimates for the returns to higher education are likely to be upwards biased.

Second, as we use gross earnings as a proxy for the earnings effects, we do not account for the costs of provision of undergraduate degrees to the individual (either upfront payment of fees or via student finance). The advantage of our approach is that our analysis will not be affected by future changes to tax policy.

Sources: PwC analysis, ONS. Notes: This work contains statistical data from ONS which is Crown Copyright. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

Appendix B – Evaluation of earning and wellbeing returns to undergraduate degrees - Regression specifications

Earnings

For the earnings returns, we adopt the following model:

[1] $\ln E_i = \alpha + \beta_1 \mathbf{D}_i + \beta_2 \mathbf{X}_i + \mathbf{Q}_t + \mathbf{Y}_t + e_i$

where $\ln E_i$ denotes the log hourly earnings of individual *i*, $\mathbf{D}_i$ denotes a vector of undergraduate degree course dummies, $\mathbf{X}_i$ denotes a vector of personal and work-related characteristics (see below for full list), $\mathbf{Q}_t$ denotes a vector of quarterly dummies, $\mathbf{Y}_t$ denotes a vector of year dummies, and e_i denotes a random error term.

The full list of personal and work-related characteristics that we control for are listed below:

- Experience (proxied by age minus time since they left education)
- Experience squared
- White dummy
- Female dummy
- Born in the UK dummy
- Married/cohabiting dummy
- Bad health dummy
- Apprenticeship dummy
- Full-time dummy

Wellbeing

For the wellbeing returns, we adopt two separate models for life satisfaction and life worth. They all use broadly the same specification:

[1] $\ln W_i = \alpha + \beta_1 \mathbf{D}_i + \beta_2 \mathbf{X}_i + \mathbf{Q}_t + \mathbf{Y}_t + e_i$

where $\ln W_i$ denotes the wellbeing of individual *i* (life satisfaction, life worth), $\mathbf{D}_i$ denotes a vector of undergraduate degree course dummies, $\mathbf{X}_i$ denotes a vector of personal characteristics (see below for full list), $\mathbf{Q}_t$ denotes a vector of quarterly dummies, $\mathbf{Y}_t$ denotes a vector of year dummies, and e_i denotes a random error term.

In each specification, wellbeing is self-reported on a scale from 0 to 10, where 10 denotes completely satisfied/worthwhile and 0 denotes not at all satisfied/worthwhile.

The full list of personal characteristics that we control for are listed below:

- Age
- Age squared
- Female dummy
- Born in the UK dummy
- Married/cohabiting dummy
- Bad health dummy
- Religious dummy
- Number of children

We also carry out a series of tests to ensure the robustness of the results, including different regression specifications, time periods, etc. These robustness tests had an effect on the magnitude of the results but the broad patterns were the same.

Appendix B – Evaluation of earning and wellbeing returns to undergraduate degrees - Course list

We group specific undergraduate courses into wider course classifications following Level 2 Common Aggregation Hierarchy, (CAH) groupings as developed by HESA. The full list of courses covered by our analysis is listed below, alongside the short names we use throughout the article.

Full course name	Short name
Agriculture, food and Related Studies	Agriculture and food
Allied Health	Allied health
Architecture, Building and Planning	Architecture and planning
Biosciences	Biosciences
Business and Management	Business
Celtic Studies	Celtic studies
Chemistry	Chemistry
Joint honours	Combined
Computing	Computing
Creative Arts and Design	Creative arts
Economics	Economics
Education and Teaching	Education
Engineering	Engineering
English Studies	English
General, Applied and Forensic Sciences	General sciences
Geography, Earth and Environmental Studies	Geography
Health and Social Care	Health and social care
History and Archaeology	History and archaeology
Languages and Area Studies	Languages
Law	Law
Materials and Technology	Materials and tech
Mathematical Sciences	Maths
Media, Journalism and Communications	Media and comms
Medical Sciences	Medical sciences
Medicine and Dentistry	Medicine and dentistry
Nursing and Midwifery	Nursing
Performing Arts	Performing arts
Pharmacology, Toxicology and Pharmacy	Pharmacology
Philosophy and Religious Studies	Philosophy and religion
Physics and Astronomy	Physics and astronomy
Politics	Politics
Psychology	Psychology
Sociology, Social Policy and Anthropology	Sociology
Sport and Exercise Sciences	Sports
Veterinary Sciences	Vet sciences

Endnotes

[1] Bank of England, 20 October 2022. **The inflationary consequences of real shocks − speech by Ben Broadbent**. Link

[2] ONS, 1 September 2023. **Impact of Blue Book 2023 changes on gross domestic product**. Link

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[4] BP, 2021. **Statistical Review of World Energy – 2021**. Link

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[9] Federal Reserve, 26 September 2017. **Inflation, Uncertainty, and Monetary Policy**. Link

[10] Times Higher Education, 6 June 2017. **Why do students go to university and how do they choose which one?** Link

[11] PwC, November 2022. **A fairer future: how can the NHS tackle health and social inequities?** Link

[12] IFS, 29 February 2020.**The impact of undergraduate degrees on lifetime earnings** Link

[13] ONS, 04 September 2015. **Relationship between Wealth, Income and Personal Well-being, July 2011 to June 2012.** Link

Authors

Jake Finney
Manager, Economist

Gora Suri
Senior Associate, Economist

Tommy Etheridge
Senior Associate, Economist

Adam Deasy
Senior Associate, Economist

Tessa Wilkinson
Associate, Junior Economist

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Economics Leadership

Simon Oates
Partner, Economics Leader

Barret Kupelian
Director, Chief Economist

Philip Dobson
Director, Public economics

Daniel Jacobson
Director, Regulation

Jason Calvert
Director, Impact assessments

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