LE London Economics

The Association of Commonwealth Universities

The impact of investment in higher education on economic growth

Final Report for the Association of Commonwealth Universities

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About the Association of Commonwealth Universities

The Association of Commonwealth Universities (ACU) is a global network of more than 400 universities in over 40 countries with a shared commitment to working together to build a more equitable and sustainable world. Accredited by the Commonwealth and incorporated by Royal Charter, the ACU has been fostering international collaboration in higher education since 1913. As the voice for higher education in the Commonwealth, the ACU supports its members, individuals, and partners to collaborate and advance their contribution to sustainable development. www.acu.ac.uk

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Table of Contents

Foreword

By Dr Kimberley Brooks, President and Vice-Chancellor, Dalhousie University, Canada and Chair, ACU Higher Education Taskforce Finance and Funding Working Group.

In an era defined by complexity, uncertainty, and accelerating global challenges, investment in human capital has never been more vital. Universities sit at the heart of this investment - building knowledge, nurturing talent, and fuelling innovation. Yet, the question of how tertiary education contributes to long-term national prosperity demands evidence. This report provides exactly that.

Commissioned by the Association of Commonwealth Universities (ACU) and delivered by London Economics, this study presents rigorous, cross-country econometric evidence that links increases in tertiary education attainment with meaningful gains in GDP per capita growth. It finds that a one percentage point rise in tertiary attainment among the adult population is associated with a 0.03 percentage point increase in annual GDP per capita growth over the following five years. While modest in appearance, the cumulative effect is profound - for the 56 countries of the Commonwealth, this translates into an estimated $28 billion uplift in GDP by 2029.

Importantly, the study highlights that the economic returns to tertiary education are even greater in lower-income countries, offering strong justification for targeted international investment in expanding access and opportunity. This aligns with the ACU's core mission: to build a more equitable world through higher education.

As Chair of the ACU Taskforce working group on Higher Education Finance and Funding, I am particularly encouraged by the study's clarity in showing that higher education is not a cost, but a powerful driver of economic resilience. While the analysis centres on the direct contribution of higher education to GDP growth, the wider spillover effects - from improved health outcomes to reduced crime and stronger public services- remind us that universities do not only grow economies. They strengthen societies.

This report underscores the importance of renewed public and private investment in tertiary education across the Commonwealth. It also calls for better data and deeper research to fully understand how that investment can be most effective- by discipline, by region, and by system. As we look to the future, these findings offer a robust foundation for shaping national and international funding strategies that prioritise inclusive growth and sustainable development.

I commend the ACU's report to policymakers, university leaders, and all those committed to the transformational power of education.

Dr Kimberley Brooks

President and Vice-Chancellor Dalhousie University, Canada

Chair, Finance and Funding Working Group

ACU Higher Education Taskforce

Introduction

By Professor Colin Riordan CBE, Secretary General and Chief Executive, Association of Commonwealth Universities.

The COVID-19 pandemic intensified long-standing pressures on higher education across the Commonwealth, disrupting education systems and prompting deep cuts to public spending. Nearly two-thirds of low- and lower-middle-income countries reduced education budgets during the crisis, deepening global inequality and slowing progress towards the Sustainable Development Goals (SDGs). At the same time, international student mobility was severely curtailed, exposing the fragility of funding models in many high-income countries. This dual shock has left education systems -- particularly in the Global South -- with a chronic and widening investment gap.

In wealthier nations, universities have become increasingly dependent on international student fees to compensate for declining domestic funding. In the UK, for example, international students now account for nearly a quarter of university income, up from just 5% in the 1990s. But this model is precarious. Tighter visa regulations and political pressure to reduce migration have already triggered falling international enrolments in the UK, Australia and Canada. Universities are now facing significant financial shortfalls, with some being forced to scale back research and academic programmes as a result.

These global trends are especially concerning in the light of the Commonwealth's demographic trajectory. Sixty per cent of its population is under 30, while youth populations are expanding rapidly in countries like Nigeria. Demand for tertiary education will continue to grow, but current enrolment levels remain far below global averages: just 25% in Commonwealth countries compared to 52% worldwide. Without bold, strategic action, this gap will widen, leaving millions of young people without the skills and knowledge needed to thrive in the modern economy.

There is an urgent need for governments to reposition higher education as a strategic national asset: one that underpins inclusive economic growth, social mobility, innovation and sustainable development. To do this, universities must demonstrate their relevance to society and their alignment with national priorities. They must also develop more resilient, diversified funding models, working in partnership with governments, the private sector and civil society to unlock new resources and support.

In this context, strengthening the evidence base for investment in higher education is more important than ever. This report presents new econometric analysis undertaken by London Economics on behalf of the ACU's Higher Education Taskforce, comprising 20 Vice Chancellors from across the Commonwealth. The research uses harmonised global data to estimate the relationship between tertiary attainment and economic growth across Commonwealth countries, finding a clear and statistically significant positive correlation between increased tertiary education levels and GDP per capita growth. Our finding that a 1 percentage point rise in tertiary education attainment across the Commonwealth could boost annual GDP by an estimated $28 billion by 2029 -- with particularly striking gains in countries like India, the UK, Bangladesh, Nigeria and Uganda -- is striking. Crucially, it shows that countries with lower starting levels of tertiary attainment benefit most from additional investment, with the potential to drive transformative national gains.

This work is informed by deep engagement with policymakers, university leaders, and international partners across the Commonwealth, and will support the ACU's advocacy as the voice of higher education in the Commonwealth

As we look ahead to the 2026 Commonwealth Heads of Government Meeting (CHOGM) and the accompanying Education and Finance Ministers' meetings, the ACU is committed to championing higher education as a public good, advancing the evidence, supporting cross-sector collaboration and driving sustainable policy reform.

The time to act is now. The Commonwealth cannot meet its development ambitions without a strong, sustainable, and well-funded higher education sector.

To help governments realise this vision, the findings of this report point to three key recommendations:

1. Prioritise Investment in Tertiary Education to Accelerate Economic Growth

Rationale: The study demonstrates a statistically significant and positive relationship between tertiary education attainment and GDP per capita growth. A 1 percentage point increase in tertiary attainment is associated with a 0.03 percentage point increase in annual GDP per capita growth, with even greater benefits observed in lower-income countries.

Recommendation: Governments should scale up public investment in tertiary education, particularly in expanding access and attainment, as a strategic lever for long-term economic growth, especially in countries at earlier stages of development.

2. Integrate Higher Education into National Growth and Development Strategies

Rationale: The monetised projections show that a 1 percentage point increase in tertiary attainment across the Commonwealth could yield an additional $28 billion in GDP by 2029, with substantial gains even in low- and middle-income countries.

Recommendation: Governments should embed higher education policy into national economic planning and industrial strategies, recognising universities as economic assets and hubs for talent development, innovation, and productivity.

3. Improve Data and Evaluation on Higher Education Investment

Rationale: The report identifies gaps in data on government spending in tertiary education and how returns vary by subject area and region. Better data is essential to assess return on investment and target funding effectively.

Recommendation: Governments should invest in national education data systems to track tertiary attainment, graduate outcomes, and public spending, enabling more effective policy decisions and cross-country comparisons of cost-effectiveness.

Executive Summary

London Economics were commissioned by the Association of Commonwealth Universities to examine the relationship between investment in tertiary education and GDP growth, with a particular focus on Commonwealth countries.

What is the main aim of the research?

Measuring the **economic benefits of human capital accumulation** is one of the key research questions investigated both theoretically and empirically in the literature in the fields of both education economics and growth and development economics. This study aims to add to the existing evidence base by exploring the link between investment in human capital and long-term economic growth at the country level, focusing specifically on the **relationship between investment in *tertiary* education and growth in GDP per capita using a global cross-country panel dataset (including both Commonwealth and non-Commonwealth countries)**.

The key proxy for investment in tertiary education used throughout the analysis is **tertiary attainment**, defined as the **percentage of the population aged 15 or above to have obtained tertiary education qualifications**.[1] This indicator has steadily increased over time, both for Commonwealth member states (from an average of approximately **3%** in 1970-74 to **14%** in 2015-19) and non-Commonwealth countries (from an average of **4%** to **16%** over the same period) – though with substantial variation across countries and over time.

The econometric analysis is based on a five-year dataset (covering seven five-year periods, from 1985-1990 to 2015-2019), reflecting the fact that the core independent variable on tertiary attainment is only available at five-year intervals. Specifically, we use an **ordinary least squares econometric regression model** to assess the correlation between country-level **tertiary attainment** in a given year and **average annual GDP per capita growth in the *following* five-year period**.[2] The main econometric model includes tertiary attainment as the key independent variable, and controls for a range of other factors that are expected to influence economic growth. An alternative specification is also considered (as a **robustness check**) that includes **three additional control variables** which are only available in later periods (from 1995). Furthermore, the analysis is also broken down by income classification (using World Bank definitions) to investigate how the relationship between tertiary attainment and economic growth differs across **lower income and higher income countries**.

What are the key findings?

The econometric analysis shows that the attainment of tertiary qualifications is associated with strong positive impacts on GDP per capita growth. The analysis identifies a **positive and statistically significant** relationship between the two variables, finding a coefficient of **0.030** under the core specification (and 0.045 under the alternative specification with additional control variables; see

[1] Our analysis here uses tertiary attainment here as a *proxy* for investment in tertiary education. This is because the availability and quality of existing cross-country data in relation to government *expenditure* on tertiary education (i.e. investment, either in monetary terms or as a percentage of GDP) is, unfortunately, relatively limited, with the data including a wide large number of gaps and missing values. As a result, in the absence of sufficiently robust tertiary investment data and given the expected strong positive relationship between tertiary investment and attainment rates, our core analysis here uses attainment as a proxy for investment.

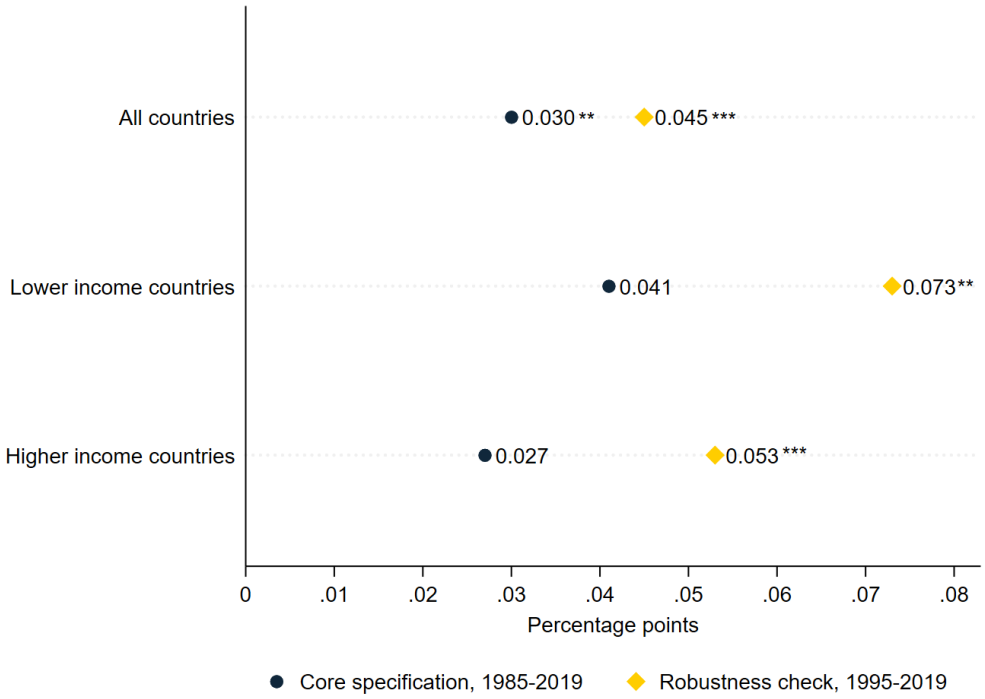
[2] The use of this 'five-year time lag' mirrors the approach used in the core existing literature (e.g. see Valero and Reenen, 2018) and is based on the expectation that any increase in tertiary education attainment would affect GDP per capita growth in the years *after* it has taken effect – i.e. once the education is completed and the graduates enter the workforce. The specific use of five-year lags is due to the fact that the core variable on tertiary attainment rates is only available on a five-year basis.

Figure 1). This indicates that a **1 percentage point increase in the proportion of the adult population with tertiary qualifications in a given country is associated with a 0.030 percentage point increase in the average annual growth rate of GDP per capita over the next five years**. For example, if the tertiary attainment rate in a given country were to increase by one percentage point (e.g. from **14%** to **15% in 2015**), then we would expect to see an increase in the country's average annual growth in GDP per capita by 0.03 percentage points over the next five years (e.g. from **1.50% per year** to **1.53% per year between 2015 and 2019**), all else being equal.

To put this result into context, **worldwide GDP per capita growth** in **2023** was **1.92%**.[3] However, there is considerable variation between countries, e.g. considering specific Commonwealth countries, GDP per capita grew by 7.20% in India and 0.72% in Nigeria, but fell by 1.68% in Canada.

The **estimated coefficient tends to be larger for lower income countries than for higher income countries** (under both the core specification and the robustness check/alternative specification). This suggests that the economic returns (in terms of GDP growth per capita) from increases in tertiary attainment are greater for countries that are at an earlier stage of economic development.

Figure 1 Percentage point change in average GDP per capita growth associated with a 1 percentage point increase in tertiary attainment



Note: Ordinary Least Square. Robustness check results refer to the inclusion of the three additional control variables which are only available in later time periods. Full results are provided in Table 6 in Annex A2.3.
*** p<0.01 (significant to the 1% level); ** p<0.05 (significant to the 5% level); * p<0.1 (significant to the 10% level).
Source: London Economics' analysis

Can these findings be monetised?

In order to contextualise these results, we then monetise the findings by considering a **hypothetical scenario in which the tertiary attainment rate increases by a uniform 1 percentage point across all 56 Commonwealth countries**. Using IMF forecasts of annual GDP per capita growth between

[3] See here: https://data.worldbank.org/indicator/NY.GDP.PCAP.KD.ZG

2024 and 2029, and the key coefficient of **0.030** from the above core analysis, we estimate that a **hypothetical increase in tertiary attainment by 1 percentage point in 2025 would result in an increase in total annual Commonwealth GDP of $28 billion in 2029**. The largest impacts were estimated for countries with the largest economies, including **India** (**$8.7 billion**) and the **United Kingdom** (**$6.4 billion**). However, a number of other countries would also be expected to experience an increase in GDP of more than $100 million, e.g. including **Bangladesh** (**$997 million**), **Nigeria** (**$391 million**) and **Uganda** (**$131 million**).

Note that these estimates do *not* capture the *additional* incremental increases in GDP that would be expected to occur in previous years before 2029 (between 2025 and 2028, *not* estimated here). In addition, the impact on GDP would be expected to last beyond 2029, i.e. there would likely also be additional increases in GDP in subsequent years that are not measured here.

What further analysis may be undertaken?

While the analysis presented here shows that there is a strong case for investment in tertiary education, it was conducted at cross-country level due to data limitations. We therefore make **three recommendations for future research**, which would allow for a more thorough understanding of the how investment in tertiary education across the Commonwealth can generate the greatest impacts in terms of economic growth. In particular, we recommend undertaking further work in the area that specifically focuses on:

- More tailored analysis of the benefits of investment in higher education, focusing on specific countries or regions within countries;
- Research on how the economic impacts of higher education investment or attainment differ across subjects; and
- Improved collection of data relating to tertiary education across countries, with a particular focus on government expenditure in tertiary education (which would allow for a comparison of the benefits (in the form of economic growth) and costs to the public purse of investing in tertiary education).

It is important to note that, on top of the *direct* effect on economic growth, there is also a range of evidence of the existence of wider/spillover effects of higher education attainment that are not measured here (e.g. in relation to positive productivity spillovers from human capital acquisition[4]; positive impacts on health outcomes[5]; reduced crime rates[6]; improved social citizenship (e.g. democratic and social values etc.), or the intergenerational transmission of skills[7]). In addition, on top of their core teaching functions, higher education institutions undertake a wide range of additional activities (e.g. research and commercialisation) that contribute positively to innovation, productivity, and long-term economic growth, and which are also not captured here.

[4] E.g. see Moretti (2004) and Battu et al. (2003).
[5] E.g. see Liu et al. (2024), Grossman (2006), and Cutler and Lleras-Muney (2010).
[6] E.g. see Hjalmarsson and Lochner (2012) and Bell et al. (2018).
[7] E.g. see Currie and Moretti (2003) and Carneiro et al. (2012).

1 Introduction and context

London Economics were commissioned by the Association of Commonwealth Universities to examine the relationship between investment in tertiary education and GDP growth.

Human capital accumulation is one of the key drivers of long-term economic growth, and the **impact of human capital accumulation on economic growth** is one of the key research questions in the fields of education economics and growth and development economics. Education gives students the opportunity to learn and improve their cognitive skills, thus enhancing their productivity and capacity for innovation, resulting in greater economic output and therefore faster economic growth. This study adds to the existing evidence base regarding the link between human capital accumulation and economic growth by undertaking a **cross-country analysis** of the association between **tertiary education** (measured through the proportion of the population to have attained tertiary education qualifications) and **growth in GDP per capita** across different countries.

This report is structured as follows. **Section 2** outlines our **methodological approach**, including a discussion of the data sources and variables used and a range of descriptive statistics for the core variables of interest. **Section 3** presents the **results from our core econometric analysis and robustness checks**, and monetises these results by **estimating the impact on GDP of a hypothetical 1 percentage point increase in tertiary attainment across Commonwealth member states**. **Section 4** provides our core conclusions and recommendations for potential future work.

On top of the *direct* effect on economic growth, there are also a number of wider/spillover effects of higher education attainment (e.g. in relation to improved health outcomes or reduced crime rates). In addition, higher education institutions undertake a wide range of activities on top of their core teaching functions (e.g. in terms of research and commercialisation activities). In the remainder of this section, we briefly present key evidence from the existing literature in relation these effects.

1.1 Existing literature on the relationship between higher education and economic growth

There is a large body of literature exploring the link between higher education and growth. Here, we provide an overview of a selection of core relevant studies.[8]

Firstly, **Valero and Van Reenen** (**2018**) assess the link between the number of universities per capita and GDP per capita growth at the *regional* level. Using a fixed effects regression analysis, they find that a 10% increase in the number of universities per capita in a given region is associated with an increase in future GDP per capita[9] of 0.4%. The study suggests four key mechanisms for this relationship, including a greater supply of human capital, increased innovation, support for democratic values promoting strong institutions, and demand effects (i.e. universities bring additional demand for staff and supplies, therefore resulting in greater economic output). The analysis finds evidence of both the role of human capital and innovation mechanisms. The authors also find evidence of spillover effects from increasing the number of universities per capita in a region on other regions in the same country, with the largest effects observed for those regions that are geographically closest.

[8] For a more detailed and comprehensive literature review, see Valero (2021).
[9] The core results presented by Valero and Van Reenen use a 5-year lag, meaning that these results show the impact of changes in the number of universities on GDP per capita in five years' time.

Taking a similar approach, **Agasisti and Bertoletti (2020)** consider the impact of regional higher education systems on economic growth, focusing on European regions between 2000 and 2017. The authors find that an increase in the number of universities in a region is linked to economic growth, although they find a weaker relationship than Valero and Van Reenen (2018), which they attribute to the use of data over a shorter time span and in a period when the growth in the number of universities was slower. They also run further models estimating the effect of the size of the university, funding, and subject specialisation on the relationship between higher education and economic growth. The paper finds that improvements in the quality of research at universities, and a specialisation in STEM subjects, are particularly strong drivers of economic growth.

Using country level analysis, **Hanushek (2016)** argues that an increase in the number of universities or the tertiary attainment rate is not sufficient to encourage economic growth, instead suggesting that the quality of education is a more important driver of the relationship between education and growth. The author finds that years of schooling (a measure of the quantity of education received) capture 25% of the variation in growth rates across countries, whereas direct measures of human capital (focusing on cognitive skills) capture the remaining 75%. Further, the analysis finds that tertiary education and years of schooling have no effect on economic growth once cognitive skills are taken into account.

Benos and Zotou (2013) conduct a meta-regression analysis of 56 previous studies focusing on education and economic growth. Whilst they find a publication bias (i.e. that papers are more likely to be published if they find a positive relationship, therefore overstating the association between education and growth), even after correcting for this, the authors still find a significant impact of education on economic growth. Similar to Hanushek (2016), they suggest that measures of quality, such as expenditure on education, student-teacher ratios, and standardised test scores may be more useful in assessing the relationship, rather than simply focusing on the 'quantity' indicators of education received such as years of schooling and attainment measures. However, the authors do acknowledge a relative lack of human capital quality data as compared to indicators measuring the quantity of education received.

1.2 Spillover effects of higher education

Whilst the focus of the analysis here is solely on the direct relationship between higher education and economic growth, the attainment of higher education qualifications can also result in a **broad range of wider benefits** to graduates themselves, to their co-workers, and to wider society more generally.

For example, in addition to the increased productivity achieved by graduates themselves, a significant strand of academic literature investigates the extent to which **the acquisition of human capital results in positive productivity externalities**, where raising one's education has a positive effect not only an individual's productivity, but also on **coworkers' productivity** (e.g. through agglomeration effects). The literature (e.g. Moretti (2004), Battu et al. (2003)) suggests that the size of these human capital productivity spillovers crucially depends on the geographical proximity of the workers concerned, with spillovers occurring between workers within the same region, city, industry, or firm.

Another body of literature (e.g. Liu et al. (2024), Grossman (2006), Cutler and Lleras-Muney (2010)) examines the extent to which educational attainment is positively associated with various **health outcomes** (also referred to as the 'health education gradient'). These effects are driven by the impact of education on improved health literacy and health knowledge, on making healthier and more informed lifestyle choices, and a lower likelihood of engaging in high-risk behaviours (e.g. smoking).

Related to high-risk behaviours, a wide range of literature (e.g. Hjalmarsson and Lochner (2012), Bell et al. (2018)) further points to the impact of educational attainment on **reducing crime rates**. Education increases individuals' likelihood of finding legitimate work opportunities (thus discouraging them from participating in crime), raises incomes, improves individuals' decision-making process and patience, and supports the formation of better peer groups; all of which are likely to lead to a reduced propensity to commit crimes.

Further, numerous studies (e.g. Currie and Moretti (2003), Carneiro et al. (2012)) point to the existence of **intergenerational benefits** of education, as children whose parents have higher levels of education themselves show better educational performance and reduced behavioural problems. It is likely that parents with higher levels of education have better knowledge about the education system and are more likely to be able to support their child's learning.

Lastly, **universities are essential to core public sector services such as health and education**. In terms of health workers, approximately half of all public sector healthcare workers worldwide have tertiary qualifications (Hasnain et al. 2024). Similarly, using the UK as an example, 96% of all teachers in England in 2023-24 had attained tertiary qualifications (Department for Education, 2024). Whilst the proportion of workers in these sectors to have obtained tertiary qualifications will differ substantially across countries, this shows the importance of higher education qualification attainment to the level and quality of public sector service provision worldwide.

1.3 Economic benefits associated with other activities undertaken by universities

Since the analysis presented here focuses on the relationship between tertiary attainment and economic growth, the findings **relate primarily to the teaching and learning activities undertaken at higher education institutions**. However, universities undertake a wide range of activities outside of teaching, meaning that they contribute to economic growth in a number of different ways. For example, universities' research and knowledge exchange/commercialisation activities contribute to innovation, productivity, and long-term economic growth. This research can also provide a catalyst for innovation in the private sector, particularly in the area which is geographically closest to the university (through agglomeration effects), contributing to further economic development in the local area.

Studies such as Valero and Van Reenen (2018) and Agasisti and Bertoletti (2020), discussed in Section 1.1, implicitly capture all aspects of universities' activities in their analyses, as they estimate the relationship between economic growth and the *number of universities* in each region, rather than focusing specifically on certain 'outputs' of universities (i.e. tertiary qualification attainment). In contrast, as our analysis here focuses on tertiary attainment as the main independent variable of interest, it mostly captures universities' activities in relation to their teaching.

To illustrate how important universities' activities are to their local and national economies, Table 1 presents a number of **analyses (all undertaken by London Economics, for comparability) estimating the total impact of universities across all of their activities**. These reports typically find **benefit-cost ratios between 5:1 and 7:1**. In contrast, and for context given universities' reliance on public funding, it is important to consider the potential impact that might be achieved with alternative uses of public funding. An analysis of regulatory impact assessments (in the UK, based on almost 600 UK Government regulatory impact assessments) finds a median benefit-cost ratio associated with these government projects/programmes of **1.8:1** (see Section 7.2 of London Economics (2025)). This illustrates the scale of the economic benefits associated with investment in higher education when all aspects of universities' activities are accounted for.

Table 1 Illustrative benefit-to-cost ratios for selected higher education institutions

Institution(s)	Academic year covered	Link to study	Economic impact	Benefit-to-cost ratio
University of Cambridge	2020-21	here	£29.8bn	11.7
University of Oxford	2018-19	here	£15.7bn	6.1
University College London	2018-19	here	£9.9bn	5.9
University of Manchester	2022-23	here	£7.3bn	6.4
University of Sheffield	2022-23	here	£4.8bn	6.4
University of Edinburgh	2021-22	here	£7.5bn	6.9
University of Glasgow	2018-19	here	£4.4bn	5.8
University of Birmingham	2021-22	here	£4.4bn	5.7
Cardiff University	2020-21	here	£3.7bn	6.4
Group of Eight (Australia)	2016	here	AUD 66.4bn	5.5

Note: Economic impact given in the prices of the academic year studied.
Source: London Economics' analysis

2 Methodological approach

In this section, we provide an overview of our methodological approach for estimating the impact of tertiary education on economic growth. A more detailed explanation of our approach is provided in Annex A2.1 and Annex A2.2.

2.1 Econometric approach

All econometric models presented as part of our main findings here use an **ordinary least squares** (**OLS**) regression model, using a cross-country panel dataset. Other methods, including random effects (RE) and fixed effects (FE), were estimated as sensitivity analyses, and these results are included in Annex A2.3.

The main econometric analysis estimates a model of the following form:

$$GDP\ Growth_{it} = \alpha + \beta Educ_{it} + \gamma X_{it} + \varepsilon_{it}$$

In this equation:

- $GDP\ Growth_{it}$ is the key dependent variable, which is defined as the annual growth rate of GDP per capita for country *i* at time *t* (i.e. the growth rate in GDP per capita between time *t* and *t-1*);
- $\alpha Educ_{it}$ is a measure of tertiary education for country *i* at time *t* and is the core independent variable used throughout the analysis. We focus on four alternative independent variables (discussed in more detail in Section 2.1.1), with tertiary attainment being the core indicator;
- X_{it} includes a range of other determinants of long-term economic growth ('control variables'), including economic indicators (e.g. capital stock and formation, trade as a percentage of GDP), demographic and socio-economic indicators, institutional variables, and proxies for R&D expenditure and number of researchers. The full list of variables used in the analysis is presented in Table 5 (see Annex A2.1);
- α is a constant term;
- ε is an error term; and
- β and γ are individual scalars/vectors of coefficients. β is the coefficient of interest, identifying the correlation between tertiary education on economic growth.

We first run a model including all countries and sixteen control variables (X_{it}). We then undertake two sets of additional analysis:

- **An alternative specification** (**robustness check**) including **three additional control variables** (R&D expenditure, access to electricity, and the percentage of researchers that are female) that are **only available in later years**[10]. Whilst expanding the model to include more variables is likely to improve the findings by accounting for other factors which may influence economic growth, this approach will reduce the sample size and exclude earlier time periods entirely.

[10] For more information on the time period included throughout the analysis, see Section 2.1.2.

- A **breakdown of the analysis by income classification**, splitting countries into **lower income and higher income groups** based on World Bank classifications.[11] This allows us to estimate how changes in tertiary attainment may impact countries differently depending on their stage of economic development. This breakdown was undertaken for both the core specification and the alternative specification.

2.1.1 Independent variables

We began our analysis by focusing on **four core independent variables** (see Table 2):

- **Tertiary attainment:** The percentage of the population aged 15+ to have obtained tertiary qualifications.[12]
- **Number of tertiary enrolments:** The number of students enrolled in tertiary education.[13]
- **Tertiary enrolment ratio:** Enrolments in tertiary education (regardless of age) as a percentage of the population of the age group which officially corresponds to tertiary education (generally 18-21 years old) (this is also referred to as the 'gross enrolment ratio').
- **Government expenditure on tertiary education:** Government expenditure on tertiary education, either in monetary terms or as a percentage of GDP.

Table 2 Overview of the core independent variables considered

Item	Attainment	Enrolments	Enrolment ratio	Expenditure
Definition	% of the population aged 15+ to have obtained tertiary qualifications	Number of students enrolled in tertiary education	Enrolments in tertiary education, regardless of age, as a % of the population of the age group which officially corresponds to tertiary education	Government expenditure on tertiary education, either in monetary terms or as a % of GDP.
Source	Barro-Lee Educational Attainment dataset	UNESCO Institute of Statistics	UNESCO Institute of Statistics	UNESCO Institute of Statistics
Data quality/ Availability	This variable is consistently available for the vast majority of countries but is only available on a 5-year basis.	This variable is provided yearly but is poorer in terms of availability across countries/time and the quality of the data.	Similar to the number of enrolments in terms of quality, as this variable divides the number of enrolments by the relevant population.	Availability is poorer, especially in earlier time periods, than for the other three variables.

Source: London Economics' analysis of Wittgenstein Centre (2018) and UNESCO Institute of Statistics (2025)

The tertiary attainment variable is provided by the **Barro-Lee Educational Attainment dataset** (Wittgenstein Centre, 2018), which is the leading cross-country data source on human capital. The data are available for the vast majority of countries throughout the period analysed but note that the information is only available on a five-year basis. The three other independent variables considered were taken from the **UNESCO Institute of Statistics** (2025). These variables are all available yearly, but the coverage and availability over time are relatively poor as compared to the Barro-Lee data. Due to these differences in data quality and availability, **our analysis focuses on tertiary attainment as our core independent variable used throughout the main analysis**

[11] See Annex A2.2.7 for more information on the country classifications used.
[12] This measure includes qualifications at ISCED level 4 and above, meaning that *some* post-secondary non-tertiary education is included. However, the measure mostly relates to higher education qualifications.
[13] This measure, and the other UNESCO measures, include qualifications at ISCED level 5 (short-cycle tertiary education) and above.

presented in Section 3.1. The other measures of tertiary education were instead used as independent variables in a **range of sensitivity analyses**, presented in Annex A2.3.

2.1.2 Time period covered

Our main results use a **five-year dataset, where we generally take averages of variables across each five-year period** (e.g. average GDP per capita growth between 2015 and 2019). This reflects the fact that the core independent variable on tertiary attainment is only available at five-year intervals, where we measure attainment at the start of each five-year period (e.g. for the period 2015 to 2019, we consider attainment levels in 2015) and look at growth in GDP per capita over the next five years (2015 to 2019; see Figure 2 for a graphical illustration).[14]

More generally, the five-year dataset is also more suitable for the analysis of long-term growth, as short-term fluctuations and anomalies are smoothed out. However, this approach necessarily leads to a dataset with fewer observations as we compress the time component. We also undertake sensitivity analyses using a yearly dataset, which are presented in Annex A2.3.

The regressions using the five-year dataset include a total of seven five-year periods, from **1985-1990** to **2015-2019** (note that the use of earlier or later years was not possible, due to the lack of availability of the other control variables included within the analysis). When including the three additional control variables that are only available in later periods (as part of the robustness checks, outlined above), the analysis is instead restricted to five periods, from **1995-2000** to **2015-2019**.

2.2 Data sources

In order to undertake the econometric analysis, data were collected on a wide range of country-level indicators from a number of sources[15]. Table 3 provides an overview of each data source used and explains how these sources were incorporated within our analysis. For a full list of variables included in the analysis, see Annex A2.1.

[14] See Annex A2.2.6 for more information on how we converted yearly variables into a five-year dataset.
[15] In terms of coverage, our econometric analysis included both Commonwealth and non-Commonwealth countries.

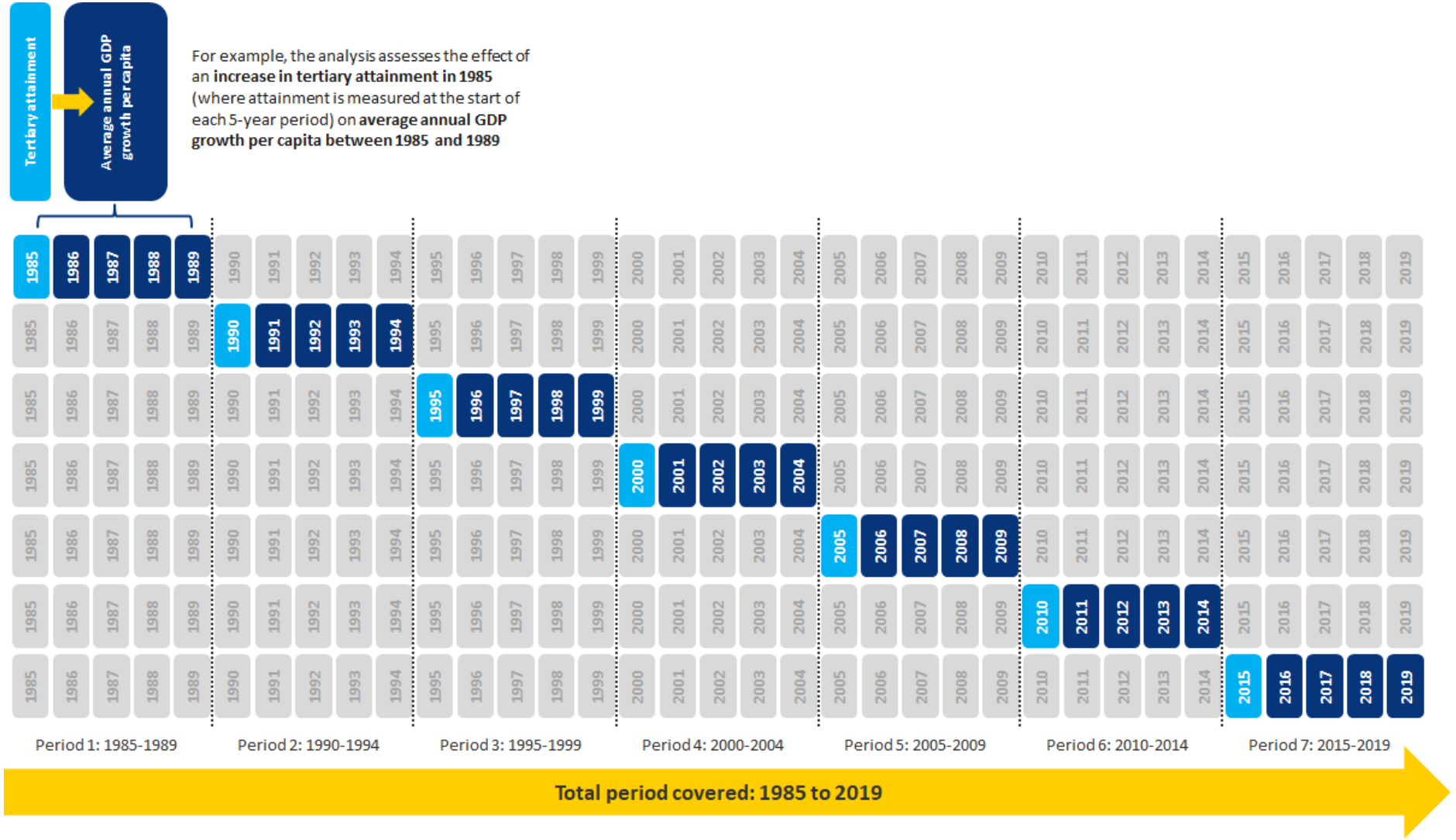
Table 3 Data sources used as part of the econometric analysis

Data source	Use
Barro-Lee Educational Attainment dataset[16]	Used for data on educational attainment at primary, secondary and tertiary levels
UNESCO Institute of Statistics[17]	Used for other variables measuring tertiary education, including the number of enrolments, the (gross) enrolment ratio, and Government expenditure on education, as well as other indicators of education (including R&D expenditure and proportion of researchers that are female) and demographic indicators (including population growth and structure, and life expectancy)
World Bank[18]	Used for demographic indicators (including population density and net migration) and a wide range of economic indicators (including GDP per capita, trade, and gross capital formation)
Freedom House[19]	Used to track political freedom over time, where countries are defined as a) Not free, b) Partly free, or c) Free
World Bank (World Integrated Trade Solution)[20]	Exports data were used to create a dummy variable indicating whether fuel makes up the majority of the country's exports[21]
International Monetary Fund[22]	Used for data on capital stock (both public and private) as a percentage of GDP

Source: London Economics' analysis

[16] See Wittgenstein Centre (2018).
[17] See UNESCO Institute of Statistics (2025).
[18] See World Bank (2025a).
[19] See Freedom House (2025).
[20] See World Bank (2025b).
[21] See Annex A2.2.3 for more information on the derivation of this variable.
[22] See International Monetary Fund (2025).

Figure 2 Overview of time period(s) covered throughout the analysis (based on 5-year periods)



Source: London Economics' analysis

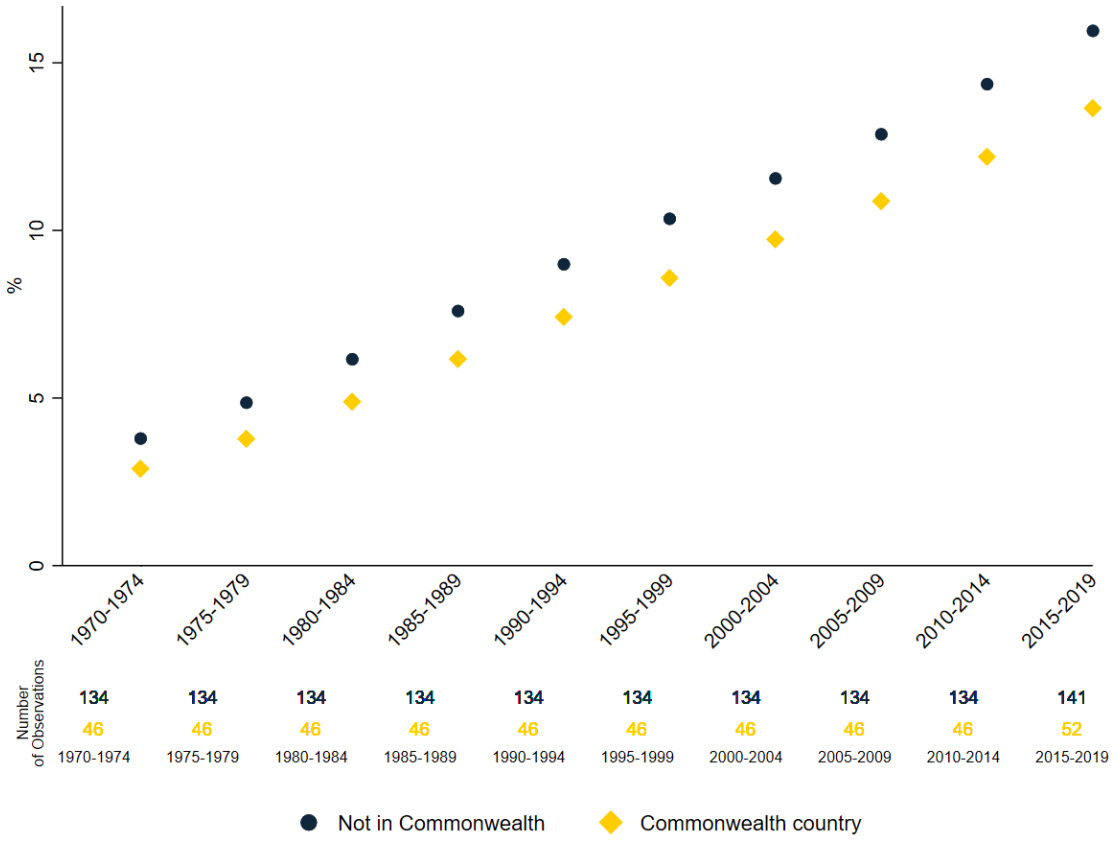
2.3 Descriptive statistics

In this section, we present trends over time relating to **two of the key indicators on tertiary education considered** - tertiary attainment and government expenditure on tertiary education - as well as **annual GDP growth per capita** (the dependent variable throughout the econometric analysis). These trends are presented separately for Commonwealth and non-Commonwealth countries (and including the underlying number of observations for each variable).[23]

2.3.1 Tertiary attainment

Figure 3 shows that the **proportion of the population in possession of tertiary qualifications** increased steadily between 1970-1974 and 2015-2019 for both Commonwealth and non-Commonwealth countries. In particular, tertiary attainment grew from around **3%** in the earliest 5-year period (1970-1974) to **14%** in the most recent period (2015-2019) for **Commonwealth member states**, and **from 4% to 16%** in **non-Commonwealth** countries. The tertiary attainment variable is consistently available for 180 countries for most of the period, as the number of observations remains stable over time. The average growth rate between each five-year period stands at between 1.2 and 1.4 percentage points.

Figure 3 Average percentage of the population aged 15+ with tertiary qualifications, 1970-1974 to 2015-2019, by Commonwealth status



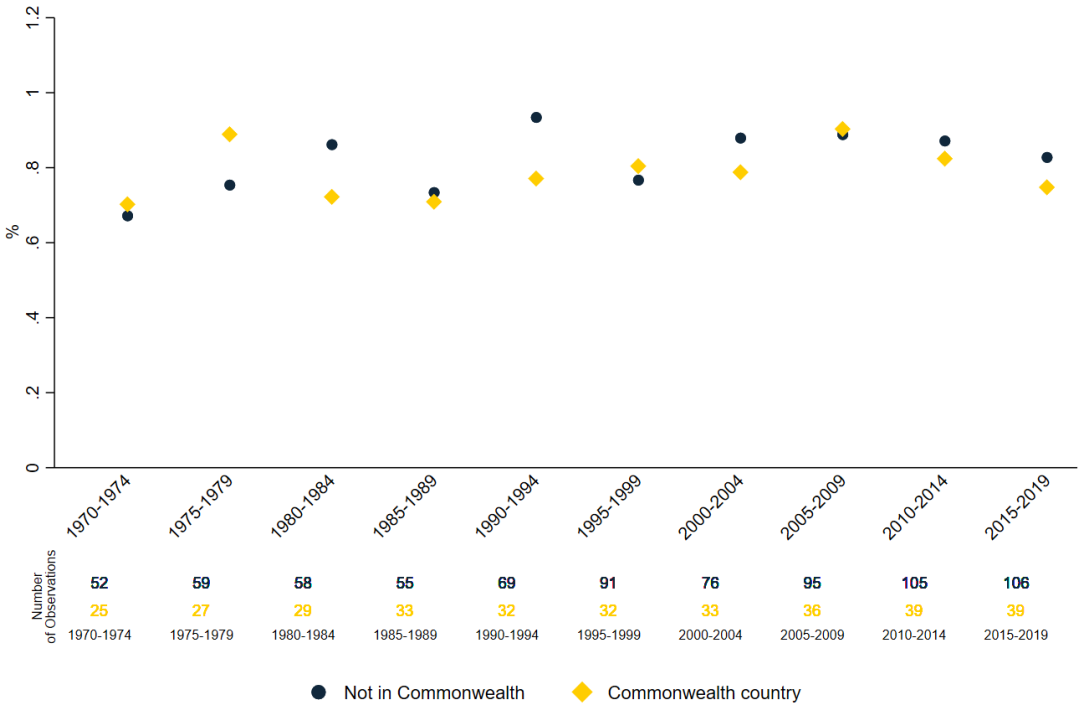
Note: The measure is only available in the first year of each five-year period. Averages are unweighted and based on all countries for which data were available, regardless of the country's inclusion within the econometric analysis.
Source: London Economics' analysis of the Barro-Lee Educational Attainment Dataset

[23] Note that these descriptive statistics are presented from 1970 onwards, while our core analysis uses data from 1985 onwards (see Section 2.1.2). This is because not all of the relevant control variables (i.e. independent variables) are available from 1970 onwards.

2.3.2 Government expenditure on tertiary education

As presented in Figure 4, **public expenditure on tertiary education as a proportion of GDP** initially increased slightly for both Commonwealth and non-Commonwealth countries, from roughly **0.7%** of GDP in **1970-1974** to approximately **0.9%** in **2005-2009**. However, spending as a percentage of GDP has since declined, with public tertiary education spending accounting for **0.75%** of GDP in Commonwealth countries and **0.83%** of GDP in non-Commonwealth countries as of 2015-2019. Note that the sample sizes for this variable are smaller than for tertiary attainment (see Section 2.3.1) and GDP per capita growth (see Section 2.3.3), especially in earlier years (although increasing to 145 countries by 2015-2019).

Figure 4 Average government expenditure on tertiary education as a percentage of GDP, 1970-1974 to 2015-2019, by Commonwealth status



Note: We take the average across each five-year period for each country before calculating the averages in the chart, to ensure that each country is only included once within the chart. Averages are unweighted and based on all countries for which data were available, regardless of the country's inclusion within the econometric analysis.
Source: London Economics' analysis of UNESCO Institute of Statistics data

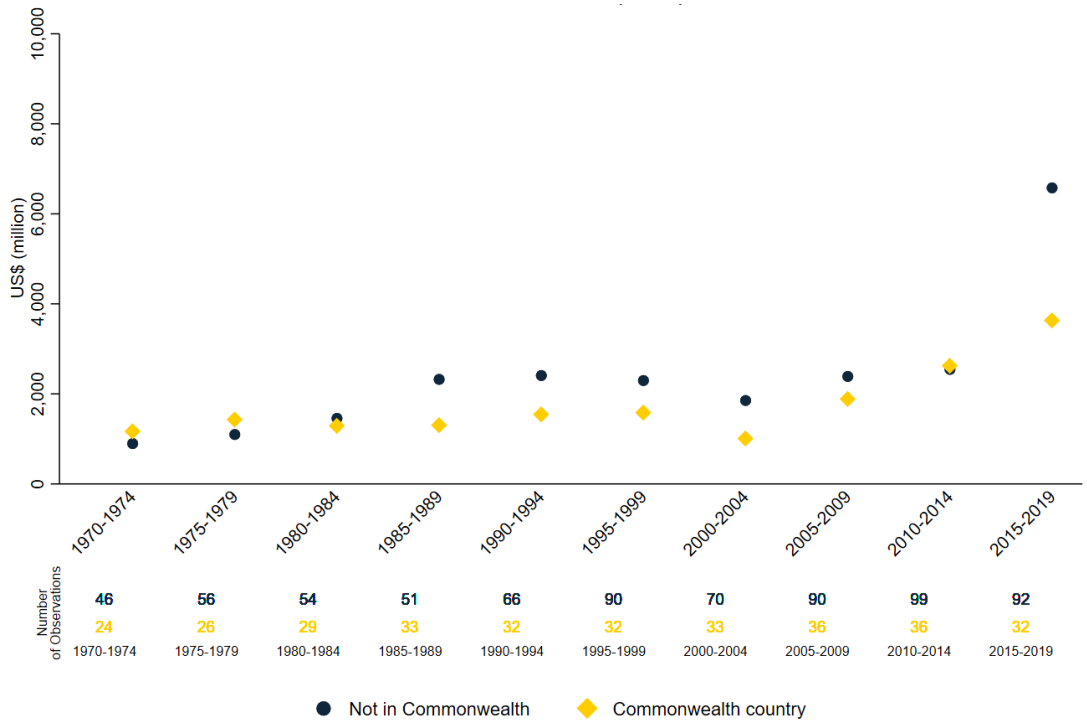
Figure 5 presents corresponding information on **public expenditure on tertiary education in monetary (US dollar) terms**, showing a large increase in the absolute level of public tertiary education expenditure over time for both Commonwealth and non-Commonwealth countries. However, this is likely to be due to changes over time in the underlying sample of countries for which this information is available, rather than a result of actual changes in government expenditure. For example:

- The reduction in the sample size for Commonwealth countries between 2010-2014 and 2015-2019 is a result of smaller countries (with smaller levels of expenditure on tertiary education) dropping out of the dataset. This leads to an increase in the average government expenditure across the (remaining) sample.
- Similarly, the large increase in average expenditure among non-Commonwealth countries in 2015-2019 is due to the United States entering the sample in that period. In 2015-2019,

the United States spent $269 billion on tertiary education, which results in a large increase in the average government expenditure across non-Commonwealth countries (on top of the fact that smaller countries again drop out of the sample in that period).

This illustrates the above-discussed data quality and availability issues in relation to the UNESCO data on government expenditure on tertiary education[24], resulting in our focus on the Barro-Lee tertiary attainment measure as our key independent variable used throughout the core econometric analysis that is presented in Section 3.

Figure 5 Average government expenditure on tertiary education in 2015 US$ (million), 1970-1974 to 2015-2019, by Commonwealth status



Note: We take the average across each five-year period for each country before calculating the averages in the chart, to ensure that each country is only included once within the chart. Averages are unweighted and based on all countries for which data were available, regardless of the country's inclusion within the econometric analysis.
Source: London Economics' analysis of UNESCO Institute of Statistics data

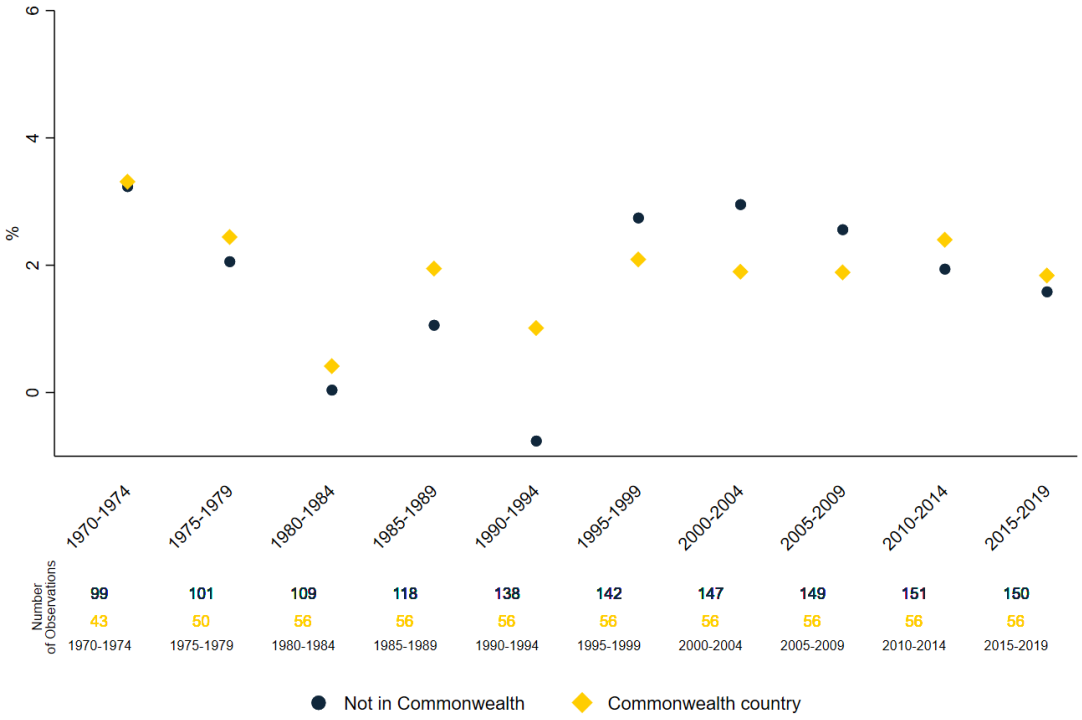
2.3.3 GDP per capita growth

Figure 6 shows a relatively mixed picture in relation to GDP per capita growth, with no clear pattern identifiable across the period. Average economic growth ranges between **0.4%** and **3.3%** for **Commonwealth** countries, and between **-0.8%** and **3.2%** for **non-Commonwealth** countries across the period from 1970-1974 to 2015-2019. This mixed picture is expected given the cyclical nature of national economies and given that the figure presents an *average* of growth rates across a wide range of different countries, which are likely to be facing wide-ranging and unique economic conditions in each five-year period.

In terms of sample size, the GDP per capita growth variable tends to be available for most countries throughout the period.

[24] Again, see Section 2.1.1 above.

Figure 6 Average annual GDP per capita growth, 1970-1974 to 2015-2019, by Commonwealth status



Note: Average across each five-year period for each country. Averages are unweighted and based on all countries for which data were available, regardless of the country's inclusion within the econometric analysis.

Source: London Economics' analysis of World Bank data

3 Findings

In this section, we first present the findings from the econometric analysis, focusing on the core independent variable (tertiary attainment) and its correlation with economic growth. We then monetise the econometric results by assessing the impact on GDP of a hypothetical 1 percentage point increase in tertiary attainment across all Commonwealth countries.

3.1 Econometric analysis

3.1.1 Core results

The econometric analysis identifies a **positive and statistically significant** relationship between tertiary attainment and economic growth, finding a coefficient of **0.030** under the core specification (across all available countries over the period 1985-2019, see Table 4). This indicates that a **1 percentage point increase in the proportion of the adult population with tertiary qualifications in a given country is associated with a 0.030 percentage point increase in the average annual growth rate of GDP per capita over the *following* five-year period**.

For example, if the tertiary attainment rate in a given country increased by one percentage point (e.g. from **14%** to **15% in 2015**), then we would expect to see an increase in the country's average annual growth in GDP per capita by 0.03 percentage points over the next five years (e.g. from **1.50% per year** to **1.53% per year between 2015 and 2019**), all else being equal. Conversely, if the tertiary attainment rate in this example *decreased* from 14% to 13% in 2015, then the analysis suggests that there would be a *decrease* in the country's average annual GDP per capita growth from 1.50% per year to 1.47% per year between 2015 and 2019.

To put this result into context, **worldwide GDP per capita growth** in **2023** was **1.92%**.[25] However, there is considerable variation between countries, e.g. considering specific Commonwealth countries, GDP per capita grew by 7.20% in India and 0.72% in Nigeria, but fell by 1.68% in Canada.

Table 4 Percentage point change in average GDP per capita growth associated with a 1 percentage point increase in tertiary attainment

Variable of interest	All countries		Lower income countries		Higher income countries	
	Core model	Robustness check	Core model	Robustness check	Core model	Robustness check
Tertiary attainment	**0.030****	0.045***	0.041	0.073**	0.027	0.053***

Note: Tertiary attainment refers to the percentage of the population aged 15+ in possession of tertiary qualifications. 'Robustness check' columns refer to the inclusion of the three additional control variables (R&D expenditure, access to electricity, and the percentage of researchers that are female) that are only available in later time periods (see Section 2.1 for further detail). Full results are provided in Table 6 in Annex A2.3.
The core model covers the years 1985 to 2019, while the robustness checks cover the years 1995 to 2019.
* Significant to the 10% level, ** significant to the 5% level, *** significant to the 1% level.
Source: London Economics' analysis

3.1.2 Additional analyses

In addition to the above core analysis, we then undertake **a robustness check** by running the econometric model with a slightly different specification that includes three additional control

[25] See here: https://data.worldbank.org/indicator/NY.GDP.PCAP.KD.ZG

variables (R&D expenditure, access to electricity, and the percentage of researchers that are female) that are only available in later years.[26] Using this alternative specification results in an **increase in the main coefficient to 0.045**, which remains **statistically significant** (again see Table 4). This suggests that a 1 percentage point increase in tertiary attainment in a given year is associated with a 0.045 percentage point increase in average GDP per capita growth over the following five years.

Next, we **disaggregate the analysis into 'lower income' and 'higher income' countries** (based on the World Bank's definition[27]), and run the regressions (using both the core and alternative specification) separately for the two groups:

- Under the **core specification** (covering the period 1985-2019), we find coefficients of **0.041 and 0.027 for lower income and higher income countries respectively**, neither of which are statistically significant.
- When **adding the further control variables** available in later time periods only (covering the period 1995-2019), both of these coefficients become **statistically significant** and increase, to **0.073 for lower income countries and 0.053 for higher income countries**. These results suggest that the economic returns from increases in tertiary attainment (in terms of GDP growth per capita) tend to be larger for countries that are at an earlier stage of development.

Across the whole sample and when considering lower income and higher income countries separately, we consistently see an increase in the coefficients when adding the three additional control variables (i.e. the 'robustness check' columns that are shaded grey in Table 4). However, this finding should be treated with caution, as it is difficult to assess whether this pattern results from a change in the underlying sample due to the removal of earlier years from the analysis (i.e. the removal of the years 1985 to 1994, as the three additional control variables were not available for those earlier years).

3.2 Monetisation

In order to contextualise these findings, we then **monetise** the findings by considering a **hypothetical scenario in which the tertiary attainment rate increases by a uniform 1 percentage point across all 56 Commonwealth countries at a given point in time**. To put the magnitude of this hypothetical increase into context, the average tertiary attainment rate across Commonwealth countries is projected to increase by **1.4 percentage points** between 2020 and 2025[28].

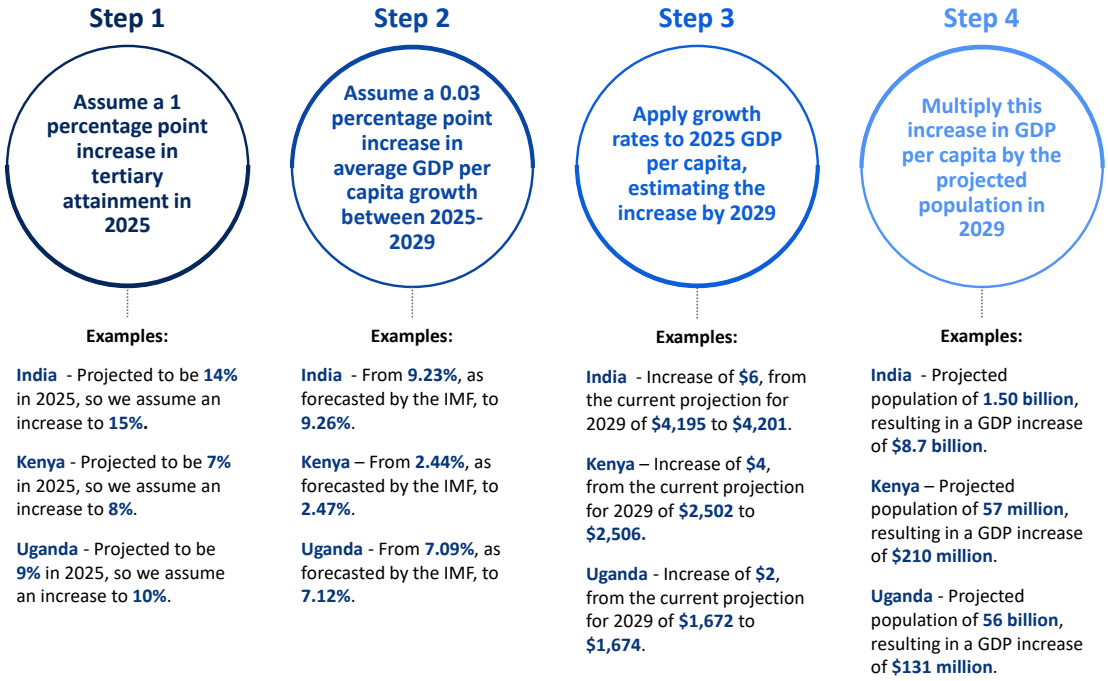
We utilise IMF forecasts of GDP per capita between 2024 and 2029 for each Commonwealth country[29] to estimate the **average projected annual growth rate of GDP per capita for each country over the 5-year period between 2025 and 2029**. Our monetisation is based on the above-discussed **core estimate of 0.030**, i.e. we assume that a hypothetical 1 percentage point increase in tertiary attainment in 2025 results in a **0.030 percentage point increase in the average projected annual growth rate of GDP per capita** in each Commonwealth country between 2025 and 2029. Using Jamaica as an example, assuming a hypothetical 1 percentage point increase in tertiary attainment

[26] Again, see Section 2.1 for more detail.
[27] See Annex A2.2.7 for further detail.
[28] Based on projections in 2018, when the Barro-Lee tertiary attainment measure was published.
[29] See International Monetary Fund (2025).

in 2025[30], then this would increase average annual GDP per capita growth in Jamaica between 2025 and 2029 from 3.60% (the forecasted value for the period) to 3.63%.

Figure 7 illustrates our approach, using the examples of India, Kenya and Uganda.

Figure 7 Monetisation approach



Source: London Economics' analysis

Undertaking this approach for each Commonwealth country individually, we find an **increase in total projected Commonwealth GDP by 2029 from this hypothetical increase in tertiary attainment of $28 billion**[31]. This increase in GDP by 2029 follows **additional incremental increases in GDP in previous years** (between 2025 and 2028, *not* presented here), as it is assumed that GDP per capita growth increases by 0.030 percentage points in *each* year of the five-year period. In addition, the impact on GDP would be expected to last beyond 2029, i.e. there would likely also be **additional increases in GDP in subsequent years** (not estimated in this analysis).

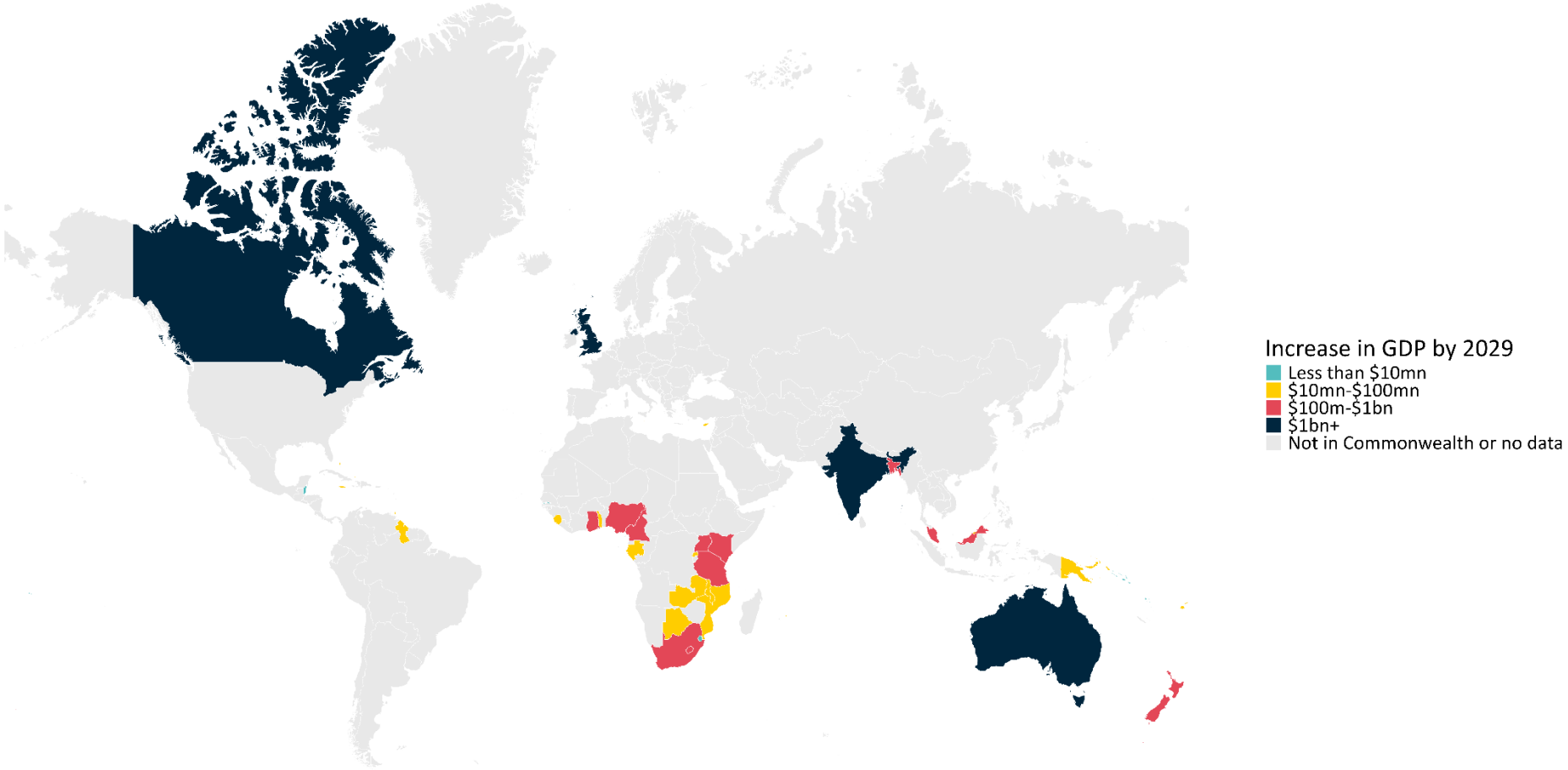
Figure 8 maps this total impact by Commonwealth country. The increase in GDP associated with a 1 percentage point increase in tertiary attainment **varies substantially across countries**, which is to be expected due to the wide range of countries included in the Commonwealth (e.g. in terms of both population size and total GDP). For example, **India** (**$8.7 billion**) and the **United Kingdom** (**$6.4 billion**) alone account for half of the total impact in GDP terms, with additional large impacts for **Canada** (**$4.1 billion**) and **Australia** (**$3.2 billion**). However, a number of other countries would also be expected to experience GDP increases of more than $100 million, e.g. including **Bangladesh** (**$997 million**), **Nigeria** (**$391 million**), and **Uganda** (**$131 million**). Full results for each country are presented in Table 10 in Annex A2.4.

[30] For context, the latest recorded *actual* level of tertiary attainment in Jamaica in the Barro-Lee Educational Attainment dataset is **16%** in 2015, and the *projected* tertiary attainment rate in 2025 is **21%**.
[31] In USD terms in nominal terms (i.e. in 2029 prices).

It is important to note that these monetised estimates are highly sensitive to the underlying econometric results. For example, in addition to the main estimate of **$28 billion** (which uses the above-discussed core regression coefficient of **0.030**[32]), we also calculated the increase in Commonwealth GDP that would arise when instead using lower and upper estimates of the regression coefficient, taking a confidence interval of 5% (with a lower bound of **0.003** and upper bound of **0.057**). Using this range, we find that the impact of a hypothetical 1 percentage point increase in tertiary attainment on total Commonwealth GDP **ranges between $3 billion and $53 billion**.

[32] See Section 3.1.1.

Figure 8 Increase in GDP in 2029 associated with a hypothetical 1 percentage point increase in tertiary attainment in 2025, by Commonwealth country



Note: Full results for each Commonwealth country can be found in Table 10 in Annex A2.4. All values are provided in USD in 2029 prices.
Source: London Economics' analysis, ArcGIS

4 Conclusions and recommendations

4.1 Conclusions from the analysis

The econometric analysis shows that the attainment of tertiary qualifications is associated with strong positive impacts on GDP per capita growth.

We investigate these impacts for **five years** after an increase in tertiary attainment. Whilst we do not have evidence of how much longer these impacts may continue for, it is expected that any impacts on GDP per capita growth would persist into the long term, as these graduates continue to contribute to their economies throughout their working lives.

Based on our core results, a hypothetical increase in tertiary attainments across all Commonwealth countries by a uniform 1 percentage point in 2025 would result in an increase in Commonwealth GDP of **$28 billion by 2029**. Whilst a 1 percentage point increase in tertiary attainments is a substantial change, as can be seen in the descriptive statistics (see Section 2.3), this shows the **positive outcomes for economies and governments that result from investments in tertiary education**.

It should be noted that the econometric analysis **cannot provide evidence of any causal relationship** between tertiary attainment and GDP per capita growth. Instead, the analysis solely shows **correlations** between the two indicators. Further, a similar relationship with GDP growth **has *not* been consistently observed for other tertiary education indicators explored here** (i.e. government expenditure (as a proportion of GDP) or the number of enrolments in tertiary education, as shown in Annex A2.3). However, this is potentially a result of lower data quality and coverage for these indicators.

4.2 Recommendations for future research

Whilst the analysis presented in this report makes a **strong case for investment in tertiary education as a key driver of economic growth**, it is conducted at a macro level, using overall tertiary attainment levels and GDP per capita growth rates at country level. To further investigate the economic returns to tertiary education, we would therefore recommend further work in the area, specifically focusing on:

- **More tailored analysis of the benefits of investment in higher education, focusing on specific countries or regions within countries**: A variety of factors – e.g. including education systems, economic structures, and cultural and institutional norms - are all likely to impact how investment in education can be best targeted. For example, regions whose economies specialise in agriculture are likely to require different types and levels of targeted investment in tertiary education as compared to regions that have a strong focus on financial services. Country- or region-based analyses would ensure that any investment in tertiary education brings the greatest return on investment, which is essential given current pressures on government budgets across the Commonwealth (and beyond).
- **Research on how the economic impacts of higher education investment may differ across subjects**: For example, Britton et al. (2020), focusing on just the UK, find substantial differences in net discounted lifetime returns to graduates across subjects, from near £0 for some subjects to around £500,000 for men studying medicine or economics. The economic returns – to both graduates and the Exchequer – associated with different subjects are also like to vary substantially across the different Commonwealth countries

(e.g. with brain drain having contrasting impacts both by country and subject of study). Therefore, further research into how investment in tertiary education in different subject areas may impact growth across the Commonwealth is important, again to maximise the return on investment for governments when expanding their tertiary education sector.

- **Improved collection of data relating to tertiary education across countries, with a particular focus on government expenditure in tertiary education**: Our analysis predominantly focused on one indicator of tertiary education, relating to attainment (i.e. the proportion of the population in possession of tertiary qualifications). Other measures of tertiary education were also explored, but these indicators typically lacked the data quality and availability required to conduct a rigorous and sufficiently robust analysis. Therefore, improvements in the underlying data sources would help to improve the robustness of our findings and expand the existing evidence base. In addition, a particular focus on public expenditure on tertiary education would allow for a comparison of the benefits (in the form of economic growth) and costs to the public purse of investing in tertiary education. This would also allow for a more thorough analysis that incorporates the quality of education received - which previous literature suggests is a more effective measure of the relationship between education and economic growth (see Section 1.1) - rather than focusing solely on measures of 'quantity'.

It is important to note that the **main barrier to undertaking more granular analysis (e.g. at regional/sub-national level) is the lack of consistently available data for the key variables of interest**. More specifically, while relevant regional level data on GDP growth is provided by the Global Data Lab[33] (covering the period 1990-2022), the data includes **no specific information on tertiary education**[34]. To overcome these data limitations, the following approaches could be explored:

- Identifying a **specific country or group of countries with available data collections on higher education**, capturing the relevant metrics at a granular level (e.g. institution level) over time. For example, the All India Survey on Higher Education (AISHE) has gathered data on a series of relevant metrics from Indian higher education institutions since 2010-11[35]. Additional analyses may explore the feasibility of undertaking a robust research project using this data (together with regional level data on growth and other characteristics).
- **Collecting data from ACU member universities**, either based on data that is already being collected by universities (but not currently available for wider research purposes), or by undertaking an ad-hoc primary data collection exercise to gather detailed information on the relevant metrics to be used for subsequent analysis.

[33] Global Data Lab - Innovative Instruments for Turning Data into Knowledge - Global Data Lab
[34] The data includes information on years of education and educational attendance, but only by age (e.g. 18-20 and 21-23) and gender, *not* by level.
[35] https://aishe.gov.in/

Index of Tables and Figures

Tables

Figures

ANNEXES

Annex 1 References

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Annex 2 Technical Annex

This annex provides further information on the econometric methodology and results. It starts by outlining the various **variables used** within the econometric analysis and their sources (Annex A2.1), and then provides more detail on the **data cleaning process** undertaken prior to the main analysis (Annex A2.2). Lastly, it presents **additional results** for both the **econometric analysis** (Annex A2.3) and the **monetisation** of the econometric results (Annex A2.4).

A2.1 Variables used within the econometric analysis

Table 5 lists the variables that are included within the econometric analysis, detailing why they are included and their source.

Table 5 Variables used within the econometric analysis

Variable name	Description	Source
GDP per capita	GDP per head of population. Used to generate GDP per capita growth (i.e. the dependent variable used throughout the analysis).	World Bank
Educational attainment	The core independent variable used within the main analysis. Defined as the percentage of the population aged 15+ to have obtained tertiary qualifications. Collected for primary, secondary and tertiary education.	Barro-Lee Educational Attainment dataset
Number of enrolments	Independent variable used within the sensitivity analyses. Defined as the number of enrolments in each level of education. Collected for primary, secondary and tertiary education.	UNESCO Institute of Statistics
(Gross) enrolment ratio	Independent variable used within the sensitivity analyses. Defined as total enrolment in tertiary education, regardless of age, as a percentage of the population of the age group which officially corresponds to tertiary education (generally 18-21). Collected for primary, secondary and tertiary education.	UNESCO Institute of Statistics
Government expenditure on education	Independent variable used within the sensitivity analyses. Collected both as a percentage of GDP and in monetary terms (USD). Collected for primary, secondary and tertiary education.	UNESCO Institute of Statistics
Population growth	Annual population growth in percentage terms. Included as a control variable, as it is expected that changes in population structure will impact on economic growth.	UNESCO Institute of Statistics
Population density	Defined as people per square kilometre of land. Included as a control variable, as it is expected that changes in population structure will impact on economic growth.	World Bank
Life expectancy at birth	Included as a control variable, as an indicator of the health of a country's population, which is	UNESCO Institute of Statistics

Variable name	Description	Source
	expected to positively impact economic growth.	
Population aged 15-24 years	Included as a control variable, to account for any changes in the size of the population at the typical age that people attend university.	UNESCO Institute of Statistics
Net migration	Defined as immigration minus emigration, as a percentage of the total population. Included as a control variable to reflect changes in the labour force and potential shifts in human capital. Created using World Bank data on migration and UNESCO information on population.	World Bank/UNESCO
Political freedom	A categorical variable which can take one of three values: Not free, partially free, free. Included as a control variable to account for institutional quality and governance.	Freedom House
Percentage of population with access to electricity	Included as a control variable to account for economic development and the quality of infrastructure. The variable is only available from 1990 onwards, so is only included in robustness checks which focus on later years[36].	World Bank
General government final consumption expenditure as a % of GDP	Included as a control variable to reflect the size of the public sector compared to the economy as a whole.	World Bank
Gross capital formation as a % of GDP	Included as a control variable to reflect investment in physical assets.	World Bank
Inflation of consumer prices	Included as a control variable to reflect purchasing power and economic stability.	World Bank
Fuel exports intensity	A dummy variable, taking the value of 1 if the fuel accounts for 50% or more of the country's exports.[37] Included as a control variable to account for different economic growth patterns of countries with a substantial amount of natural resources.	World Bank (World Integrated Trade Solution)
Trade openness	Defined as imports plus exports as a percentage of GDP. Used as a control variable to reflect a country's openness to international markets.	World Bank
General government capital stock as a % of GDP	Included as a control variable, representing the value of government-owned physical assets, which is an indicator of the quality of public infrastructure.	International Monetary Fund
Private capital stock as a % of GDP	Included as a control variable, representing the value of privately-owned physical assets.	International Monetary Fund
R&D expenditure (GERD) as a % of GDP	Included as a control variable, reflecting the extent to which the country is investing in research and innovation. The variable is only available from 1996 onwards, so is only included in robustness checks which focus on later years.	UNESCO Institute of Statistics

[36] See Section 2.1 for further information.
[37] See Annex A2.2.3 for further information on how this variable is derived.

Variable name	Description	Source
Female researchers as a % of total researchers	Included as a control variable to represent gender diversity and inclusion in the university sector and to reflect social progress. The variable is only available from 1996 onwards, so is only included in robustness checks which focus on later years.	UNESCO Institute of Statistics

A2.2 Data cleaning and conversion for econometric analysis

In this section, we provide further information on the data cleaning/conversion process undertaken in preparation for the econometric analysis.

A2.2.1 Barro-Lee Educational Attainment data

The information provided within the Barro-Lee Educational Attainment dataset presents the estimated number of people in each country with a given level of education, by age group and year. To calculate the attainment rate, we divide the number of people with the given level of education aged 15 or above by the total population aged 15 or above, using the population estimates included in the Barro-Lee dataset. We include both lower secondary and upper secondary education within our calculations for secondary attainment; in other words, the secondary attainment rate considers any education at lower secondary level or above.

A2.2.2 Definitions of primary, secondary, and tertiary education variables from UNESCO

Variables downloaded from the UNESCO Institute of Statistics, which are provided by level of education, are available in varying disaggregation of education level (based on ISCED levels[38]). To ensure a consistent approach across all indicators used (namely enrolments, the enrolment ratio, and government expenditure on education), we include all levels of education which may be included within primary, secondary and tertiary education. Using the number of enrolments as an example, we consider both lower secondary and upper secondary enrolments within the secondary enrolment variables. Similarly, we include enrolments in all programmes between ISCED level 5 (short-cycle tertiary education) and ISCED level 8 (doctoral or equivalent) when considering tertiary education.

A2.2.3 Derivation of fuel exports variable

We use data from the World Bank's World Integrated Trade System database on the value of exports by product, country and year. Using this data, we create a dummy variable which equals 1 if fuel accounted for more than 50% of the country's exports in the given year.

We use the Harmonised Commodity Description and Coding System (HS)[39] to estimate the proportion of each country's exports that were related to fuel. Specifically, our definition of fuels includes any items within HS code 27, which is "Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes". This includes a range of fuels, including coal, oil, petroleum and other similar products.

[38] See here: https://isced.uis.unesco.org/
[39] See here: https://trade.ec.europa.eu/access-to-markets/en/content/harmonised-system-0

A2.2.4 Harmonisation of country codes across datasets

The data cleaning process involved the use of a range of datasets from a number of different sources. We used ISO country codes to harmonise the identification of countries across these datasets. We then matched these country codes to World Bank country names, which are used throughout the analysis and throughout this report. Manual matching or editing of codes was required in some instances, where codes and/or country names varied across datasets.

A2.2.5 General data cleaning

Once the datasets were merged together, we undertook a number of cleaning steps aimed at removing anomalies and creating additional variables to use within the analysis. This included:

- Replacing values of zero with missing data in situations where a value of zero was implausible, for variables such as government expenditure on education or capital stock;
- Replacing values that were clearly implausible with missing data, based on large differences between one year and the following and previous year. Specifically, we set a value to missing if it had increased (decreased) by at least 50% or above compared to the previous year ***and*** was followed by a decrease (increase) of 50% or above in the following year;
- Resetting certain values of education expenditure when it was clear that data was inputted incorrected (e.g. in instances where values were provided in dollars rather than millions of dollars); and
- Creating variables showing log differences to generate proxies for percentage changes, for variables such as GDP per capita growth (i.e. the dependent variable used throughout the analysis), number of enrolments, and government expenditure on education. Log differences are preferred as they are easier to interpret, because they are additive over time and treat increases and decreases symmetrically.

A2.2.6 Converting from a yearly dataset to the five-year dataset

After the completion of the data cleaning process, we converted the dataset from a yearly dataset into one consisting of five-year periods. Within the five-year analysis, we took the value in the first year of the period for educational attainment (the key independent variable) and for most other educational and societal indicators. For economic indicators, such as inflation and government expenditure, we instead took an average across the given five-year period. This is because GDP per capita growth is more likely to be sensitive to these economic indicators in the short-term (i.e. within the five-year period), whereas societal indicators have a greater impact on economic growth through medium- and long-term economic development.

We also took averages across each five-year period for the alternative education-related independent variables that were used for sensitivity analysis (see Section 2.1.1 for further information), in relation to the number of enrolments, the enrolment ratio, and government expenditure on education, in order to maximise the number of data points included within the analysis. This is to reduce the impact of missing data and anomalous data points. To ensure that we measured tertiary education before the start of the relevant period, we took lags when including these variables in the regressions. For example, we considered the average enrolment ratio between 2010-2014 when estimating the impact on GDP per capita growth between 2015-2019. This was because we expected a potential increase in tertiary education to affect GDP per capita growth in the years *after* it has taken effect, once the education is completed and the graduates enter the workforce.

A2.2.7 Country classifications

To consider how the impact of changes in the tertiary attainment rate may impact different countries in different ways, we conduct robustness checks on 'lower income' vs. 'higher income' countries. These groups are defined based on the World Bank's analytical classification of countries,[40] which splits countries into four groups based on Gross National Income (GNI) per capita: low income, lower middle income, upper middle income, and high income. As conducting the analysis on these four groups individually would have resulted in low sample sizes, we combine a) the low income and lower middle income groups and b) the upper middle income and high income groups. Lastly, to ensure that these groups remain consistent throughout the period of analysis, we place each country into either the lower income or higher income group based on the *first year* that the country was included in the World Bank's analytical classifications. For most countries, this is the year that these analytical classifications began, which is 1987.

A2.3 Econometric results

The tables below present the econometric results. Table 6 presents the full results from the **core analysis,** focusing on tertiary attainment as the key independent variable, which is discussed in more detail in Section 3.1.

Table 7, Table 8, and Table 9[41] instead present results from our **sensitivity analyses** using alternative independent variables (see Section 2.1.1), including the enrolment ratio, the number of enrolments, and public expenditure on education:

- With regards to the **enrolment ratio**, we ran regressions using the unadjusted ratio and taking natural logarithms (see Table 7 and Table 9). We found a zero or *negative* relationship between the tertiary enrolment ratio and economic growth using the five-year dataset (mostly not statistically significant), and a positive relationship using the yearly dataset (for the fixed effects specification only).
- With regards to the **number of enrolments** (also see Table 7), we considered the log of the number of enrolments and also ran the model using the average growth rate in the number of enrolments as the core independent variable (i.e. measuring any expansion of the tertiary education sector). We found insignificant results with regards to the log of the number of enrolments, but positive and significant results in the model including the growth rate of enrolments.
- Lastly, in terms of **public expenditure on education** (see Table 8), we considered three measures: expenditure as a percentage of GDP, the log of expenditure in USD terms, and the average growth rate. We tend to find insignificant results across all specifications using these three measures of public tertiary education expenditure.

Overall, across the range of sensitivity analyses undertaken here, we almost always find an insignificant relationship between tertiary education and economic growth. It is difficult to know why we find a consistently significant and positive relationship between tertiary *attainment* and economic growth but no such relationship when considering other tertiary education indicators. One reason may be down to data quality, as the indicators from the UNESCO Institute of Statistics are patchier in terms of availability and quality than the tertiary attainment measure from the Barro-

[40] See here: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

[41] Table 7 and Table 8 use the same specification as that outlined in the main report, focusing on the independent variables outlined above rather than attainments. Table 9, in contrast, presents several specifications using a yearly dataset, focusing only on the enrolment ratio.

Lee Educational Attainment dataset. These differences in availability can be seen when comparing the number of observations included within each regression.

However, more generally, we may expect to see stronger results for measures of attainment (regardless of data quality) as this provides a current 'stock' measure of the workforce. In contrast, measures such as tertiary expenditure and enrolments levels constitute 'flow' measures that capture the current provision of higher education, which is likely to take a number of years to feed through into labour market (and, eventually, economic growth). Whilst we aim to account for this by taking lags, it may be the case that the effects take longer than the five years accounted for within our model; however, lags of ten years or more would have resulted in further issues regarding data availability, so were not included within the sensitivity analyses here.

Table 6 Econometric results (using the five-year dataset) – Educational attainment

Variable	All countries		Lower income countries		Higher income countries	
	Core model	Robustness check	Core model	Robustness check	Core model	Robustness check
Percentage of population aged 15+ with tertiary education[1]	**0.030****	**0.045*****	**0.041**	**0.073****	**0.027**	**0.053*****
Percentage of population aged 15+ with primary education[1]	0.013	0.027**	0.002	0.014	0.011	0.034*
Percentage of population aged 15+ with secondary education[1]	-0.001	-0.013	0.006	-0.013	-0.001	-0.019
Log GDP per capita[1]	-0.008***	-0.012***	-0.006**	-0.013**	-0.008**	-0.009**
General government final consumption expenditure (% of GDP)	-0.101***	-0.131***	-0.125***	-0.173***	-0.038	-0.081**
Gross capital formation (% of GDP)	0.099***	0.088***	0.116***	0.114***	0.089***	0.079**
Population growth (annual %)[1]	-0.596***	-0.788***	-0.575***	-0.984***	-0.496**	-0.598**
Log population density[1]	0.000	0.000	0.001	0.001	0.000	0.001
Log life expectancy at birth[1]	0.016	-0.056**	0.009	-0.071***	-0.024	-0.088*
Log population aged 15-24 years - 5 year lag[1]	0.001	-0.002	0.002	-0.000	0.000	-0.002
Inflation (annual %)	-0.001*	-0.020***	-0.002	-0.024***	-0.001	-0.010
Fuel exports account for 50% or more of total exports[1]	0.001	0.001	0.006	0.011	-0.003	-0.005
Trade openness	0.009***	0.006**	0.009**	0.011**	0.009*	0.003
Freedom House: Country is partially free[1]	-0.000	-0.001	-0.002	-0.000	0.007	-0.004
Freedom House: Country is free[1]	0.006	0.002	0.003	0.003	0.014	0.002
General government capital stock as a percentage of GDP[1]	-0.001	-0.003	-0.000	-0.003	0.004	-0.001
Private capital stock as a percentage of GDP[1]	-0.005**	-0.002	-0.005*	-0.002	-0.007***	-0.003
Net migration as a percentage of total population[1]	-0.131	0.364*	-0.130	0.643	-0.169	0.138
R&D expenditure (GERD) as a percentage of GDP		0.353		0.742		0.152
Percentage of population with access to electricity[1]		0.023**		0.023		0.051
Female researchers as a percentage of total researchers[1]		-0.001		-0.004		-0.002
Observations	697	361	418	190	279	171
R-squared	0.379	0.469	0.383	0.464	0.388	0.497
First year of analysis	1985	1995	1985	1995	1985	1995
Mean value of key regressor	13.6%	16.3%	8.4%	11.0%	21.4%	22.2%

Note: Robustness check columns (shaded grey) refer to the inclusion of the three additional control variables which are only available in later time periods. Freedom House coefficients are compared to a freedom score of "Not free". * Significant to the 10% level, ** significant to the 5% level, *** significant to the 1% level. [1] Measured at the start of each 5-year period.

Source: London Economics' analysis

Table 7 Econometric results (using the five-year dataset) - Enrolment ratio and number of enrolments

Variable	Enrolment ratio		Log enrolment ratio		Log number of enrolments		Average growth rate of number of enrolments (annual %)	
	Core model	Robustness check	Core model	Robustness check	Core model	Robustness check	Core model	Robustness check
Tertiary enrolment ratio/number of enrolments – (first lag)	**-0.006**	**-0.017***	**-0.000**	**-0.002**	**-0.000**	**-0.001**	**0.060*****	**0.041***
Primary enrolment ratio/number of enrolments – (first lag)	-0.012*	-0.017**	-0.010**	-0.016**	-0.003	0.004	0.013	0.061
Secondary enrolment ratio/number of enrolments – (first lag)	0.009	0.020**	0.003	0.008	0.000	-0.001	-0.052*	-0.019
Log GDP per capita[1]	-0.005***	-0.010***	-0.005***	-0.009***	-0.005***	-0.009***	-0.005**	-0.007***
General government final consumption expenditure (% of GDP)	-0.090***	-0.141***	-0.092***	-0.139***	-0.089***	-0.137***	-0.096***	-0.158***
Gross capital formation (% of GDP)	0.110***	0.092***	0.106***	0.095***	0.106***	0.088***	0.102***	0.074***
Population growth (annual %)[1]	-0.659***	-1.026***	-0.668***	-0.992***	-0.665***	-1.115***	-0.645***	-1.074***
Log population density[1]	0.000	-0.000	0.000	-0.000	0.000	-0.000	-0.001	-0.000
Log life expectancy at birth[1]	0.025	-0.021	0.025	-0.029	0.025	-0.044	0.027	-0.068***
Log population aged 15-24 years - 5 year lag[1]	0.001	-0.001	0.002*	-0.001	0.004	-0.004	0.002**	-0.001
Inflation (annual %)	-0.001	-0.020***	-0.001	-0.018***	-0.001	-0.019***	-0.001	-0.017***
Fuel exports account for 50% or more of total exports[1]	-0.006	-0.002	-0.005	-0.003	-0.005	-0.004	-0.005	-0.004
Trade openness	0.010***	0.008**	0.011***	0.008**	0.010***	0.007**	0.013***	0.008**
Freedom House: Country is partially free[1]	-0.001	0.000	-0.001	-0.000	-0.001	-0.002	0.002	-0.003
Freedom House: Country is free[1]	0.001	0.000	0.001	-0.000	0.002	-0.001	0.004	-0.003
General government capital stock (% of GDP)[1]	0.000	-0.001	0.000	-0.001	0.000	-0.002	-0.001	0.000
Private capital stock (% of GDP)[1]	-0.004*	-0.002	-0.004**	-0.003	-0.005**	-0.003	-0.004*	-0.002
Net migration as a percentage of total population[1]	-0.180	0.461**	-0.177	0.444**	-0.138	0.629***	-0.142	0.563***
R&D expenditure (GERD) (% of GDP)		0.375		0.343		0.409**		0.339*
Percentage of population with access to electricity[1]		0.007		0.011		0.024**		0.024**
Female researchers as a percentage of total researchers[1]		0.011		0.011		0.004		0.007
Observations	581	315	576	314	578	317	509	288
R-squared	0.411	0.496	0.414	0.488	0.407	0.481	0.428	0.506
First year of analysis	1985	1995	1985	1995	1985	1995	1985	1995
Mean value of key regressor	28.9%	38.0%	-1.74	-1.31	11.93	12.23	5.7%	5.0%

Note: Robustness check columns (shaded grey) refer to the inclusion of the three additional control variables which are only available in later time periods. Freedom House coefficients are compared to a freedom score of "Not free". * Significant to the 10% level, ** significant to the 5% level, *** significant to the 1% level. [1] Measured at the start of each 5-year period.

Source: London Economics' analysis

Table 8 Econometric results (using the five-year dataset) - Measures of public expenditure on education

Variable	Expenditure as a % of GDP		Log expenditure in USD		Average growth rate of expenditure in USD (annual %)	
	Core model	Robustness check	Core model	Robustness check	Core model	Robustness check
Expenditure on tertiary education – (first lag)	**0.026**	**0.296**	**-0.000**	**0.001**	**-0.002**	**-0.027***
Expenditure on primary education – (first lag)	0.391**	0.220	0.002	0.002	0.021**	0.003
Expenditure on secondary education – (first lag)	-0.014	-0.235	-0.004*	-0.004	0.008	0.010
Log GDP per capita[1]	-0.005**	-0.005*	-0.001	-0.004	-0.004	-0.004
General government final consumption expenditure (% of GDP)	-0.104***	-0.104**	-0.066**	-0.102**	-0.078**	-0.072*
Gross capital formation (% of GDP)	0.099***	0.090***	0.099***	0.086***	0.150***	0.158***
Population growth (annual %)[1]	-0.722***	-0.882***	-0.702***	-0.968***	-0.427**	-0.391
Log population density[1]	0.001	-0.001	0.001	-0.001	0.000	-0.001
Log life expectancy at birth[1]	0.042**	-0.007	0.033*	-0.011	0.039	0.017
Log population aged 15-24 years - 5 year lag[1]	0.001	-0.000	0.003	0.001	0.000	-0.000
Inflation (annual %)	0.001	-0.028	-0.003	-0.022	-0.003	-0.048
Fuel exports account for 50% or more of total exports[1]	-0.006	-0.009	-0.005	-0.006	-0.011	-0.013**
Trade openness	0.009***	0.008**	0.009***	0.008***	0.008**	0.007**
Freedom House: Country is partially free[1]	0.005	0.005	0.004	0.003	0.003	0.006
Freedom House: Country is free[1]	0.006	0.005	0.007	0.004	0.006	0.009
General government capital stock (% of GDP)[1]	0.001	0.001	0.001	0.004	0.003	0.004
Private capital stock (% of GDP)[1]	-0.007**	-0.006**	-0.006**	-0.006**	-0.005	-0.008***
Net migration as a percentage of total population[1]	-0.023	0.215	-0.029	0.284	-0.278	-0.162
R&D expenditure (GERD) (% of GDP)		-0.068		-0.012		-0.181
Percentage of population with access to electricity[1]		0.015		0.008		0.014
Female researchers as a percentage of total researchers[1]		-0.014		-0.016		-0.004
Observations	349	208	344	203	262	163
R-squared	0.390	0.462	0.377	0.445	0.445	0.466
First year of analysis	1985	1995	1985	1995	1985	1995
Mean value of key regressor	0.9%	1.0%	6.22	6.62	4.2%	3.0%

Note: Robustness check columns (shaded grey) refer to the inclusion of the three additional control variables which are only available in later time periods. Freedom House coefficients are compared to a freedom score of "Not free". * Significant to the 10% level, ** significant to the 5% level, *** significant to the 1% level. [1] Measured at the start of each 5-year period.

Source: London Economics' analysis

Table 9 Econometric results (using the yearly dataset) - Enrolment ratio

Variable	Enrolment ratio					
Countries	**All**	**All**	**All**	**All**	**Lower income**	**Higher income**
Specification	**Core model**	**Core model**	**Core model**	**Additional control variables**	**Core model**	**Core model**
Model	**OLS**	**Random effects**	**Fixed effects**	**Fixed effects**	**Fixed effects**	**Fixed effects**
Log tertiary enrolment ratio (third lag)	**0.001**	**0.003**	**0.012*** **	**0.010** **	**0.010*** **	**0.017*** **
Log primary enrolment ratio (fifth lag)	0.001	0.005	0.007	0.009	0.011	0.007
Log secondary enrolment ratio (fifth lag)	0.001	-0.000	0.000	0.029**	-0.009	0.010
Log GDP per capita (first lag)	-0.005***	-0.007***	-0.058***	-0.083***	-0.061***	-0.065***
Gross capital formation (% of GDP)	0.136***	0.128***	0.147***	0.223***	0.136***	0.158***
General government capital stock (% of GDP)	-0.005**	-0.008***	-0.029***	-0.069***	-0.028***	-0.021**
Private capital stock (% of GDP)	-0.012***	-0.015***	-0.026***	-0.029***	-0.023***	-0.031***
Trade openness	0.007**	0.011***	0.019***	0.012	0.016	0.021**
General government final consumption expenditure (% of GDP)	-0.095***	-0.108***	-0.192***	-0.416***	-0.129**	-0.278***
Log population density	0.000	-0.000	-0.042***	-0.085***	-0.061***	-0.042***
Population growth (annual %)	-0.842***	-0.998***	-1.330***	-1.412***	-0.987***	-1.291***
Net migration as a percentage of total population	0.191	0.268	0.312	0.645	0.192	0.304
Inflation (annual %)	-0.003***	-0.003***	-0.003***	-0.020***	-0.002***	-0.005*
Freedom House: Country is partially free	0.004	0.001	-0.007	0.022*	-0.007*	-0.008
Freedom House: Country is free	0.010**	0.008**	-0.002	0.010	-0.006	0.009
Fuel exports account for 50% or more of total exports				0.006		
Log R&D expenditure (GERD) (% of GDP) (first lag)				0.002		
Log researchers per million inhabitants (FTE) (first lag)				0.008		
Observations	2,839	2,839	2,839	915	1,602	1,237
R-squared	0.298		0.315	0.572	0.301	0.438
First year of analysis	1975	1975	1975	1997	1975	1975
Mean value of key regressor	33.7%	33.7%	33.7%	55.7%	21.4%	48.4%

Note: The 'Additional control variables' column (shaded grey) refers to the inclusion of three additional control variables which are only available in later time periods. Freedom House coefficients are compared to a freedom score of "Not free". * Significant to the 10% level, ** significant to the 5% level, *** significant to the 1% level. The regressions also include time dummies. ***Source: London Economics' analysis***

A2.4 Monetisation results by country

Table 10 presents the results from the monetisation analysis, considering the potential impact on GDP (in both aggregate and per capita terms) in 2029 of a hypothetical 1 percentage point increase in the tertiary attainment rate in each country between 2020 and 2025. More details on the approach used, and commentary on the results, can be found in Section 3.2.

Note that there are two gaps in the table (for Pakistan and Sri Lanka) that arise where there were insufficient data to allow us to monetise the impact for the given country (denoted as '-' in the table). These gaps imply that the results here likely provide an *underestimate* of the total impact on Commonwealth GDP.

Table 10 Monetisation results by Commonwealth country

Country		Income classification	Projected % of population aged 15+ with tertiary qualifications (2025[1])	Increase in GDP by 2029	
				Total GDP	GDP per capita
1	Antigua and Barbuda	Higher income	21%	$4m	$39
2	Australia	Higher income	41%	$3,249m	$112
3	Bahamas	Higher income	32%	$26m	$60
4	Bangladesh	Lower income	6%	$997m	$6
5	Barbados	Higher income	19%	$13m	$45
6	Belize	Lower income	17%	$6m	$13
7	Botswana	Lower income	19%	$43m	$15
8	Brunei Darussalam	Higher income	11%	$28m	$63
9	Cameroon	Lower income	9%	$110m	$3
10	Canada	Higher income	60%	$4,058m	$94
11	Cyprus	Higher income	41%	$66m	$69
12	Dominica	Lower income	-	$1m	$17
13	Eswatini	Lower income	9%	$9m	$8
14	Fiji	Lower income	22%	$11m	$11
15	Gabon	Higher income	10%	$35m	$14
16	Gambia	Lower income	5%	$6m	$2
17	Ghana	Lower income	6%	$145m	$4
18	Grenada	Lower income	21%	$3m	$22
19	Guyana	Lower income	11%	$45m	$56
20	India	Lower income	14%	$8,702m	$6
21	Jamaica	Lower income	21%	$36m	$13
22	Kenya	Lower income	7%	$210m	$4
23	Kiribati	Lower income	3%	$1m	$4
24	Lesotho	Lower income	9%	$4m	$2
25	Malawi	Lower income	2%	$19m	$1
26	Malaysia	Lower income	22%	$883m	$25
27	Maldives	Lower income	14%	$14m	$32
28	Malta	Higher income	29%	$47m	$79
29	Mauritius	Lower income	8%	$31m	$25
30	Mozambique	Lower income	2%	$50m	$1
31	Namibia	Lower income	8%	$25m	$8
32	Nauru	Higher income	-	$0.3m	$22
33	New Zealand	Higher income	44%	$458m	$78
34	Nigeria	Lower income	12%	$391m	$2
35	Pakistan	Lower income	8%	-	-
36	Papua New Guinea	Lower income	8%	$55m	$4
37	Rwanda	Lower income	2%	$28m	$2

Country		Income classification	Projected % of population aged 15+ with tertiary qualifications (2025[1])	Increase in GDP by 2029	
				Total GDP	GDP per capita
38	Samoa	Lower income	18%	$2m	$9
39	Seychelles	Higher income	19%	$4m	$38
40	Sierra Leone	Lower income	6%	$14m	$1
41	Singapore	Higher income	60%	$972m	$158
42	Solomon Islands	Lower income	7%	$3m	$4
43	South Africa	Lower income	8%	$705m	$10
44	Sri Lanka	Lower income	24%	-	-
45	St Kitts and Nevis	Higher income	-	$2m	$45
46	St Lucia	Lower income	21%	$5m	$24
47	St Vincent & the Grenadines	Lower income	15%	$2m	$19
48	Tanzania	Lower income	4%	$174m	$2
49	Togo	Lower income	5%	$20m	$2
50	Tonga	Lower income	15%	$1m	$10
51	Trinidad and Tobago	Higher income	27%	$48m	$33
52	Tuvalu	Lower income	-	$0.1m	$13
53	Uganda	Lower income	9%	$131m	$2
54	United Kingdom	Higher income	37%	$6,356m	$91
55	Vanuatu	Lower income	4%	$2m	$5
56	Zambia	Lower income	10%	$65m	$3
Total/average (all Commonwealth countries)			**17%**	**$28,317m**	17%

Note: Gaps arise where there were insufficient data to allow us to monetise the impact for the given country (denoted as '-' in the table). Note that the analysis of the estimated increase in GDP is based on the cross-country analysis presented in Section 3.1 and Table 6, and assumes the same uniform effect of tertiary attainment on GDP per capita growth across all countries (in percentage points).

[1] Projections of the tertiary attainment rate in 2025 for each country, from Wittgenstein Centre (2018).

Source: London Economics' analysis.

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