

# The determinants of international demand for UK higher education

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Higher Education Policy Institute



HEPI Report 91

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# **Foreword**

**Nick Hillman, Director,  
Higher Education Policy Institute**

Ever since 23 June 2016, when the UK voted in favour of leaving the European Union, universities have faced uncertainty over student numbers and research income among other issues. Theresa May's Government has done what it can to allay the fears. For example, students coming from other EU countries have had their funding underwritten by the Treasury for the duration of their studies and substantial extra research funding has been promised.

In one crucial area, however, the Government is at risk of making things worse rather than better. Yet another tough crackdown on international students is expected, even though the UK higher education sector is the most autonomous, most well regarded and most attractive anywhere in Europe.

This report, produced by London Economics for HEPI and Kaplan International, moves the discussions on. It provides the first proper econometric analysis of the impact of Brexit and other global events on the demand for UK higher education. We hope it is of use to policymakers as well as institutions.

Above all, it shows the hard facts mean any further crackdown on international students will not only damage our fantastic educational institutions but also the whole economy – and therefore the lives of those who voted Leave as well as those who voted Remain.

## **Foreword**

**Linda Cowan, Managing Director (UK),  
Kaplan International Pathways**

At Kaplan International, enabling the long-term health and sustainability of higher education and its wider social impact is at the heart of our mission. To achieve this, we incorporate into our work:

1. an understanding of the factors influencing worldwide market demand;
2. systematic analysis and reporting of data to inform our diagnoses and forecasting; and
3. a constant effort to interpret and respond to the needs and aspirations of our university partners.

This report not only focuses admirably on the key factors that fuel demand, but also shows the econometric dynamics that underpin these factors with impressive rigour.

We would like to highlight three areas of specific interest to higher education institutions, for their far-reaching consequences not just for higher education, but for the wider community.

First, in drawing out key sensitivities that should be taken into account in financial forecasting, the information in this report could be of use to universities with their own financial modelling. Particularly at this time of potential change and uncertainty in our immigration system, universities need to take account of the impact of regulation on international recruitment and the treatment of EU students. The uncertainty around the status of EU students post-Brexit, and during a hypothetical 'transition period', means that forecasting around numbers and revenues is made even less precise than it already often is.

Secondly, if beneficial impacts on the recruitment of international students, such as the depreciation of sterling as detailed in this report, are restricted by regulation, the important potential gains to be had from these dynamics for our university sector and the local communities which house our universities are at risk. It is important to remember that there is a delicate, but definite, relationship between an increase in numbers – stimulated by, for example, a drop in the value of the pound – and the Government's resolve to reduce net migration and remain steadfast in its conviction that international students should not be removed from migrant numbers.

Thirdly, our collaborative and mutually rewarding work with universities around the Anglophone world makes us a highly attuned barometer of global demand for higher education. The findings of this report underline how important it is that we continue working with the sector to make globalisation work for, not against, universities, students, and the communities they enrich.

The work that universities do – not just teaching and research, but the wider social, cultural and economic impact of their activity – is more important than ever in a world where truth and trust are fragile. As an engine of student mobility, cultural diversity and sustainable incremental revenue, Kaplan International is committed to supporting and enabling universities to achieve their goals. This report will inform our planning and will hopefully inform planning and thinking both within and for the higher education sector.



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## Executive Summary

London Economics were commissioned by the Higher Education Policy Institute (HEPI) and Kaplan International Pathways (Kaplan) to undertake an analysis of the determinants of overseas demand for UK higher education. The analysis was undertaken at undergraduate and postgraduate level separately, though the results are more robust at the undergraduate level.

Using a range of data on UK higher education enrolments from 2003/04 to 2014/15 from 189 countries, the analysis indicates that there are a range of factors that determine demand for UK higher education. These include domestic factors, such as **UK fee levels**, but also external factors including the **exchange rate, fee levels charged by competitor countries, energy prices, overseas economic growth** and **policy interventions** within a country.

The analysis demonstrates that, although some factors have a relatively immediate effect on the demand for UK higher education (such as GDP per capita), other factors (such as the exchange rate and UK fee levels) have both an immediate effect and a longer-term impact.

### *UK and competitor country tuition fees*

- **A 10% increase in UK fees** would reduce first-year undergraduate enrolment by **3.3%** in the same period and a further **2.2%** in the subsequent year. The cumulative effect of the 10% increase in fees would be to decrease enrolment by **5.5%**.

- The corresponding impact at postgraduate level was estimated to be **2.1%**.
- **A 10% increase in US fees** – denominated in sterling – would increase UK undergraduate enrolment by **6.6%** in the same period, and a further **4.4%** in the subsequent year. The cumulative effect of the 10% increase in US fees would be to increase enrolment by **11.0%**.

### *Currency depreciation*

- **The direct effect of a 10% depreciation of sterling** would increase UK enrolment by **2.1%** in the same period and a further **2.0%** in the following year. The cumulative direct effect would be **4.1%**. However, because US higher education fees are denominated in sterling, there is also an **indirect effect** as US higher education becomes less attractive and UK higher education becomes more attractive. The indirect effect of the 10% depreciation would be to increase enrolment by a further **11.0%**. The **total impact** of a 10% depreciation in sterling would be expected to result in a **15.1%** increase in enrolment at undergraduate level.
- The corresponding impact at postgraduate level was estimated to be **3.5%**.

### *Commodity prices*

- For countries that are large oil producers (i.e. in the global top 20), a **10% increase in the energy price index** results in a **3.8%** increase in UK higher education enrolment at undergraduate level. At the same time, among countries that are not large oil producers (i.e. not in the top 20

producers), a 10% increase in the energy price index will result in a **1.1%** decline in demand for UK higher education at undergraduate level.

### *Policy interventions*

- We assessed the possible impact of the change to visa arrangements encapsulated by the April 2012 decision to remove the automatic ability of international students to undertake two years of post-study work in the UK. The analysis suggests that the introduction of the policy was associated with a **20.3%** decline in enrolment at undergraduate level. However, the impact on postgraduate enrolment was positive, with the model suggesting that there was a **7.2%** increase in student enrolment at postgraduate level, other factors being held constant. Because of other factors at work in explaining the postgraduate enrolment rate, this result suggests that the rate of increase could have been even higher in the absence of this policy intervention.

To illustrate the impact of some of these macroeconomic factors on different higher education institutions, we modelled a range of scenarios.

- We found that a **10% depreciation of sterling**, holding all other factors constant, resulted in a **£227 million** positive impact on the potential fee revenue of UK higher education institutions (in relation to students' first year of study).
- The **removal of student tuition fee support** from undergraduate EU-domiciled students would negatively affect demand for higher education, as EU students would see the cost of higher education increase substantially.

- **Harmonising the fees** charged to EU and international students would have an ambiguous effect on institutions. Among the highest calibre institutions, the increase in fees for EU students to international student levels would result in an increase in aggregate revenues despite the reduction in student enrolments. However, fewer than 10 institutions would be positively affected.

Removing EU student support and fee harmonisation would result in a **£40 million** decline in higher education institution finances.

**In aggregate, the combined effect of the currency depreciation (+£227 million), and the removal of EU undergraduate fee support and fee harmonisation (-£40 million) was potentially positive – amounting to £187 million in students’ first year of study – though there would be significant variation across institutions.**

The analysis is based on the **necessary assumption that all other factors in the model remain constant**. The analysis uses historic data, and does not take into account the change in sentiment that might be felt toward the United Kingdom since the recent decision to leave the European Union or the 2016 presidential election in the United States. Furthermore, the general attractiveness of the sector – especially for postgraduate students – might be adversely affected by the fact that UK higher education institutions could find it increasingly challenging to retain high-calibre research staff and related research funding.

Most importantly, the analysis presented here assumes that there are no immigration caps, nor any differential treatment of higher education institutions in relation to the ability to secure student visas (and post-study work visas). As such, the positive impact of the depreciation assumes that the resulting additional **20,000** students are permitted to study in the United Kingdom. If this is not the case, then the **£227 million** potential gain that might be achieved by UK higher education institutions may not be realised or only realised in part – thus representing the potential loss associated with restricting international student numbers.

*What does this mean for the UK economy?*

The **£227 million per annum** potential loss identified only captures the tuition fee income in students' first year of study. This increases to **£463 million per annum** if we consider the fee income accrued over the total duration of study. If we further include the economic output associated with students' non-tuition fee expenditure over the course of their studies (**£604 million**), the total potential loss to the UK economy stands at **£1.067 billion per annum**.

Universities have extensive supply chains. Known as the indirect and induced effects, UK higher education institutions (and their staff and students) support these supply chains through their purchases. If we also consider these indirect and induced effects on the wider UK economy associated with this source of export income, the estimate of potential loss increases to around **£2 billion per annum**.



## Introduction

By any accepted measure, the United Kingdom has an outstanding higher education system that has proved immensely attractive to international students. With many world-class universities, strength in breadth and the benefit of teaching in English – not to mention the historic links between the UK and many other countries – UK higher education institutions have successfully recruited hundreds of thousands of students from around the world each year. The benefits have been enormous and wide-ranging, and include higher export earnings, more diverse campuses and educational advantages.

With more than **232,000** first year overseas students in 2014/15, accounting for approximately 10% of all internationally-mobile students, the United Kingdom higher education sector was forecast to generate more than **£10 billion** of export income in revenues in 2015.<sup>1</sup> Over and above these ‘hard’ financial metrics, the sector also promotes long-term relationships with the rest of the world, resulting in trade and diplomatic gains for the nation. Earlier work by HEPI suggests one-quarter of countries globally have a president, prime minister or monarch who was educated in the UK tertiary education system.<sup>2</sup> In addition, there are educational benefits, which earlier work conducted for HEPI and Kaplan shows are recognised by home and overseas students alike.<sup>3</sup>

London Economics were commissioned by HEPI and Kaplan to undertake an analysis of the determinants of overseas demand for UK higher education, and to consider what the impact of a number of macroeconomic characteristics might be on future

enrolment levels and UK institutions' tuition fee income. The analysis looks only at the impact of different economic and policy factors on teaching and learning income, and does not consider the impact on research funding.

- The first section provides a summary of the data used in this analysis, as well as the methodological approach. Information on the evolution of student enrolments over time is also presented.
- The second section summarises results from the econometric analysis and provides an explanation of which factors determine demand for UK higher education from overseas.
- The third section explores the impact of some hypothetical scenarios on student enrolment and the financial position of UK institutions, both in aggregate and disaggregated using a third-party classification of university clusters.

The paper ends with a conclusion.



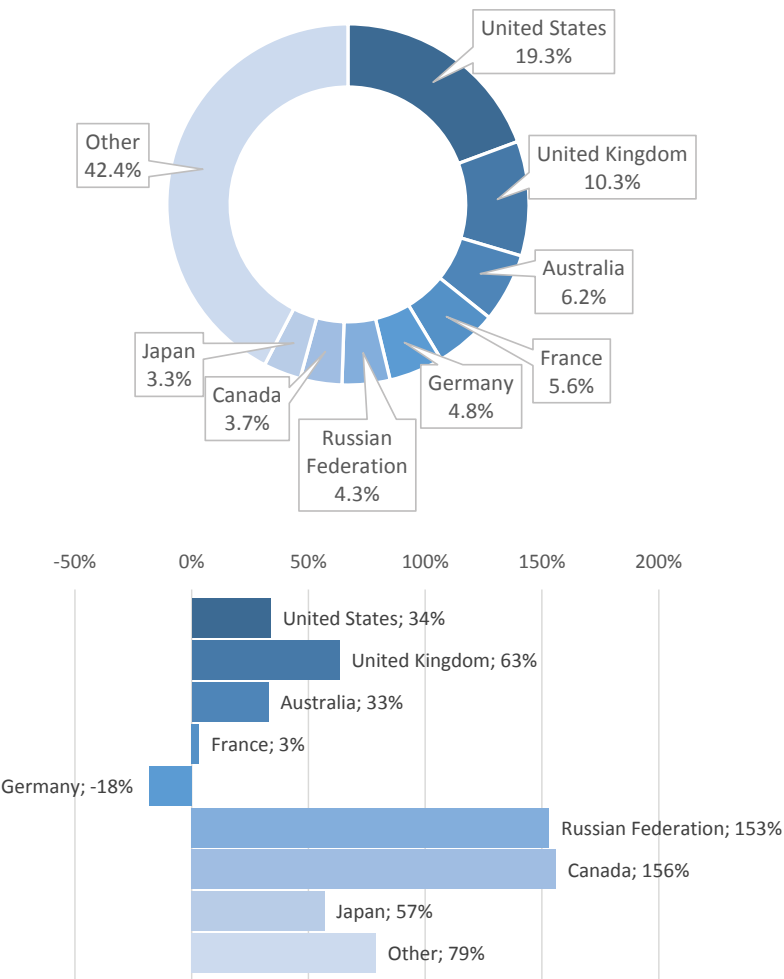
## Data and methodological approach

To undertake the analysis, a database containing information on **189 countries** over a decade-long period was constructed using data from a range of sources.

- **Student enrolments:** The number of first-year non-UK students entering UK higher education institutions by country of domicile is taken from bespoke data provided by the Higher Education Statistics Agency (HESA), and covers the period from 2000/01 to 2014/15. Students' countries of domicile were identified from their permanent address.<sup>4</sup>
- **Tuition fees and tuition fee income:** The number of overseas students entering UK higher education is likely to be influenced by the level of tuition fees in other countries. To control for this impact, key competitor countries are identified using data on inbound internationally-mobile students recorded by UNESCO.<sup>5</sup>

Figure 1 shows the distribution of total inbound internationally-mobile students by country of study in 2013, and the growth in student numbers since 2003.

Figure 1: Distribution of inbound internationally-mobile students by country of study in 2013 and growth since 2003



Note: 2012 figure used for Russian Federation.  
Source: London Economics' analysis of UNESCO data

- The United States was the destination country for approximately **one-fifth** of all internationally-mobile students in 2013, with the top eight countries accounting for approximately **58%** of all students. For the purposes of this study, the total number of students and the growth in the number of students were used to identify 'competitor' countries to the UK. Based on this approach, we selected the **United States, Australia, France, Germany** and **Canada** as our main competitor countries. Tuition fee data for these five countries was taken from various OECD *Education at a Glance* reports.<sup>6</sup> In addition, we included a number of variables to account for the possibility that some regions or countries may have historical ties with the destination countries.
- **Measures of average tuition fees in the United Kingdom:** We used HESA data to estimate average fee levels in the UK. By **domicile** (Home/EU or non-EU-international) and **level of study** (undergraduate or postgraduate), average UK tuition fees in each academic year were derived using information on the total income generated by UK institutions from the relevant category of tuition fee income and the number of corresponding students in a given year.<sup>7</sup>
- **Macroeconomic variables:** A number of macroeconomic variables are taken from the World Bank's Global Economic Monitor and Development Indicators database.

In particular:

- **exchange rates** (local currency units per pound sterling in the relevant academic year);

- **Gross Domestic Product (GDP)** per capita (in US dollars);
- **energy price index** (based on current prices – further broken down depending on whether the country is a significant oil producer)<sup>8</sup>;
- **non-energy price index** (based on current prices);
- **precious metals price index** (based on constant prices); and
- **total population.**

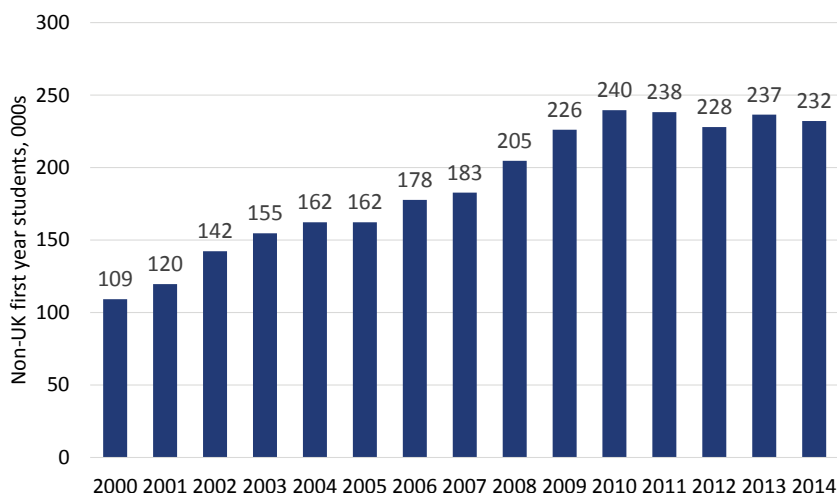
**Other variables of interest:** The amendments to the Tier 1 post-study work visa system in 2012 also influenced the number of non-UK students entering the UK higher education system (see Figure 2). The impact of this reform is captured using a dummy variable, which equals 1 in 2012 (and thereafter) and zero otherwise.<sup>9</sup>

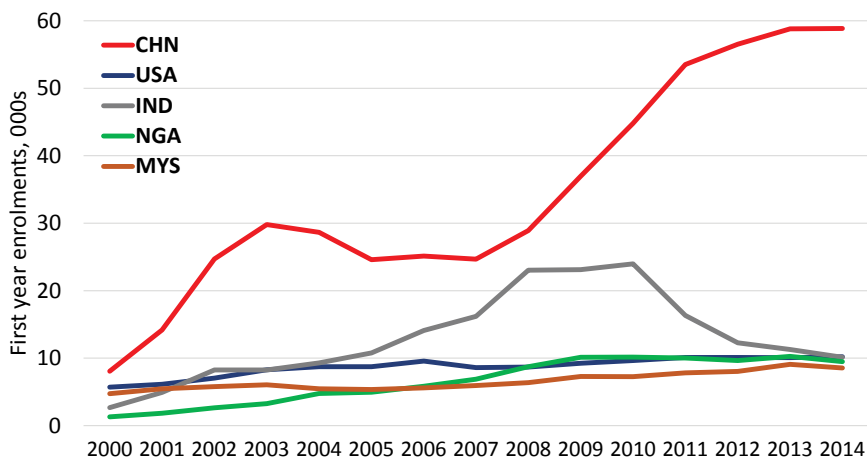
There are a number of factors that influence the attractiveness of different countries that are **not** captured in this model. The same applies to more recent political outcomes. For instance, while the decision of the United Kingdom to exit the European Union may have a deterrent effect on both higher education students and staff enrolling or working at UK higher education institutions, the recent United States presidential election might have a similar impact on the decision of internationally-mobile students not to study in the US (potentially to the benefit of the United Kingdom). Currently, there is no sensible means of capturing these effects, but readers should be aware of these influences.

## Descriptive statistics

Looking at the information contained in Figure 2, the analysis of HESA data demonstrates a significant increase in overseas student enrolments since 2000/01. From approximately **109,000** students at the start of the period, enrolment more than doubled to **240,000** in 2010/11, and remained relatively stable thereafter. In 2014/15, the number of enrolments by overseas students was estimated to be **232,000**, split roughly equally between undergraduates and postgraduates.

*Figure 2: UK higher education non-UK domiciled enrolments 2000/01 to 2014/15 and top-5 originating countries*





Source: London Economics' analysis of HESA data

The main growth in student numbers came from a six-fold increase in students from China (from under **10,000** in 2000/01 to approximately **59,000** in 2014/15). In contrast to this increasing reliance on China, although there was significant growth in the number of students originating from India between 2000/01 and 2008/09, this tailed off between 2008/09 and 2010/11 and declined thereafter. In 2014/15, there were approximately **10,000** students from India commencing their studies in the United Kingdom – a comparable number to the United States, Nigeria and Malaysia (the other three countries in the top five).

## Econometric analysis

In order to quantify the impact of the key determinants on the demand for UK higher education accurately, we use a **fixed-effects specification**, which essentially strips out the 'fixed' country-level effects that may play a role in determining the

international demand for higher education but are essentially constant across time. For instance, in different overseas countries, there may be different social values placed on higher education that play a role in choosing whether and where to study overseas. If there is a high economic and social value placed on higher education in particular countries (which has not changed over time), then a fixed-effects specification strips this underlying factor out of the analysis. This allows the model to consider those other additional factors that might influence demand (such as exchange rates).

In this setting, the econometric model explores the relationship between the number of **first-year non-UK domiciled student enrolments** (i.e. the dependent variable) and key macroeconomic determinants (i.e. explanatory variables). These explanatory variables include variables such as higher education tuition fee levels (in the UK and competitor countries), economic factors within a country (such as GDP per capita), and other variables (such as policy interventions), controlling for any time-invariant characteristics between countries.

Given the dataset, the additional **lagged** (or delayed) effects of some determinants are also explored.

Estimations for undergraduate and postgraduate students are performed separately. In this report, we concentrate on the results relating to undergraduate enrolment to a greater extent than postgraduate enrolment, given the better reliability of the undergraduate analysis.





## Results and findings

In relation to the average **undergraduate fee charged by UK higher education institutions** (denominated in sterling), the results from the econometric analysis suggest that domestic and international fees have both an immediate and delayed effect on enrolment (as might be expected).<sup>10</sup>

- The results indicate that a **10% increase in average UK fee levels** would result in a **3.3%** reduction in first-year undergraduate enrolment in the same period. In addition, the 10% increase in UK undergraduate fees would result in a **2.2%** reduction in undergraduate enrolment in the subsequent year (on top of the **3.3%** reduction in enrolment in the first year). The aggregate reduction in enrolment in the year following the increase in fees was estimated to be **5.5%**.<sup>11</sup>
- A **10% increase in the average undergraduate fee charged by US institutions** would result in a **6.6%** increase in undergraduate UK higher education enrolment in the same year. The impact of the change in US fees charged carries over to the next period, with the same 10% increase in US fees resulting in a further **4.4%** increase in UK enrolment in the subsequent period (resulting in an **11.0%** cumulative increase).<sup>12</sup>

The above findings have focussed on the fee levels in the United Kingdom and the United States – **denominated in sterling**. However, it is important to also consider the impact of changes in the **exchange rate**.

- **Direct effect: A 10% depreciation of sterling** (as recently occurred) would be expected to result in a **2.1%** increase in UK undergraduate enrolment in the same year. With a lagged effect of **2.0%** in addition to the immediate effect, the cumulative direct effect on enrolments associated with the 10% depreciation would be **4.1%**.
- **Indirect effect:** The impact of the exchange rate so far does not take into account the interdependency between different higher education systems. Given the fact that the econometric model uses US higher education fees denominated in sterling (and the depreciation of sterling increases the price of US higher education fees in sterling), it is also necessary to include the additional indirect impact resulting from the increase in the sterling value of US fee levels. Therefore, following the depreciation of sterling (as in the previous example), in addition to the **4.1%** direct effect, we would expect to see an increase in undergraduate enrolment in the UK of **11.0%** as a result of the indirect effect.

### *Energy prices*

- Among larger oil producers (i.e. in the top 20 global oil-producing nations), a 10% increase in the energy price index would result in a **3.8%** increase in UK higher education enrolment at undergraduate level. At the same time, among those countries that were not in the top 20 global oil-producing nations, the same 10% increase in the energy price index would result in a **1.1%** decline in demand for UK higher education at undergraduate level.

### *Gross Domestic Product (per capita)*

- In relation to other macroeconomic variables, following a 1% increase in GDP per capita internationally, the results indicate that we would expect to see a **0.5%** increase in UK undergraduate higher education enrolment.<sup>13</sup>

### *Policy interventions*

- Finally, we also consider the possible impact of the change to visa arrangements encapsulated by the April 2012 decision to remove the automatic right of international students to undertake two years of post-study work in the United Kingdom. To achieve this, we included a dummy variable in the model – simply identifying whether the post-study visa arrangements were in place in the relevant year. The analysis suggests that the introduction of the policy in 2012 – holding other factors constant – was associated with a **20.3%** decline in enrolment at undergraduate level.
- The analysis also suggests that the removal of post-study work visas was associated with a **7.2%** increase in enrolment at postgraduate level. Because of other factors at work on the postgraduate enrolment rate, this result suggests that the rate of increase could have been even higher in the absence of this policy intervention.



## What does it mean for UK higher education?

To understand the impact of a range of possible scenarios on individual UK institutions, we use HESA information on non-UK enrolments at both undergraduate and postgraduate level (full-time and part-time). Presented in Figure 3, the chart illustrates the very different reliance of different UK higher education institutions on non-UK domiciled students, but also the very different composition of students.

However, changes in the wider macroeconomic environment might have a different impact on UK higher education institutions depending on their particular characteristics (such as research focus, location or reputation). In other words, a heavy reliance on non-UK domiciled students may be sustainable for some institutions, but for other institutions the responsiveness of student enrolment to changes in macroeconomic factors may be more acute. **This suggests that institutional reliance on overseas students does not necessarily equate with the potential risk from or exposure to external shocks.**

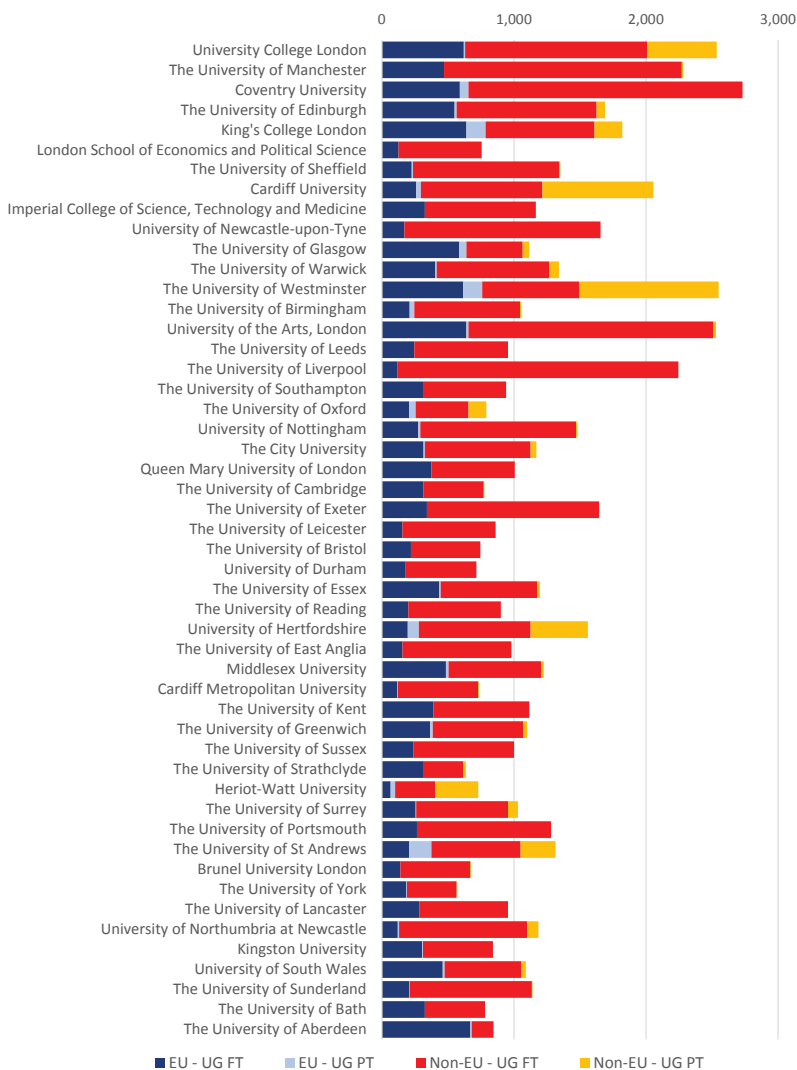
### *Characterising institutions*

Rather than splitting institutions by mission group membership, which is partly self-selected and also incomplete, we base our analysis on a classification of institutions developed by Boliver (2015).<sup>14</sup> This research suggests that as a result of the differences in research activity, teaching quality, economic resources, academic selectivity and socioeconomic student mix, it is possible to classify UK higher education institutions into four clusters. Among the pre-1992 universities, Oxford and Cambridge 'emerge as an elite tier', with the remaining

Russell Group universities essentially undifferentiated from the majority of other pre-1992 universities. However, Boliver's analysis indicates that there is a division among the post-1992 universities, with around a quarter of post-1992 universities forming a 'distinctive lower tier' (Cluster 4).

Using this analysis, we group UK higher education institutions into these four clusters.<sup>15</sup> **Cluster 1** consists of two institutions only (University of Oxford and University of Cambridge). **Cluster 2** consists of 39 mainly pre-1992 institutions (Russell Group and/or former 1994 Group institutions or unaffiliated institutions). **Cluster 3** consists of 67 institutions (covering members of the old 1994 Group, University Alliance, MillionPlus, Guild HE and unaffiliated institutions). **Cluster 4** consists of 17 institutions (covering members of University Alliance, MillionPlus, Guild HE and unaffiliated institutions).

**Figure 3: Non-UK undergraduate student enrolments, top 50 UK institutions**



Source: London Economics' analysis of HESA data

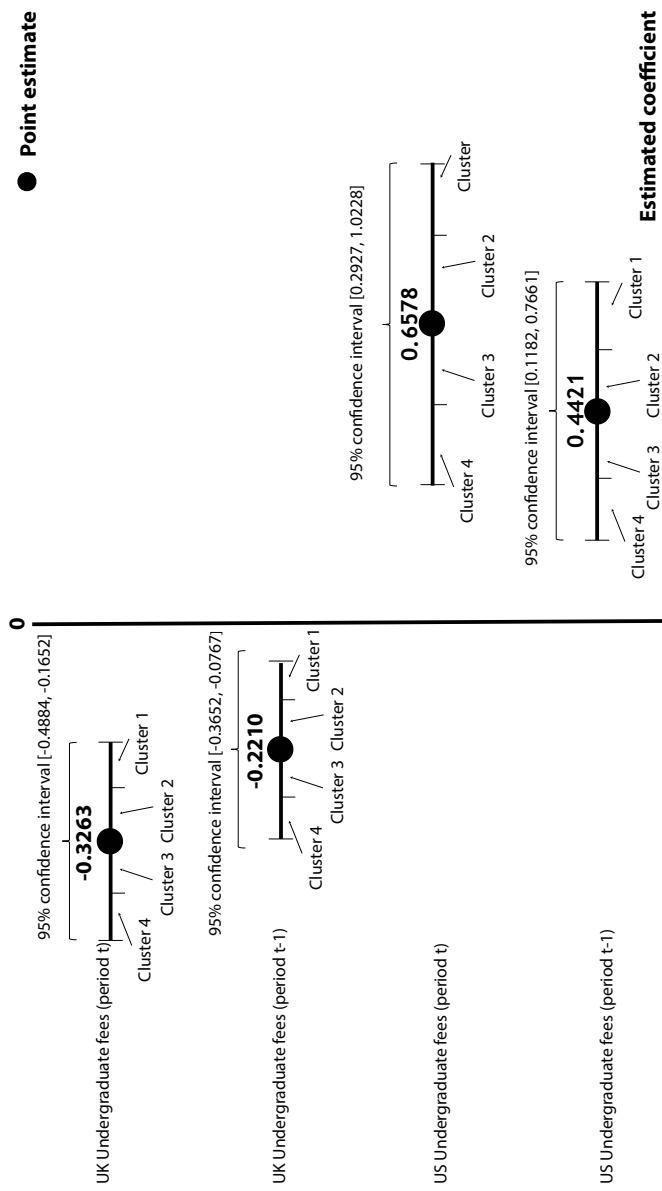
## *Turning the econometrics into financial outcomes*

To understand the effect of different macroeconomic factors, we use the estimates and confidence intervals from the econometric analysis. We split the confidence interval generated for a given variable into four equal segments and assign the clusters to the mid-point of each segment. In the example below, using the coefficient with respect to **UK fees**, we assume that institutions in Cluster 1 are **least affected** by price increases, and institutions from Cluster 4 **most affected** by increases in average fees. Clearly, this is a simplification and does not take into account the different geographical markets and competition that some institutions face. However, using average UK fees as an example, in response to a 10% increase in average fee levels, institutions in Cluster 1 would see a **2.1%** reduction in first-year enrolment at undergraduate level (and **2.9%**, **3.7%** and **4.5%** for Clusters 2, 3, and 4 respectively).

This approach is replicated for all variables of interest, where we assume that institutions in Cluster 1 are either the most positively or least negatively impacted by policy or macroeconomic changes, while institutions in Cluster 4 are either the most negatively or least positively impacted, depending on the change being considered.



Figure 4: Example of alternative measures of responsiveness by university cluster



Source: London Economics

We report our findings, in aggregate and at cluster level, relative to the 2014/15 baseline. We also assume that percentage changes in the average fee level adopted as part of the econometric analysis are applied by all institutions. This is relatively accurate at undergraduate level (given the current regulatory environment that results in full-time undergraduate fees being capped at £9,000 per annum), but less realistic at postgraduate level where fees are unregulated.<sup>16</sup>

### *What is the impact of an exchange rate depreciation?*

Holding all other factors constant, at undergraduate level, our modelling suggests that the **direct effect** of a **10% sterling depreciation** would result in a **2.1%** increase in UK higher education enrolment in the same year with a further **2.0%** effect in the subsequent year. In addition to the **4.1%** direct effect, we would expect to see an increase in undergraduate enrolment in the UK of **11.0%** as a result of the **indirect effect**. At postgraduate level, our modelling suggests that the **direct effect** of a 10% depreciation of sterling is associated with a **3.5%** cumulative increase in postgraduate enrolment in the year following the currency depreciation (on average).

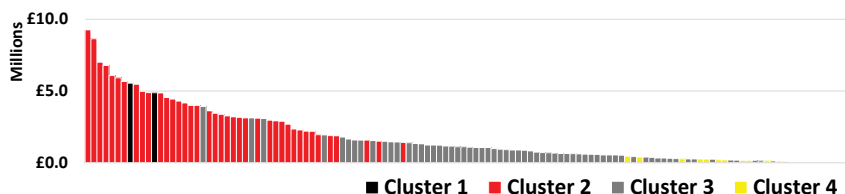
The analysis presented in Table 1 indicates that:

- In Cluster 1, the effect of the 10% depreciation would be to increase the number of EU and non-EU students enrolled – by approximately **125 (11%)** and **240 (11%)** respectively for each of the two institutions on average. If there were no limits on the number of students allowed to enter the United Kingdom, the total positive financial impact across the two institutions would be approximately **£10 million**.

- In Cluster 2, which consists of 39 institutions, the depreciation would increase the number of EU and non-EU students by **70 (11%)** and **225 (9%)** per institution on average respectively. Again, with no restrictions on students entering the UK, the total positive financial impact across the Cluster would be approximately **£150 million**, with each institution potentially benefitting by approximately **£4 million** on average.
- In Cluster 3, depreciation would result in an increase in student enrolments by **30 (9%)** and **75 (8%)** per institution on average (EU and international students, respectively). The total financial impact would be approximately **£60 million**, corresponding to a potential **£1 million** increase in fee income for each of the 67 institutions.
- Finally, for the 17 higher education institutions contained in Cluster 4, the effect of a sterling depreciation (per institution) would increase enrolment among EU and international students by approximately **10 (5%)** and **10 (4%)** respectively. Assuming that institutions could benefit from the increased demand, the potential financial gain available corresponds to approximately **£3 million** in aggregate across the Cluster.

Across all institutions, the depreciation of sterling would result in an increase in demand for higher education by approximately **20,000 (9%)** students. Of this number, approximately **14,500** are estimated to be non-EU international students, with the remaining **5,500** coming from the European Union.

*Figure 5: Impact of a sterling depreciation on UK higher education institutions' finances*



Source: London Economics' analysis

At an institutional level, although there is significant variation, the representative institution would see fee income generated from overseas increase by approximately **£2 million** in the first year of new student enrolment, with additional fee income being generated by these students as they continue their studies.

In aggregate, the total increase in fee revenue generated by UK higher education institutions associated with the possible increase in student numbers is estimated to be **£227 million** in students' first year of study.

It is important to note that the estimates presented above do not take into account any revision to the student visa regime currently in operation. Clearly, the analysis of enhanced revenues assumes that an additional **20,000** EU and international students would be allowed to come to the United Kingdom to pursue their studies. However, given the level of uncertainty in relation to the inclusion or exclusion of students from migration targets, it is unclear that these financial gains would be realised. If it is decided that institutions cannot benefit

**Table 1** *Impact of a sterling depreciation on UK higher education enrolment*

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Total
Number of HEIs	2	39	67	17	125
Average impact on student numbers (per institution) and total students affected (total column)					
European Union	123 (11%)	72 (11%)	30 (9%)	11 (5%)	5,282 (10%)
Non-EU	241 (11%)	224 (9%)	75 (8%)	12 (4%)	14,455 (9%)
Average change in fee income (per institution (£ millions))					
European Union	£0.8m	£0.4m	£0.2m	£0.1m	£0.3m
Non-EU	£4.5m	£3.5m	£0.7m	£0.1m	£1.5m
Total change in fee income (per cluster (£ millions))					
European Union	£1.5m	£17.1m	£12m	£1.1m	£31.7m
Non-EU	£8.9m	£135m	£49.1m	£1.8m	£194.8m
<b>Total</b>	<b>£10.4m</b>	<b>£152.1m</b>	<b>£61.1m</b>	<b>£2.8m</b>	<b>£226.4m</b>

Note: Impact on student numbers per institution multiplied by the average change in fee income per institution may not equal the total change in fee income due to rounding. Note that the full results generated from the econometric analysis are presented in this table, while the information presented in the text is rounded for simplicity. Source: *London Economics' analysis*

from the increased demand for higher education because of an international student number cap or tougher rules placed on some institutions, the potential economic loss to the UK economy could be significant, arising from lost fee income and lost non-tuition fee expenditure.

In the case of an across-the-board student number cap, meaning that no more students could arrive in the UK, the loss in potential tuition fee income associated with first-year enrolment would be **£227 million**, while a partial cap on Cluster 3 and Cluster 4 institutions only would result in a **£64 million** potential loss of tuition fee income.

*What is the impact of changing EU student support arrangements?*

To illustrate the model's results further, we consider the impact of a hypothetical change in student support for EU students. In particular, we consider the example where European Union students, who currently receive subsidised income-contingent loans for their tuition fees, have this loan subsidy removed.<sup>17</sup> To implement this, we use information from the Department for Education on the proportion of the tuition fee that is written off by the Exchequer (the Resource Accounting and Budgeting charge). The most recent estimate of this proportion stands at **23%**.<sup>18</sup> By removing this income-contingent loan subsidy, the effective cost (albeit deferred) of tuition fees increases by **23%** for European Union-domiciled undergraduate students (only).

This situation can be presented in our model as an increase in the price of UK fees charged to EU-domiciled undergraduate students. However, the removal of the loan itself will likely further depress demand (over and above the direct price

*Table 2 Impact of a change in higher education student support arrangements*

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Total
Number of HEIs	2	39	67	17	<b>125</b>
Average impact on student numbers (per institution) and total students affected (total column)					
European Union	(21) (-2%)	(32) (-5%)	(31) (-9%)	(27) (-13%)	<b>(3,847)</b> <b>(-7%)</b>
Average change in fee income (per institution (£ millions))					
European Union	(£0.1 m)	(£0.2 m)	(£0.2 m)	(£0.2 m)	<b>(£0.2 m)</b>
Total change in fee income (per cluster (£ millions))					
European Union	<b>(£0.3 m)</b>	<b>(£8.2 m)</b>	<b>(£12.9 m)</b>	<b>(£2.7 m)</b>	<b>(£24.0 m)</b>

Note: Impact on student numbers per institution multiplied by the average change in fee income per institution may not equal the total change in fee income due to rounding. Note that the full results generated from the econometric analysis are presented in this table, while the information presented in the text is rounded for simplicity.  
Source: *London Economics' analysis*

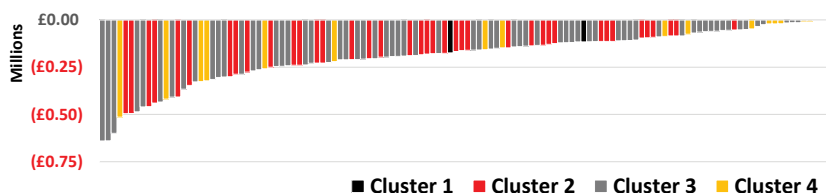
effect), as the approach we have considered assumes that EU students have an alternative source of credit available to finance their studies. Given this is highly unlikely in many cases, the estimates presented here should be considered as a **minimum effect** of the removal of student support.

The analysis presented in Table 2 indicates that:

- In Cluster 1, the effect of the removal of the loan subsidy for EU-domiciled undergraduates would be to reduce the number of EU-domiciled students by **20 (2%)** in each institution on average. The total impact in financial terms across the two institutions in this Cluster stands at approximately **£300,000** in the first year of study.
- In Cluster 2, the removal of the loan subsidy would reduce the number of EU students by approximately **30 (5%)** per institution on average. The total impact in financial terms across the Cluster is estimated to be approximately **£8 million**, with each institution seeing a reduction in tuition fee income of approximately **£200,000**.
- In Cluster 3, the total financial impact of the removal of EU undergraduate student support would be approximately **£13 million**, corresponding to **£200,000** per institution. In terms of student numbers, this equates to a reduction in student enrolments by **30 (9%)** per institution.
- For the institutions contained in Cluster 4, the impact would result in a reduction in enrolment among EU students by **30 (13%)**, which corresponds to an institutional-level impact of approximately **£200,000** (and **£3 million** in aggregate).



*Figure 6: Impact of removal of EU undergraduate student support on UK higher education institutions' finances*



*Source: London Economics' analysis*

In aggregate, the removal of student support for EU undergraduates would result in a reduction in first-year enrolment at UK higher education institutions by approximately **4,000** students (**2%** of total non-UK students).

From the perspective of institutions, the representative institution would see fee income generated from EU undergraduate students decrease by approximately **£200,000** in students' first year, with additional tuition fee income being lost as they continue their studies. The total fee revenue generated by UK higher education institutions (associated with students' first year of study) would be expected to decline by **£24 million**.

*What is the impact of EU and international student tuition fee harmonisation?*

In the final scenario, we consider the impact on institutions if the current requirement to charge European Union-domiciled students the same fees as Home-domiciled students is removed (on top of the removal of student support). To model this, EU-

domiciled fees are increased to those being charged to non-EU international students.

The analysis indicates that for Cluster 1, there would be a reduction in student numbers as a result of the increase in fees and removal of student support for EU-domiciled students. However, the reduction in student numbers is **outweighed** by the increase in tuition fees per student for the remaining student body. This results in a **(net) increase in average and total tuition fee revenue in Cluster 1**. This is based on the fact that demand for the Oxbridge institutions in Cluster 1 is assumed to be relatively unresponsive to changes in the tuition fee charged, resulting in a relatively small reduction in student numbers (by **37%**, as compared to **42%-68%** across the other clusters).

Across Cluster 1, the removal of the loan subsidy combined with the harmonisation of fees between EU-domiciled and international students would be expected to reduce the number of EU students by **400 (37%)** per institution. However, tuition fee revenue associated with students in their first year of intended study would be expected to increase by approximately **£12 million** for the two institutions.

In Cluster 2, the removal of the loan subsidy combined with the harmonisation of fees between EU-domiciled and international students would reduce the number of EU students by **470 (68%)** per institution on average. Unlike Cluster 1, the total impact in financial terms across the Cluster is negative, and estimated to be approximately **£23 million**, with the representative institution in this Cluster seeing a reduction in

**Table 3 Impact of a change in higher education student support arrangements and fee convergence**

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Total
Number of HEIs	2	39	67	17	<b>125</b>
Average impact on student numbers (per institution) and total students affected (total column)					
European Union	(402) (-37%)	(467) (-68%)	(162) (-48%)	(83) (-42%)	<b>(31,290) (-57%)</b>
Average change in fee income (per institution (£ millions))					
European Union	£5.8m	(£0.6m)	(£0.3m)	(£0.3m)	<b>(£0.3m)</b>
Total change in fee income (per cluster (£ millions))					
European Union	<b>£11.6m</b>	<b>(£23.1m)</b>	<b>(£23.2m)</b>	<b>(£4.8m)</b>	<b>(£39.5m)</b>

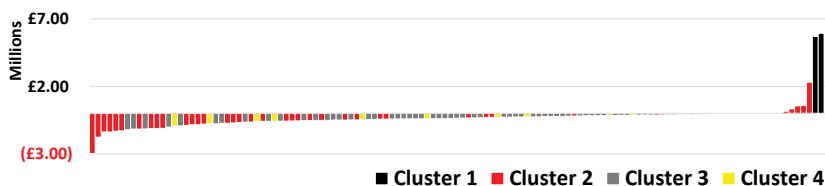
Note: Impact on student numbers per institution multiplied by the average change in fee income per institution may not equal the total change in fee income due to rounding. Note that the full results generated from the econometric analysis are presented in this table, while the information presented in the text is rounded for simplicity. Source: *London Economics' analysis*

fee income of approximately **£1 million** (with one institution facing a reduction in revenues of almost **£3 million**).

However, there are five institutions identified in Cluster that would experience an increase in aggregate fee revenues (by between **£200,000** and **£2 million** per institution). This results from the fact that the increase in tuition fees that the remaining EU students would pay exceeds the reduction in EU student enrolment that would be expected to occur as a result of that fee increase.

The aggregate reduction in fee income across the Cluster results from the fact that the jump in fees between EU and international students in this Cluster is in general less extreme than in Cluster 1, and as such, the increase in revenue per student does not make up for the reduction in student numbers (except for those five specific higher education institutions).

*Figure 7: Impact of a change in higher education student support arrangements and fee harmonisation on UK higher education institutions' finances*



Source: London Economics' analysis

In Cluster 3, the removal of the loan subsidy combined with the harmonisation of fees between EU-domiciled and international students would reduce the number of EU students by **160 (48%)**

for each of the 67 institutions on average. The total negative impact in financial terms across the Cluster was estimated to be approximately **£23 million**, with the representative institution seeing a reduction in tuition fee income of **£300,000**. Four institutions with a heavy dependence on EU students are identified to have an income reduction of more than **£1 million** each following the implementation of the fee harmonisation scenario.

Finally, in relation to Cluster 4, the removal of the loan subsidy and the harmonisation of fees between EU-domiciled and international students would reduce the number of EU students by **80 (42%)** per institution on average. In financial terms, the fee harmonisation policy was estimated to have an aggregate negative impact of **£5 million** (corresponding to **£300,000** per institution). As before, there is some significant variation depending on each institution's dependency on EU students, with one institution seeing an income reduction of almost **£1 million**.

In aggregate, the harmonisation of fees between EU-domiciled and international students and the removal of loan subsidies for EU students is estimated to reduce student numbers by approximately **31,000 (14%** of total non-UK students) across all institutions. This corresponds to **57%** of EU enrolments. Total tuition fee income decreases by **£40 million**. However, this figure masks the significant difference in the impact on financial resources experienced at the institutional level. Fewer than 10 institutions would be expected to be financially better-off, but more than a 100 worse off.

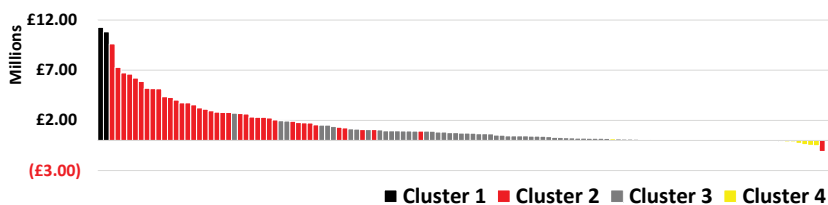
## What is the combined impact of all three scenarios?

Table 4 shows the impact on student numbers and institution tuition fee income if all three scenarios occurred simultaneously.

For Cluster 1, each institution's EU-domiciled tuition fee revenue was estimated to **increase** by approximately **£7 million**, while an additional **£4 million** per institution would be generated from international students. The two Oxbridge institutions in this Cluster would be approximately **£22 million** better off as a result of the three scenarios occurring simultaneously.

In Cluster 2, there would be a **reduction** in EU student income of approximately **£6 million** across all institutions (corresponding to **400** EU students on average per institution), although this would be more than offset by a **£135 million** potential increase in tuition fee income from international sources. In aggregate, institutions in Cluster 2 would be **£129 million** better off, however, this masks some significant variation across the Cluster.

*Figure 8: Aggregate impact of three scenarios on UK higher education institutions' finances*



Source: London Economics' analysis

For institutions in Cluster 3, the impact of the three scenarios results in a reduction in fee income from EU sources of

*Table 4 Impact of all proposed changes on institutional fee income*

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Total
Number of HEIs	2	39	67	17	<b>125</b>
Average impact on student numbers (per institution) and total students affected (total column)					
European Union	(280) (-26%)	(394) (-57%)	(132) (-39%)	(73) (-36%)	<b>(26,008)</b> <b>(-47%)</b>
Non-EU	241 (11%)	224 (9%)	75 (8%)	12 (4%)	<b>14,455 (9%)</b>
Average change in fee income (per institution (£ millions))					
European Union	£6.6m	(£0.2m)	(£0.2m)	(£0.2m)	<b>(£0.1m)</b>
Non-EU	£4.5m	£3.5m	£0.7m	£0.1m	<b>£1.5m</b>
Total change in fee income (per cluster (£ millions))					
European Union	£13.2m	(£6.1m)	(£11.2m)	(£3.7m)	<b>(£7.9m)</b>
Non-EU	£8.9m	£135m	£49.1m	£1.8m	<b>£194.8m</b>
<b>Total</b>	<b>£22.1m</b>	<b>£128.9m</b>	<b>£37.9m</b>	<b>(£1.9m)</b>	<b>£186.9m</b>

Note: Impact on student numbers per institution multiplied by the average change in fee income per institution may not equal the total change in fee income due to rounding. Note that the full results generated from the econometric analysis are presented in this table, while the information presented in the text is rounded for simplicity.

Source: *London Economics' analysis*

approximately **£11 million**, combined with a potential increase in fee income from international sources by almost **£49 million**. In aggregate, institutions in Cluster 3 would benefit from an increase in fee income of **£38 million** (corresponding to an average of approximately **£500,000** per institution).

Only partially offsetting the **£4 million** reduction in fee income generated from EU students, institutions in Cluster 4 might be expected to see an increase in fee revenues of **£2 million** from international students. This corresponds to a reduction of approximately **£100,000** in tuition fee income per institution.

In aggregate, assuming there were no limits on the number of international students allowed to enter the UK to study, and that institutions were able to recruit and charge full international fees to an additional 20,000 EU and non-EU students to offset against the 31,000 lost as a result of post-Brexit fee and loan changes, then the implementation of the three hypothetical scenarios would result in a potential increase in total revenue to UK higher education institutions of approximately **£187 million** annually. This benefit could come at a cost of reduced diversity, because there would be somewhat fewer students from EU countries.



## Conclusion

There are a range of factors that determine the demand for UK higher education, including both domestic factors such as UK fee levels but also external factors such as the exchange rate, competitor countries' fee levels, energy prices, overseas economic growth and policy interventions within a country. Although some factors have a relatively immediate effect on the demand for UK higher education, a number of other factors (such as the value of the currency and UK fee levels) have both an immediate effect and a longer-term impact.

To illustrate the impact of some of these macroeconomic factors on demand for UK higher education, a range of scenarios were modelled.

- **A 10% depreciation of sterling**, holding all other factors constant, would result in a large and significant positive impact on the finances of UK higher education institutions (by about **£227 million** in relation to students' first-year of study).
- The **removal of student support** from undergraduate EU-domiciled students would have a negative effect on demand for higher education, as EU students would see the cost of higher education increase substantially.
- **Harmonising the fees** charged to EU and international students would have an ambiguous effect on institutions. Among the highest-calibre institutions, the harmonisation of fees would potentially result in an **increase** in aggregate revenues despite an expected reduction in student numbers. For the remaining institutions, fee harmonisation would have a **negative** effect on institutional finances.

The impact of the removal of student support for EU students and fee harmonisation would be expected to reduce institutional income by **£40 million**.

**In aggregate, the combined effect of the currency depreciation (+£227 million) and the removal of EU undergraduate fee support and fee harmonisation (-£40 million) was positive – amounting to £187 million – although there was significant variation across higher education institutions.**

In an economic sense, the analysis is based on the key assumption that all other factors in the model remain constant. However, while necessary due to the current political uncertainty regarding future immigration caps as well as measurement issues, this is a bold assumption that does not take account of a range of potential factors negatively affecting the international demand for education in the United Kingdom.

First, the analysis is based on historic information – and does not take into account the change in sentiment that might be felt toward the United Kingdom following the recent decision to leave the European Union (or any knock-on consequences from other major events, such as the 2016 US presidential election).

Second, the general attractiveness of the sector – especially for postgraduate students – might be adversely affected by the fact that UK higher education institutions are expected to find it increasingly challenging to retain high-calibre research staff and related research funding in a less benign environment.

Most importantly, the analysis presented here assumes that there are no immigration caps, nor any differential treatment

of higher education institutions in relation to the ability to secure student visas (and post-study work visas). As such, the positive impact of the 10% depreciation of sterling assumes that an additional **20,000** students will be allowed to study in the United Kingdom. However, given the current political environment, if it were decided that institutions could not benefit from this increased demand because of an international student number cap or as a result of tougher rules facing some institutions, then the **£227 million** potential gain that might be achieved by UK higher education institutions may not be realised or only realised in part – thus representing the potential loss associated with restricting international student and post-study visas.

*What could this mean for the UK economy?*

The **£227 million** per annum potential loss identified only captures the tuition fee income in students' first year of study. This increases to **£463 million** per annum if we consider the fee income accrued over the total duration of study.<sup>19</sup> If we further include the economic output associated with students' non-tuition fee expenditure over the course of their studies (**£604 million**), the total potential loss to the UK economy stands at **£1.067 billion** per annum.<sup>20</sup>

Universities have extensive supply chains. Known as the indirect and induced effects, UK higher education institutions (and their staff and students) support these supply chains through their purchases. If we also consider these indirect and induced effects on the wider UK economy associated with this source of export income, the estimate of potential loss increases to **£1.995 billion** per annum.<sup>21</sup>



## Endnotes

- 1 2010-11 prices (see London Economics (2011), *Estimating the Value to the UK of Educational Exports*, BIS Research Paper 46
- 2 HEPI, *Now that's what we call soft power: 55 world leaders educated in the UK*, October 2015
- 3 HEPI / Kaplan, *What do prospective students think about international students?*, March 2015
- 4 Students coming to the United Kingdom to undertake pre-higher education studies were excluded in the analysis. Furthermore, exchange students (including Erasmus students) are excluded from the HESA enrolment data received. This is based on the HESA standard registration population, which excludes dormant students (those who have suspended study but have not formally de-registered); incoming visiting and exchange students; postdoctoral student instances; instances where the whole of the programme of study is outside of the UK; instances where the student has spent, or will spend, more than eight weeks in the UK but the study programme is primarily outside the UK; National College for Teaching and Leadership (NCTL) Subject Knowledge Enhancement (SKE) student instances; students on sabbatical; and writing-up students.
- 5 UNESCO define an internationally-mobile student as an individual who has physically crossed an international border between two countries in order to participate in an education programme in a destination country, which is different from his or her country of origin. This excludes students who are in exchange programmes or undertake part of their studies at educational institutions abroad but are credited at their home institutions.
- 6 Given the different structure of the higher education markets in each of these countries, a weighted average fee (in US dollars) is calculated for each country in a given year, where the weights correspond to the percentage of full-time students by type of institution (public, government-dependent private and private). For years with missing

data, a linear interpolation is used resulting in consistent data covering the period from 2003 to 2013. Fees are assumed to be unchanged between 2013 and 2014. In many cases, the reported figures are based on domestic students only; however, in some cases, the fees are a reported average for both domestic and international students. For consistency, we make use of domestic fee levels, and because the analysis is focusing on the impact of relative changes in fee levels, we are implicitly making the assumption that the relativities between countries for domestic students is the same as that for international students. The reported fees are for 'tertiary-type A' students only (i.e. undergraduate students). Finally, these weighted average fees are converted into sterling for the purposes of the analysis in order to remove any impact of exchange rate movements.

For some student groups (non-UK-non-EU international students), a distinction between fee income by the level of study (i.e. undergraduate versus postgraduate) was not available. For these categories of fee income where no further breakdown was available, we calculated an 'average' fee across the entire category. This implies that the tuition fees charged at undergraduate and postgraduate level are the same. This clearly does not reflect reality, but we are limited on the options available given the absence of better data.

The analysis presented in this report uses HESA information to generate average UK-wide tuition fee levels across the sector. It was not possible to differentiate the very different fee and student support arrangements in existence by Devolved Administration. As such, UK-wide averages are used.

- 7 The number of all students is used rather than the number of new students only, as a breakdown of student data by cohort is unavailable. Hence, particular changes in the fee regime for new students in a given year follow through in subsequent years, as new students replace existing students. This has the result of somewhat smoothing the path of tuition fees over time.
- 8 We also consider the impact of energy prices, which may have a differential impact depending on whether the country in question is

essentially a producer or consumer of energy products. For energy producers, increases in energy prices are likely to increase wealth within that country and thereby may lead to an increase in demand for education (both in the UK and elsewhere), with the opposite being true of (predominant) consumers of energy products. To address this possibility, as the price of oil is one of the key components contained within the energy price index, we have refined the model by interacting the energy price index with whether the country in question is one of the 'leading' (top 20) oil producers.

- 9 It is noted that this is a catch-all approach, and as such might capture a range of events or other determinants of UK higher education enrolment that occurred in parallel to the change in student visa arrangements in 2012.
- 10 Please see the main report for the results relating to postgraduate students. However, it is important to note that in terms of predictive power, the econometric modelling was substantially more powerful explaining the determinants of first-year enrolment at undergraduate level compared to postgraduate level.
- 11 In other words, in the year following an increase in fees, the elasticity of demand for UK undergraduate qualifications from overseas with respect to price stands at -0.548.
- 12 In economic terms, the results suggest that higher education in the United States and United Kingdom at undergraduate level are substitutes, with the cross price elasticity of demand estimated at approximately 1.1. In other words, a 10% increase in the sterling-denominated US undergraduate fee level would be expected to increase UK higher education demand by 11% in the year following the price change.
- 13 Denominated in US dollars and adjusted for relative prices
- 14 Vikki Boliver (2015), 'Are there distinctive clusters of higher and lower status universities in the UK?', *Oxford Review of Education*, Vol, 41 No. 5, pp.608-627, DOI: 10.1080/03054985.2015.1082905

- 15 See Boliver (2015; op. cit.) for a complete list of institutions. Note that the analysis by Boliver includes a total of 127 institutions in its classification. The slightly smaller number of institutions included here (125) is based on the fact that the relevant HESA information on student numbers and tuition fee income was unavailable for the University Campus Suffolk and the University of Wales, Newport (both included in Cluster 4). Hence, instead of 19 institutions, the analysis for Cluster 4 is based on 17 institutions only.
- 16 Despite the fact that the econometric modelling at postgraduate level was less persuasive, it is clear from an economic perspective that a number of variables – such as a depreciation of sterling – will intuitively have a positive effect on enrolment. As such, we adopt the comparable approach outlined above for both undergraduate and postgraduate enrolment. Finally, we consider the impact on enrolment and institutional finances once the entire cumulative effect has occurred.
- 17 Note that subject to eligibility conditions, EU students also potentially receive interest rate subsidies on maintenance loans. However, in this analysis, we have only considered the proportion of the tuition fee loan that is expected to be subsidised by the UK Exchequer (as represented by the Resource Accounting and Budgeting (RAB) charge). The size of the Exchequer maintenance and fee loan subsidy is measured by the RAB charge, which calculates the proportion of the nominal loan value that would not be expected to be repaid (in present value terms). Under the current student support regime, non-repayment occurs as a result of debt forgiveness after 30 years or in the case of permanent disability or death. Based on graduate earnings profiles (from the Labour Force Surveys) and the administrative information relating to the criteria for repayment of loans, estimates of the RAB Charge stand at approximately 23% for full time students, which implies that for every £1,000 in loans that are provided by the government, approximately £770 would be expected to be repaid (in present value terms) with the remaining £230 being ‘lost’ to the public purse as a result of write-offs.
- 18 ‘The Resource Accounting and Budgeting (RAB) charge, which represents the value of the part of the loan that is not expected to be repaid, is not



calculated separately by the nationality of the students. We estimate that the RAB charge for full time tuition fee and maintenance loans is between 20% and 25%.' Jo Johnson MP, *Hansard*, 9 June 2016.

- 19 For full-time students, we assume an average study duration of three years for first degrees and higher degrees (research); and one year for taught postgraduate degrees and other undergraduate and postgraduate qualifications. For part-time students, we assume that these study durations are doubled, respectively. Using these assumptions, we thus calculated the tuition fee income over the total duration of study (discounted to reflect present values, using HM Treasury Green Book discount rates).
- 20 To analyse the level of non-tuition fee income, we used estimates from the 2011-12 *Student Income and Expenditure Survey*. The survey provides estimates of the average expenditure by English domiciled students on living costs, housing costs, participation costs (including tuition fees) and spending on children for both full-time and part-time students. From these estimates, we excluded any estimates of tuition fee expenditure to avoid double-counting. Since the survey does not cover non-UK domiciled students, our analysis implicitly assumes that non-tuition fee expenditure levels do not vary significantly between UK and overseas students. We do however adjust the estimates for the longer average stay durations in the UK of international students compared to EU students, based on the approach outlined in London Economics (2011), *Estimating the Value to the UK of Education Exports*, BIS Research Paper 46. Finally, we adjusted the resulting estimates for inflation.
- 21 The estimates of the indirect and induced effects associated with tuition fee income and non-tuition fee income are based on estimates provided by Ursula Kelly, Professor Iain McNicoll and James White (2014), *The impact of universities on the UK economy*, Universities UK.



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