OXFORD ECONOMICS

The Economic Costs and Benefits of International Students

January 2013

A report for the
University of Sheffield

OXFORD
ECONOMICS

Contents

1 Executive Summary

This report quantifies the economic costs and benefits of international students at Sheffield-based universities to the local economy at both the regional (Yorkshire & the Humber) and sub-regional (Sheffield) levels. Costs and benefits are assessed in the **short-term** (while the students are at university) and the **long-term** (post-graduation when they may join the local labour market).

For the short-term, results are initially quantified in terms of a direct revenue effect. The impact on GDP is then estimated, inclusive of direct, indirect and induced effects. Figures are presented based on data for the 2012/13 academic year. Due to the lack of longitudinal data, analysis of the long-term impacts is largely qualitative, drawing on statistical evidence where appropriate.

International students will make a net total contribution to Sheffield's GDP in 2012/13 of £120.3 million…

- Our modelling indicates that international students will make a net contribution to Sheffield's GDP of £120.3 million. At the wider regional level, this figure rises to £136.8 million.

…with the direct net benefit amounting to some £97.9 million…

- Of this total net figure, £97.9 million will be generated directly, reflecting the fact that the injection of local funds by international students (primarily via fee income and their subsistence spending) is considerably greater than their consumption of local public resources.

…with an additional £24.8 million raised via indirect and induced effects

- Further net benefits are generated via the indirect (supply-chain) and induced (spending of employees) impacts. Together these effects contribute £22.4 million to Sheffield's GDP net of costs, a figure that rises to £34.3 million at the regional level. Table 1.1 provides a full breakdown of the results for the various costs and benefits.

Table 1.1: Summary of costs and benefits

Economic costs and benefits of international students to regional and sub-regional economy (£mns)						
		Direct Spending	Direct GDP	Indirect GDP	Induced GDP	Total GDP
Sheffield	Benefits	187.2	120.0	6.4	21.1	147.5
	Costs	42.6	22.1	1.9	3.2	27.2
	Net Benefit	144.6	97.9	4.5	17.9	120.3
Yorkshire & the Humber	Benefits	207.7	131.5	16.1	29.0	176.6
	Costs	56.8	29.0	5.3	5.5	39.8
	Net Benefit	150.9	102.5	10.8	23.5	136.8

Source: Oxford Economics estimates, DfT, ONS, HMT, Universities of Sheffield

- Based on careers service data from the University of Sheffield, we estimate that around 8.9% of international students take up positions in the Yorkshire & the Humber region in any given year, with a further 10.7% employed in the rest of the UK. In absolute terns, this translates into 453 graduates per year entering the regional labour force.
- The impact of such employment flows is controversial. It is impossible to know whether the relevant students have "displaced" members of the resident workforce. However, almost half of international students at the University of Sheffield were studying for STEM degrees, where the UK has acknowledged skill gaps.
- Although, theoretically, the increase in labour supply should result in a reduction in average wages for the resident population, empirical evidence on this issue is very mixed.
- Meanwhile, from the perspective of the employer the impact is unambiguously positive. The boost to the labour supply should enable better job matching, thereby boosting productivity.

International students are typically young, have no dependents and are highly skilled…

- Data from Sheffield-based universities indicated that the vast majority of students have no dependents (94%), are under the age of 30 (88%) and are single (85%). In addition, given their purpose of visit it is fair to assume that the vast majority are also highly-skilled.

…implying that their long-run net fiscal impact is highly likely to be positive…

- Given these characteristics, it seems highly likely that their net fiscal impact is positive. This benefit will accrue to existing residents as the government will need to generate less tax revenue per capita (of existing residents) to fund current spending.

…while further long-term external benefits should result from international students studying in Sheffield

- Moreover, further long-term external benefits are likely to result from the presence of international students. These include: the boost to external demand as a consequence of increased familiarity with locally-produced goods; the potential for the UK's international relations to be boosted by international students attaining positions of influence abroad; and increased tourism revenues if international students return to visit the region.

2 Introduction

This chapter outlines the aims and objectives of this report and defines key terms. This should provide the reader with an indication of the scope of the report and the framework of analysis, with additional detail, on the methodology, data sources and assumptions used, provided in later chapters.

2.1 Aims and Objectives

The aim of this report is to provide a robust assessment of the costs and benefits of international students to the local economy at both the regional (Yorkshire and the Humber) and the sub-regional (Sheffield) levels.

For the purposes of this analysis, the various costs and benefits of international students are separated into "**short-term**" (while studying in Sheffield) and "**long-term**" (after graduating when they may potentially join the local labour market). Short-term figures are presented based on data for the academic year 2012/13. This is used as a reference point but it is likely that the net impact will broadly reoccur on an annual basis. Costs and benefits are measured in terms of both revenue and contribution to GDP. Due to data constraints the analysis of long-term costs and benefits is more qualitative although, where available, statistical evidence is used to support arguments.

2.2 Terminology

The report aims to provide a complete assessment of the impact of international students in Sheffield. Therefore, the activity of international students studying at the following institutions was captured: the University of Sheffield; Sheffield Hallam University and Sheffield College. Sheffield College is a college of higher and further education courses rather than a university. For ease of exposition, however, the group is described as "**Sheffield-based universities**". Here an international student is defined as one who has not been domiciled within the EU for the three years prior to the start of the course[1].

The impact on GDP (both costs and benefits) is quantified in terms of three separate effects: direct, indirect and induced. In this sense, the methodological approach is equivalent to economic impact analysis. However, whilst an impact study typically assesses the gross benefits of the unit of interest, this study values these gross benefits generated by international students net of the gross

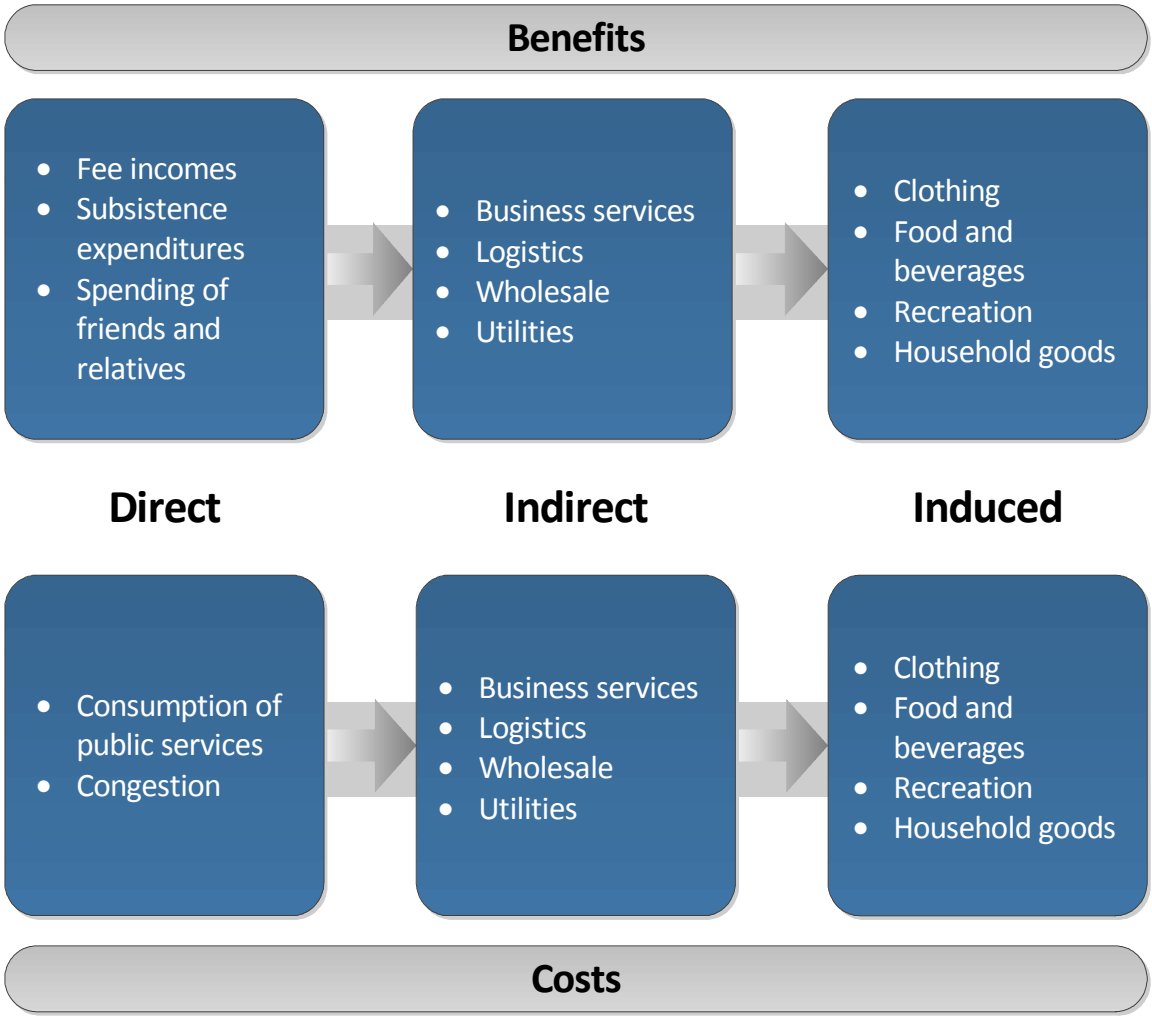
[1] Technically, a student can be qualified as "international" even if domiciled within the UK, if they have only recently moved from a non-EU country. Such individuals are accounted for in this report, although are treated differently when quantifying the impact of spending by friends and relatives. See section 3.2.3 for more details.

costs they incur. As such, the methodological approach is effectively a hybrid between economic impact analysis and a formal cost-benefit study[2].

More detail on each channel of impact is provided below, while Figure 2.1 provides a visual demonstration:

- **Direct**: refers to the economic activity resulting from the direct presence of international students at university.
- **Indirect**: consists of activity that is supported as a result of local supply-chain purchases, the additional local procurement resulting from these purchases and so on.
- **Induced**: involves activity that is supported by the spending of those employed as a result of the direct and indirect impacts.

Figure 2.1: Direct, Indirect and Induced Impacts

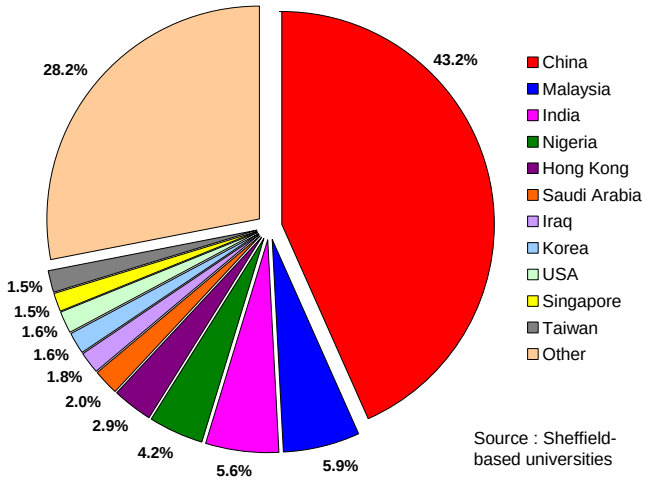


[2] Further discussion of this point can be found in Section 3.1.

2.3 Background information

During the 2012/13 academic year, a total of 8,222 international students studied at Sheffield-based universities. Of these, the vast majority (93%) were full-time. Data on the breakdown of students between undergraduate and postgraduates was not available from the University of Sheffield Hallam. However, based on data for the other institutions, we estimate that the majority are either undergraduates (43%) or post-graduates on taught courses (41%). Over 3,500 of the international students (or 43%) were of Chinese descent (Chart 2.1) with other common nationalities including Malaysia (489), India (458) and Nigeria (346). The international student population covered 127 countries in total.

Chart 2.1: Origins of International Students



The remainder of this report is structured as follows:

- Chapter 3 provides an overview of the methodology;
- Chapter 4 quantifies the net short-term economic impact of international students;
- Chapter 5 concludes; and
- Chapter 6 is a bibliography providing full references to sources cited during the course of the report.

3 Methodology

- This chapter aims to provide an overview of the analytical framework used in this study. The aim is to provide the reader with a brief introduction to the methodology in order to assist with their understanding of the results.
- The analytical approach adopted for this study represents somewhat of a hybrid of different economic techniques. Rather than a formal cost benefit analysis, impact analysis is used to quantify the size of both benefits and costs. The implication is that the "headline" result should be interpreted as representing the net contribution of international students to local economic activity.
- Essentially, the admission of an international student leads to an injection of spending into the local economy. In this report we identify three separate channels through which these injections support economic activity: fee income paid directly to the University; the subsistence spending of international students whilst studying; and finally the expenditure of friends and relatives that come to visit international students.
- Our assessment of the economic short-term costs of international students was informed by a review of the literature on the costs and benefits of immigration. Based on this we identified three major costs: consumption of publicly funded resources; the impact on productivity of increased road congestion; and the impact on social capital. Due to the impracticality of quantifying the latter effect, only the first two were formally modeled.

This chapter aims to provide an overview of the analytical framework used in this study. The aim is to provide the reader with a brief introduction to the methodology in order to assist with their understanding of the results.

3.1 Analytical framework

The analytical approach adopted for this study represents somewhat of a hybrid of different economic techniques. Although, the objective is to assess the net benefit of international students to the local economy, it does not follow a conventional cost-benefit approach. Doing so would imply quantifying the benefits against an explicit counterfactual e.g. versus a home student studying at the University. Rather the costs and benefits of international students are quantified using techniques associated with economic impact analysis. On the benefit side we quantify the effect of an injection to the economy (the spending of international students) including associated indirect and induced impacts.

Meanwhile, costs are quantified based on an estimate of publically funded resources consumed by an international student. It is assumed that these would otherwise have been invested in Sheffield[3]. The implication is that the "headline" result should be interpreted as representing the net contribution of international students to local economic activity.

3.2 Quantifying short-term benefits

The short-term economic benefits that an international student brings to Sheffield are analogous to those generated by an international tourist. Essentially, the admission of an international student leads to an injection of spending into the local economy. In this report we identify three separate channels through which these injections support economic activity: fee income paid directly to the University; the subsistence spending of international students whilst studying; and finally the expenditure of friends and relatives that come to visit international students. Below, we discuss our approach to modelling each effect.

3.2.1 Fee income

Data on fee income was supplied by the relevant universities. The cost of any bursaries/scholarships awarded to international students studying during the 2012/13 academic year was then deducted from this total to ensure that we captured the appropriate injection into the local economy.

In total, international students during the 2012/13 academic year will contribute £104.5 million in fee income (net of bursaries and scholarships) to Sheffield-based universities. Reflecting its much higher intakes, the majority of this will be generated for the University of Sheffield (£75.8 million) with Sheffield Hallam University contributing the vast majority of the remainder (£28.5 million) (Table 3.1).

Table 3.1: Fee income paid by international students in Sheffield during 2012/13 academic year

Fee Income raised by international students in Sheffield (£mns)			
University of Sheffield	Sheffield College	Sheffield Hallam University	Total
75.8	0.2	28.5	104.5

Source: University of Sheffield, Sheffield College, Sheffield Hallam University, ELTC

[3] Clearly, the counterfactual of how these funds would actually have been spent is unanswerable. A wide variety of possibilities include funding deficit reduction, funding a centralised tax cut, spending the money elsewhere in the UK (or even abroad). Of the potential options, assuming that the money will be fully invested in Sheffield results in the maximum cost.

3.2.2 Subsistence spending

Subsistence spending refers to all spending by international students on goods and services other than on their tuition fees. It includes, for instance, expenditure on food, rent, travel and entertainment, as well as expenditure on books and other course materials. For estimating subsistence expenditure, we have made use of the *Student Income and Expenditure Survey* (SIES). The *SIES* provides a wealth of information on the spending habits of both full- and part-time students, indentifying the key areas in which these students make purchases. The latest available *SIES* is for the 2007/08 academic year[4], therefore, the *SIES* figures were adjusted to obtain expenditure estimates for the 2012/13 academic year using UK Consumer Price Index (CPI) data and forecasts from the Oxford Economics global macroeconomic model. In total, we estimate that a full-time student will spend £11,688 per year on subsistence, a figure that rises to £18,586 for part-time students[5].

This spending breakdown was then scaled up by the additional number of full-time and part-time international students that were admitted to Sheffield-based universities during the 2012/13 academic year and aggregated into broader spending categories[6]. The proportion of spending that was allocated to separate items for both part-time and full-time students is summarised in Table 3.1. In total, we estimate that international students at Sheffield-based universities will spend around £99.4 million on subsistence in 2012/13 academic year. No data is available on the extent to which such spending is allocated regionally. However, as most students tend not to travel significantly it seems likely that most of the spending occurs regionally. We assumed that for full-time students 80% of subsistence spending took place in Sheffield and 100% within the wider YH region. For part-time students, we assumed that 50% of subsistence spending took place in Sheffield and 75% within the wider YH region.

[4] An updated report was due to be published in September 2012, but has been delayed until January 2013 and therefore, given the targeted launch date, was not used for this analysis.

[5] The higher level of spending by part-time students is linked to a number of factors but is primarily linked to the fact that they are more likely to be occupied in employment, with the associated higher purchasing power reflected in higher spending.

[6] The existing spending breakdown was too granular to insert directly into the local IO tables that we had developed, hence the need for aggregation.

Table 3.2: Allocation of Student Subsistence Expenditure

Student Subsistence Spending		
Sector	Full-time	Part-time
Retail distribution	45.5%	44.6%
Other land transport	15.6%	21.5%
Health & veterinary services	1.1%	1.0%
Letting of dwellings	24.4%	20.4%
Hotels, catering & pubs etc	5.8%	2.8%
Recreational services	3.2%	2.4%
Other service activities	1.6%	5.0%
Telecommunications	2.7%	2.4%

Source: SIES, Oxford Economics calculations

3.2.3 Visits from friends and relatives

The final element of the calculation of the benefits of international students is expenditure from visits by foreign friends and relatives. As indicated, some of the students classified as "international" are listed as domiciled in the UK (but have been so, for less than three years – the minimum residency criterion). For these students, we assumed that revenues from visits from overseas friends and relatives were zero.

The source used for this data is the International Passenger Survey (IPS). This provides detailed expenditure by various types of visitor to the UK as a whole, to the Yorkshire & the Humber region and also to the city of Sheffield, broken down by purpose of visit. The data is also partially broken down by the country of origin of the visitors. However, there are two areas in which the data is still insufficiently detailed:

- The IPS data merely specifies that visitors are visiting friends and relatives. It does not specify who their friends and relatives are, or whether or not they are students. We have assumed here that visitors are all visiting foreign nationals from their own country and that the percentage of these visits that are to students are proportionate to the percentage of the population of that nationality that is made up of students. For example, by assuming that the population share of Malaysian-nationals living in Yorkshire & the Humber identified by the 2001 Census[7]

[7] Unfortunately, the results from the 2011 Census were not available at a sufficiently disaggregated level for the purposes of this section of analysis.

remains constant, the most recent population figures suggests that 2,854 persons of Malaysian citizenship live in Yorkshire & the Humber in 2012/3[8]. Meanwhile, based on data from the university it was established that of the 8,222 international students, 5.9% (489) are Malaysian. Consequently we have assumed that 17.1% of the projected Malaysian visitors to Yorkshire & the Humber in 2012/13 travelling in order to visit friends or relatives were visiting international students at Sheffield-based universities.

- Secondly, the IPS data does not specify where within Sheffield/Yorkshire & the Humber visitor spending takes place. Therefore, we have assumed that those visiting students at the University of Sheffield conduct all their spending in Sheffield, and by default in Yorkshire & the Humber.

3.3 Quantifying short-term costs

Our assessment of the economic short-term costs of international students was informed by a review of the literature on the costs and benefits of immigration[9]. Based on this we identified the following short-term costs:

- Consumption of public services: the most typically cited cost of immigration is the additional consumption of public services (health, education, police, fire, transport, waste removal etc).
- Increased congestion: increased congestion can impose costs on other residents. One example would be increased traffic congestion which, by increasing journey times, can impact upon local business productivity and hence GDP. Immigration has also had the effect of increasing house and rental prices (as the supply of housing tends to be fairly fixed in the short-term) but for this report, we will assume that this simply generates a transfer of resources between owners and tenants with no net impact on GDP.
- Reduced social capital: some authors have argued that immigration can reduce the level of "social capital" in an economy by reducing social cohesion.

Our view was that only the first two impacts could be robustly addressed quantitatively. Therefore, we have excluded any effects on social capital from

[8] The census data was grown forward using Oxford Economics data and forecasts of regional UK populations.

[9] In the case of the UK, some recent high-profile examples include Sriskandarajah, Cooley and Reed (2005), Dustmann, Frattini and Hall (2010) and House of Lords (2008).

the short-term analysis. Below, we provide additional detail on our methodology for the other two costs.

3.3.1 Consumption of public services

We started from the assumption that an international student in Sheffield would consume, on average, the same value of public service expenditure as the average individual in the region. Data on average public spending per capita by function for the Yorkshire and the Humber region is available for fiscal year 2010-11 from the Treasury's Public Expenditure Statistical Analysis (PESA)[10]. This indicates that on average public expenditure per capita in the region was £8,512[11].

In terms of government expenditure, the major item that this neglects is debt interest payments. It could be argued that as part of these payments reflect past investments in infrastructure (from which international students enjoy benefits whilst residing in the UK), this assumption understates the actual cost of international students. However, given the difficulty in accurately assigning this cost to international students we exclude it from the calculation. Moreover, it is important to note that in other ways our method is likely to overstate the average consumption of public services by international students. Perhaps most significantly, the analysis implicitly assumes that international students are present in the UK (and hence consume public resources) throughout the year. In reality, most international students, particularly undergraduates, are likely to spend a significant proportion of time outside of the country (returning home during vacations etc). Overall, we think that the simplifying assumptions used are more likely to overstate rather than understate the consumption of public resources by international students.

Four adjustments were made to this figure in order to generate a more robust estimate of the average consumption of public services by an international student at a Sheffield-based university during the 2012-13 academic year.

First, and most straightforwardly, the figures were inflated to account for changes in public spending since 2010-11. This was based on plans documented in the 2010 Comprehensive Spending Review for departmental expenditure limits[12].

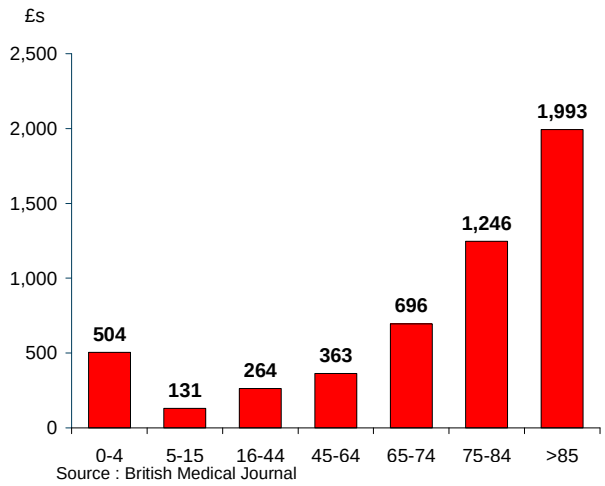
[10] http://www.hm-treasury.gov.uk/pespub_pesa12.htm

[11] It is worth noting that by analysing the consumption of public sector resources in terms of average rather than marginal cost, the estimates probably overstates international students' share of expenditure. This is because in the case of pure public goods (which are non-rivalrous in consumption) the marginal cost of provision is zero. See Dustmann and Fratini (2010), p.97, for more details.

[12] Unfortunately, the government does not produce projections on expenditure by function (all figures are backward-looking). Therefore, it was not possible to grow forward with a fully consistent comparator. However, we are confident that projecting with departmental spending plans should not create a significant distortion.

The second adjustment was made to expenditure on health services to reflect the fact that the average consumption of health resources varies significantly according to age. Data from Feachem, Sekhri and White (2000) demonstrates this effect (Chart 3.1). Therefore, an adjustment factor was applied to the average per capita health expenditure figure based on the demographic breakdown of the population of Sheffield and the demographic pattern of health expenditure implied by the Feachem, Sekhri and White article. Based on available data from the Universities, we estimate that over 99% of international students during the 2012/13 academic year were between the ages of 16-44. Given this, we assumed that all students fitted into this age cohort. Applying data on the age breakdown of the population of Sheffield to the figures from the article indicates an average cost per capita of around £410[13]. Therefore we scaled down average health expenditure by a factor of 0.64 (264 divided by 410). Further details on this can be found in the Appendix.

Chart 3.1: Average NHS costs per capita by age band, 2000[14]



A third adjustment was made to reflect the fact that international students are not entitled to the majority of UK benefits under the "no recourse to public funds" clause[15]. Although such "public funds" do not cover the full spectrum of UK welfare payments, it is highly unlikely that international students would qualify for these other benefits as they are typically based on other eligibility criteria which

[13] Although the BMJ figures are out-of-date, as they are being used to generate an adjustment factor what matters is whether the relative cost per capita of different age cohorts has materially altered during the intervening years rather than whether the actual monetary value of the costs has changed. We think it unlikely that the former has changed significantly.

[14] Although the data is somewhat out of date, we do not expect the relationship between different demographic trends to have significantly altered.

[15] Here, public funds refer to: attendance allowance; carers allowance; child benefit; council tax benefit; disability living allowance; housing benefit; income support; income-based jobseeker's allowance; severe disablement allowance; social funds payment; child tax credit; the working tax credit; and the state pension credit. International students are unable to claim any of these benefits, although in cases where the student has temporarily run out of money they may have recourse to housing benefit.

international students are unlikely to have met (e.g. eligibility for contributory employment and support allowance is based on national insurance contributions while access to maternity benefits and industrial injury benefits are dependent on the individual having worked in the UK previously). As such, we assume that international students do not consume any benefits.

The final adjustment was made to reflect the fact that as students they will be directly consuming higher education resources. Data available from PESA only disaggregate regional spending per capita as far as education. Therefore, we first estimated total expenditure on higher education in Yorkshire and the Humber (by applying the forecast share of higher education expenditure at the national level for 2012/13 to the regional educational total). We then divided this figure by the number of higher education students in the Yorkshire and the Humber region. It is worth noting that this figure likely overstates an international students' actual consumption of resources, since a proportion of spending will be allocated to research funding from which international students on taught courses derive little direct benefit.

Table 3.2 documents how these various changes affect our estimate of average consumption of public services per capita. The first column shows the unaltered breakdown of expenditure for fiscal year 2010-11 according to PESA. The second column then inflates this data for academic year 2012-13 based on the projected growth in government expenditure during this period. The final column then reflects adjustments made to estimated spending on health, education and social protection to reflect the special characteristics of international students. In total, we estimate that international students at Sheffield-based universities will consume, on average, £6,905 of public services per capita in 2012-13.

Table 3.3: Estimated average consumption per capita of public services Sheffield-based international students in 2012-13

Estimated consumption of public services (£s)			
Category of expenditure	2010-11	2012-13 inflated	2012-13 adjusted
1. General public services	105	103	103
of which: public and common services	101	100	100
of which: international services	4	4	4
2. Defence	1	1	1
3. Public order and safety	476	469	469
4. Economic affairs	541	533	533
of which: enterprise and economic development	85	84	84
of which: science and technology	37	36	36
of which: employment policies	68	67	67
of which: agriculture, fisheries and forestry	76	75	75
of which: transport	276	272	272
5. Environment protection	147	145	145
6. Housing and community amenities	186	183	183
7. Health	1,916	1,888	1,215
8. Recreation, culture and religion	121	119	119
9. Education	1,415	1,394	4,136
10. Social protection	3,604	3,551	0
Total	**8,512**	**8,388**	**6,905**

Source: Oxford Economics, HMT, BMJ, ONS

3.3.2 Increased congestion

In order to estimate the economic cost of increased congestion caused by the presence of international students in the local area, we made use of the work Tsang and Rohr (2011) who estimate the marginal external cost of increased congestion of car-using migrants in 2009/10 prices, based on previous work by the Department for Transport. This indicates that the marginal cost per km travelled for a migrant in a conurbation was 41 pence[16]. In line with Tsang and Rohr (2011), we assume average commute trips per year of 336 and an average trip length of 14km. This implies an average annual cost per international student (that drives) of £1,929 in 2009/10 prices. This figure was inflated to 2012/13 prices using CPI data and forecasts from the Oxford Economics Global Macroeconomic Model. This resulted in a final estimated marginal cost of £2,129.

In order to quantify the associated impact on GDP one further adjustment was required. We assumed that only that part of the increase in congestion that affected those commuting to work would affect GDP (the increase in travel time would reduce time at work and therefore productivity). According to the latest National Transport Survey 27% of the average distance travelled by drivers was for commuting or business purposes[17]. This implied that the marginal cost in terms of lost GDP was £584 per driver.

3.4 Developing local Input Output tables

As indicated, the associated indirect (supply chain) and induced (due to the spending of employees) impacts were quantified for both the short-term costs and benefits. In order to do so, it was necessary to construct Input Output (IO) tables at both the regional and sub-regional levels. An IO table contains data on inter-sectoral purchases in an economy. In essence, it quantifies who buys what and from whom. By appropriately manipulating the IO table it is possible to estimate the extent to which a given purchase will generate demand for other sectors. As the IO table also incorporates the household sector, it is also possible to quantify the induced impact. When doing so, estimates were scaled down based on the fact that households do not spend 100% of their gross income on average (as is implicitly assumed by the IO table). Part of household income is taxed, thereby generating revenue for the Exchequer, and some of it is saved. Without this adjustment, the results presented in this report would overestimate the likely induced impact.

Quantifying the local impact was more challenging as the ONS does not produce local IO tables. The first task was to develop our own bespoke local IO model for Yorkshire & the Humber and Sheffield. In order to do so, we followed the

[16] See Table 9-2. p44.

[17] See Table NTS0402 at https://www.gov.uk/government/organisations/department-for-transport/series/national-travel-survey-statistics for more details.

process adopted by Flegg et al (1995). Therefore, the relationships between different sectors embedded within the domestic use IO table are adjusted to accommodate both their relative sizes in comparison with the rest of the UK, as well as their relative importance in the regional economy. In doing this, the domestic use input-output table better reflects the nature of the regional economy and the level of inter-regional trade occurring for the area of interest. In practice, the local multipliers are smaller than at the national level, reflecting a much higher incidence of "leakage"[18].

For each cost and benefit we formally model the economic impact by allocating the size of the economic "shock" to the appropriate sector. However, given the difficulty with assigning this impact accurately within an IO model, for the GDP loss caused by increased congestion we instead use the average regional and sub-regional Type I and Type II multipliers to quantify the scale of the direct and indirect effects.

[18] "At a regional level, such leakage will inevitably be higher (compared to the national level), as "leakage" occurs not only when goods and services in the supply chain are purchased abroad but also from other regions within the national economy.

4 Results

- This chapter presents a full breakdown of the short-term costs and benefits including an assessment of the net economic contribution of international students during the 2012/13 academic year. There proceeds a qualitative analysis of the potential long-term economic impacts.
- In the short-term, international students at Sheffield-based universities are estimated to directly contribute £120.0 million to sub-regional GDP and £147.5 million in total (inclusive of indirect and induced effects). The equivalent figures at the regional level are £131.5 million and £176.6 million respectively.
- Meanwhile, in total, the gross cost of international students is estimated to be £22.1 million in sub-regional GDP and £27.2 million in total (inclusive of indirect and induced effects). The equivalent figures at the regional level are £29.0 million and £39.8 million respectively.
- Therefore, our modeling indicates a net direct economic contribution to sub-regional GDP of £97.9 million with a slightly larger figure of £102.5 million at the regional level. These figures rise to £120.3 million and £136.8 million respectively inclusive of indirect and induced effects.
- The long-term impact is much more uncertain and this report does not attempt to formally quantify it. Data from the careers service at Sheffield university suggests that the proportion of international students that remain to work in the local area is likely to be modest (less than 10%). Whether such a movement represents a benefit to the UK labour market is, to some extent, a normative issue. We discuss the issues in detail in section 4.2.2.
- However, based on the characteristics of international students, it seems highly likely that those that do stay will make a positive net contribution to the UK Exchequer.

As indicated, during their studies (the “short-term”) international students will generate a variety of economic benefits and costs for the local economy. In this chapter, we present the result of our formal analysis and quantify the net impact (benefits less costs) including both indirect and induced impacts.

4.1 Short-term

4.1.1 Benefits

Three separate channels through which international students create economic benefits were identified in Chapter 3. The first, and perhaps most straightforward, is via the fee income which they pay to their University, which helps to support activity in the local education sector. We estimate that such fees contributed £73.9 million to GDP at both the regional and sub-regional level. This in turn generated associated indirect and induced impacts worth £3.0 million and £16.0 million at the sub-regional level and £7.1 million and £20.2 million at the regional level.

Meanwhile, total subsistence spending by international students of £76.8 million in Sheffield is estimated to directly contribute £43.2 million to sub-regional GDP with a further £3.2 million supported via the supply chain and £4.7 million created via associated induced spending. Meanwhile, at the regional level, total subsistence spending of £97.4 million directly contributes £54.7 million to GDP with £8.5 million supported indirectly and £8.3 million via the induced impact.

Finally, benefits are also generated by the spending of friends and relatives that come to visit international students. We estimate that, in total, such visitors will spend £5.9 million in Sheffield during the 2012/13 academic year. We estimate that this will directly contribute £2.9 million to sub-regional GDP with an additional £0.2 million and £0.4 million supported via indirect and induced effects. As all spending is assumed to take place in Sheffield, the direct regional contribution is also £2.9 million but the indirect and induced effects are larger at £0.5 million and £0.5 million respectively.

Therefore, in total, international students are estimated to directly contribute £120.0 million to sub-regional GDP and £147.5 million in total (inclusive of indirect and induced effects). The equivalent figures at the regional level are £131.5 million and £176.6 million respectively. A full summary of the results is presented in Table 4.1.

Table 4.1: Value of economics benefits of international students at Sheffield-based Universities in 2012/13

Economic benefits of international students to regional and sub-regional economy (£mns)						
		Direct Spending	Direct GDP	Indirect GDP	Induced GDP	Total GDP
Sheffield	Visits from Friends and Relatives	5.9	2.9	0.2	0.4	3.5
	Subsistence Spending	76.8	43.2	3.2	4.7	51.0
	Fee Income	104.5	73.9	3.0	16.0	92.9
	Total	187.2	120.0	6.4	21.1	147.5
Yorkshire & the Humber	Visits from Friends and Relatives	5.9	2.9	0.5	0.5	3.9
	Subsistence Spending	97.4	54.7	8.5	8.3	71.5
	Fee Income	104.5	73.9	7.1	20.2	101.2
	Total	207.7	131.5	16.1	29.0	176.6

Source: Oxford Economics estimates, SIES, ONS, University of Sheffield, University of Sheffield Hallam, ETLC, Sheffield College

4.1.2 Costs

In chapter 3 it was estimated that international students at Sheffield-based universities will consume on average £6,905 of public service resources during the 2012/13 academic year. Scaling up by the number of international students suggests that total consumption will be around £56.8 million. The counterfactual of how this money would otherwise have been spent is unknowable but for the purposes of this analysis we assume that it all would have been invested by the government in the regional economy. Of this, we assume that 75% (£42.6 million) would have been spent in Sheffield with the remaining 25% in the wider Yorkshire & the Humber region.

These figures are used as the input to our regional and sub-regional input-output models. The results indicate that the direct gross cost of such foregone spending in terms of Sheffield's GDP was £20.7 million with further indirect and induced effects of £1.8 million and £3.0 million. Meanwhile, at the regional level, the larger initial shock (£56.8 million) generates a direct GDP cost of £27.6 million with associated indirect and induced effects of £5.0 million and £5.3 million respectively.

In addition, it was estimated in Chapter 3 that international students generated a marginal cost in lost GDP of £584 per driver in terms of the increased congestion (and its associated effect on productivity). In order to estimate the number of international student drivers we used data from *SIES* which indicated that 73% of part-time students used a car and that 26% of full-time students used a car. Although, intuitively, it seems likely that international students have a lower propensity to drive than their home-equivalents, given the lack of appropriate evidence to calibrate an adjustment factor, we have assumed that these proportions are the same for international students. Applying these shares to the number of part-time and full-time international students and multiplying by the estimated marginal cost implies a direct loss of GDP of £1.4 million due to increased road congestion. Given that all the universities are based in Sheffield, we assume that all the loss takes place there (and by default in the wider Yorkshire and the Humber region). The associated indirect and induced impacts are £0.1 million and £0.1 million at the sub-regional and £0.3 million and £0.2 million at the regional level[19].

Therefore, in total, the gross cost of international students is estimated to be £22.1 million in sub-regional GDP and £27.2 million in total (inclusive of indirect and induced effects). The equivalent figures at the regional level are £29.0 million and £39.8 million respectively. A full summary of the results is presented in Table 4.2.

[19] As the impact of increased congestion will affect businesses across the region, it was impossible to allocate the impact precisely within an IO table. Therefore, the indirect and induced impacts were estimated using average Type I and Type II multipliers.

Table 4.2: Value of economic costs of international students at Sheffield-based universities during 2012/13

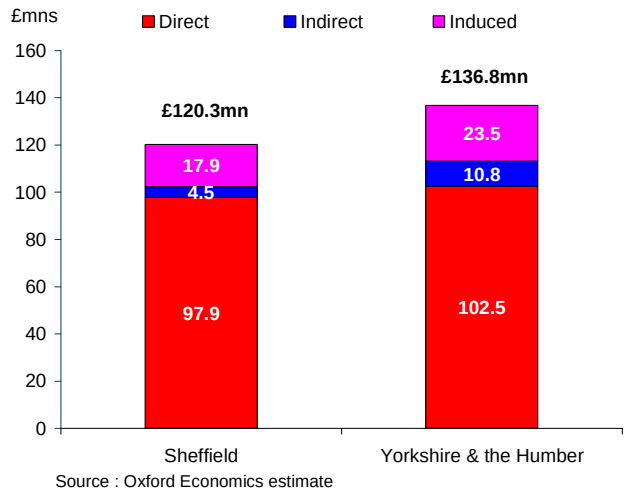
Economic costs of international students to regional and sub-regional economy (£mns)						
		Direct Spending	Direct GDP	Indirect GDP	Induced GDP	Total GDP
Sheffield	Consumption of public services	42.6	20.7	1.8	3.0	25.5
	Congestion	-	1.4	0.1	0.1	1.7
	Total	42.6	22.1	1.9	3.2	27.2
Yorkshire & the Humber	Consumption of public services	56.8	27.6	5.0	5.3	37.9
	Congestion	-	1.4	0.3	0.2	1.9
	Total	56.8	29.0	5.3	5.5	39.8

Source: Oxford Economics estimates, DfT, ONS, HMT

4.1.3 Net impact

Netting of the various costs and benefits it is clear that international students at Sheffield-based universities will make a positive economic contribution to the local economy during the 2012/13 academic year. We estimate a net direct economic contribution to sub-regional GDP of £97.9 million with a slightly larger figure of £102.5 million at the regional level. Moreover, further net benefits are realised via indirect and induced impacts. We estimate these to be worth some £4.5 million and £17.9 million respectively at the sub-regional level and £10.8 million and £23.5 million at the regional level (Chart 4.1).

Chart 4.1: Total net economic impact on GDP of international students, regional and sub-regional levels



Source : Oxford Economics estimate

4.2 Long-term

4.2.1 Introduction

The long-term impact of international students will depend crucially on the extent to which they remain in the local labour market. In instances where students

move abroad post-graduation the economic effects (both costs and benefits) are likely to be negligible although theoretically their experience of the UK may generate some modest positive external benefits (see section 4.2.4 for more details on this).

However, in cases where international students take up positions at local firms the economic costs and benefits are much more significant. Formally quantifying these is beyond the scope of this report. Doing so robustly would require longitudinal data from which a full assessment of the extent to which international students work in the local area, the type of job they take up (in terms of both sector and position), and the length of their stay. Instead, we assess the issue qualitatively using evidence from the literature on the economic costs and benefits of immigration. In general, the economic impact of immigrants has been shown to be dependent on their characteristics (e.g. age, employment status, skill level, marital status and presence or otherwise of dependents). Table 4.3 below presents evidence on some of these characteristics for the relevant student population[20]. The results indicate that the vast majority of students have no dependents (94%), are under the age of 30 (88%) and are single (85%). Moreover, it is fair to assume that the vast majority of international students would qualify as "skilled" workers given that they are studying at a higher-education institution.

Table 4.3: Characteristics of International Students at Sheffield-based Unviersities during 2012/13 academic year

Characteristics of International Students in Sheffield							
Number of dependents							
None	1	2	3	4	5	6	8
93.6%	3.0%	2.2%	0.7%	0.3%	0.1%	0.1%	0.0%
Age							
Under 20	20-29	30-39	40-49	50-59	Over 60		
11.9%	75.9%	9.6%	2.1%	0.4%	0.1%		
Relationship status							
Divorced	Living as married	Married	Separate	Single	Widow		
0.3%	0.2%	14.2%	0.0%	85.2%	0.0%		

Source: University of Sheffield, Sheffield College, ELTC

In the remainder of this chapter, we assess the likely impact in this context, drawing upon evidence from the literature to support arguments where appropriate.

[20] Sheffield Hallam University did not provide data on the characteristics of international students. Therefore, these results only reflect data for the other three institutions. There is no reason to expect that the inclusion of Sheffield Hallam would have significantly altered these proportions.

4.2.2 Labour market effects

Survey data from the University of Sheffield careers service was made available to assess the extent to which international students in Sheffield take up roles in the region following graduation. Unfortunately, these data have only been collected for home and EU students[21]. Here, we use the responses of EU students as a proxy for the likelihood of an international student taking up a job in the local area. It should be noted that since EU students do not require a visa to work in the UK, using this proportion is likely to lead to an overestimate of the extent to which international students continue to work in the regional economy.

Based on data from the three most recent surveys available (for academic years 2008-9, 2009-10 and 2010-11) we estimate that 8.3% of international students will take up positions in South Yorkshire[22], 8.9% in the whole Yorkshire and the Humber region with a further 10.7% employed elsewhere in the UK (Table 4.4). It is possible that international students may subsequently take up positions in the local workforce (for instance following a period of further study or having worked elsewhere). However, we expect these examples to be very rare and therefore ignore them here.

Table 4.4: Post-graduation activities of EU students from the University of Sheffield

	Academic Year		
	2008/9	2009/10	2010/11
Total in employment	119	130	149
Employed in South Yorkshire	17	21	20
Employed elsewhere in Yorkshire and the Humber	0	3	1
Employed elsewhere in the UK	21	20	34
Total employed in the UK	38	44	55
In further study only	63	67	77
Assumed to be unemployed	13	24	20
Not available for employment	4	5	4
Other	10	11	4
Total Known Destinations	209	237	254

Source: University of Sheffield Careers Service

Scaling up by the number of international students in academic year 2012/13 suggests that 681 of this cohort will go on to work in the South Yorkshire region (the majority of whom are likely to take up positions in Sheffield), with a further 47 in the wider Yorkshire and the Humber region. Meanwhile, based on the careers service data 1,609 will take jobs in the UK. These figures represent a continuous flow but defining the relevant time period is problematic. As we scaled the results from the survey up by the entire international student population it will include individuals on different course lengths (anywhere

[21] From this year onwards, data is being collected for international students from the 2012/13 academic year onwards but this was not available to us at the time of this study.

[22] Data is not available to a sufficiently geographically disaggregated degree to isolate jobs in Sheffield but it would seem likely that the majority of these jobs will be located in Sheffield.

between 1-4 years). Based on data on the split of international students between postgraduate (both on research and taught courses) and undergraduates, and assuming average course lengths of one year for a postgraduate taught course, and three years for postgraduate research students and undergraduates, we estimate that around 62%[23] (5,116) of the cohort of international students studied in this analysis graduated in the 2012/13 academic year. This would imply an annual flow of around 424 graduates to firms in South Yorkshire with a further 29 in the wider Yorkshire & the Humber region.

The above has given an indication of the likely scale of progression by international students to the local labour market. This suggests that such flows are relatively modest. As an indication of this, the total estimate of 453 jobs in the Yorkshire and the Humber region represents just 0.02% of total regional employment[24].

The economic value of this effect, however modest, is controversial and attracted debate within the literature. The impact is dependent on a number of issues which we explore further in this section including: the extent to which these workers displace native workers; the relative productivity of international students compared to native workers; any impact on average wages.

The question of whether this employment would result in the displacement of a native worker is virtually impossible to prove. However, it is clear that such displacement is less likely in industries where the UK has acknowledged skills gaps. Currently, these are focused in STEM (Science, Technology, Engineering and Maths) subjects[25]. Data from the University of Sheffield on the subject breakdown of international students indicates that 46% were studying STEM degrees during the 2012/13 academic year, which other things equal, suggests that to some extent “displacement” was limited.

Theoretically, as immigrants expand the size of the labour force they should have some impact on the average wage[26]. Under conventional assumptions, an increase in the supply of labour will reduce the average market wage. However, the empirical evidence is mixed with most studies having focused on the US labour market. For example, Card (2001, 2005) finds that immigration has no noticeable impact on wages in contrast to Borjas (2003) whose estimates imply a strong negative effect. In the UK, Manacorda, Manning and Wadsworth (2006) find no evidence for a wage effect and suggest that it is because immigrants and

[23] A breakdown of international students by course type at Sheffield Hallam University was not available. Therefore, the estimated proportion is based on data from the other three institutions, with that breakdown implicitly assumed to hold at Sheffield Hallam University.

[24] This is based on total employment in the region during the three months between August and October 2012, the latest figure available, when this report was written.

[25] For example see Royal Academy of Engineering (2012).

[26] In the long-run this effect could be offset by effects on labour demand (if for example the region is made more competitive).

natives are imperfect substitutes[27]. Meanwhile, House of Lords (2008) concluded that "immigration has had a small negative impact on the lowest-paid workers in the UK". However, as this study is focused on the impact of skilled immigration, this negative effect is not applicable.

The preceding analysis has adopted a relatively narrow focus, by examining the labour market impact from the perspective of the employee rather than the employer. From the perspective of the latter, the impact of international students entering the local labour force is unambiguously positive. The additional supply of workers should enable better skills matching for local employers which should theoretically boost productivity.

4.2.3 Fiscal impact[28]

The fiscal impact of an immigrant depends crucially on their age and employment status. International students that continue to work in the local area will directly affect the economy's fiscal position by paying taxes, claiming benefits and consuming goods and services provided by the Government. They will also generate indirect fiscal effects by affecting the level of economic output (GDP) and altering the returns to labour and capital (Home Office (2001)).

An individual's net fiscal contribution will vary in a fairly predictable manner over the course of their life-cycle. They will be a net fiscal burden whilst in compulsory state financed education; become a net contributor when they are in employment; and a net burden once again when they retire. Exceptions to this may occur to this e.g. if the person requires a significant degree of state-financed medical treatment whilst in employment but, in general, these heuristics are likely to hold in the vast majority of cases. In addition, as most international students' residency eligibility in the UK is conditional upon employment, they are unlikely to endure prolonged spells out of work.

Moreover, empirical evidence in the literature corroborates this view. For example, Dustmann, Frattini and Hall (2010), in their study of A8 migration to the UK, found that migrants were 59% less likely than residents to claim state benefits and 57% less likely to live in social housing. Furthermore, said immigrants were found to have made a positive net fiscal impact in every year of analysis since the EU enlargement of 2004[29]. As indicated by the authors these results are "primarily driven by the characteristics of the A8 population, who generally are younger and better educated and have fewer children than

[27] In the case of international students this would seem plausible. Key differences include the cost and administrative burden of obtaining a work visa and the increased likelihood that an international student may want to move abroad at some point.

[28] The focus of this report is on the local economic implications of international students. However, as fiscal policy is largely determined at the national level, much of the discussion in this section is framed at this level of analysis. Irrespective of this, the national fiscal implications of international students clearly have significant implications for the local economy.

[29] Four fiscal years were analysed from 2005/6 to 2008/9.

natives"[30]. Meanwhile, Rowthorn (2008) in his survey of the relevant literature suggests that "Highly skilled migrants normally make a large fiscal contribution, whereas unskilled migrants are likely to impose a net cost on native taxpayers if they settle in the receiving country"[31].

Overall, given the characteristics of international students, outlined in the introduction, it seems highly likely that their net fiscal impact is positive. This benefit will accrue to those already resident in the country as the government will need to generate less tax revenue per capita (of existing residents) to fund current government spending.

4.2.4 Other external effects

The impact of immigration on the labour market and a country's fiscal position are the by far the most widely investigated sections of the economics literature. However, a number of other effects have been cited, some of which do not depend upon whether the student joins the local labour force. The effects are documented in bullet point form below:

- **Tourism**: as a result of their familiarity with the local region and friendships developed whilst at university, international students are more likely to return to the region subsequently on holiday. Such visits boost the local economy by providing an injection similar to that quantified as part of the short-term economic benefits.
- **Influence**: there is the potential for the UK's international relations and influence abroad to be boosted should international students that studied in the UK return to work in elite positions in their country of origin.
- **Familiarity with British products**: living in the UK for an extended period will make international students much more familiar with British products than would otherwise be the case. This should provide a boost to demand for British exports if they move abroad subsequently.
- **Innovation**: Chellaraj, Maskus and Mattoo (2005) found a positive link between international graduate students and innovation. Specifically, it was estimated that a ten-percent increase in the number of foreign graduate students raises patent applications by 4.7%, university patent grants by 5.3% and non-university patent grants by 6.7% in the USA. Such results suggest that international students may increase innovative activity both at the university and across industry, a

[30] Dustmann, Frattini and Hall (2010), p.3

[31] Rowthorn (2008), p.560

process that is likely to generate wider returns for the local economy.

5 Conclusion

This report has assessed the net contribution of international students at Sheffield-based universities to the regional and sub-regional economies. The results are unambiguous; whilst studying international students make a substantial positive net contribution to direct GDP. Based on figures for the 2012/13 academic year, we estimate this amount to £97.9 million at the sub-regional level and £102.5 million at the regional level. Further net benefits accrue via indirect and induced effects.

Due to data constraints, this report does not seek to formally quantify the economic impact of students following graduation. Based on survey data from the University of Sheffield's careers service, it seems likely that the proportion of international students that remain in the region to take up positions in employment is fairly modest (less than 10%). To what extent, such jobs involve the "displacement" of native workers is impossible to ascertain. However, the fact that a significant proportion of international students in the latest academic year were taking STEM degrees, in which the UK suffers from acknowledged skill gaps suggests that "displacement" effects are likely to be limited to a considerable extent. Moreover, analysis of the characteristics of international students indicates that it is highly likely that those that do continue to live in the UK will make a positive net fiscal impact, thereby generating an external benefit for residents. Other spillover benefits are possible via increased trade, tourism and the potential for improved international relations should international students educated in Sheffield take up positions of influence abroad.

Therefore, the evidence from this report strongly endorses the contention that international students in Sheffield make a positive net economic contribution to the local economy. Moreover, although the analysis has been necessarily restricted to a specific locality, there seem few grounds to suppose that the result would not hold at other higher education institutions across the UK. Meanwhile, it is interesting to note that a recent report by the Migration Advisory Committee (2012), which employed formal cost benefit analysis, found that the reduction in non-EE students due to the reduction in grants of Tier 4 visas would generate a net cost of £2.4 billion. This report is produced in the context of the government's stated policy stance to "bear down" on non-EEA student migration as part of a wider commitment to cut net migration. The findings here do not support the economic case for such a policy stance.

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