Expenditure and Displacement Impacts of Students' Consumption: Interregional Input-Output Analysis of a City-Region

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Abstract

University students generate positive expenditure effects where they study and negative expenditure displacement effects at their place of origin. This paper specifies a model to estimate the magnitude of these impacts. Spatial expenditure/displacement profiles are constructed by combining information on students' consumption and the location of their places of origin, study and term time residence. An input-output model captures the dependence between a major student centre, the surrounding city region and the wider regional economy. The analysis reveals positive expenditure effects to the city and spill-over effects to the surrounding city region. Negative net-migration of students triggers expenditure displacement.

JEL Codes: I23, I25, R12, R15
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1 Introduction

Students attending higher education institutions (HEIs), such as universities, transfer income from their place of origin to their place of study. This movement can displace consumption at the origin. As students are mobile, the location of the expenditures and the income sources are not necessarily the same. This gives rise to a spatial demand-shift effect, where students increase consumption where they study and reduce consumption where they are from. Because of this, the location of HEIs can have an important impact not only upon their host economies but also on the localities where students originate from. Therefore students are an economic 'benefit' to the region that attracts them. Conversely, students who leave to study elsewhere are a 'cost' to the region that the left.

Unsurprisingly therefore, local governments have in place policies to attract students. For example, London and Partners, the official promotional organisation for London, maintains a website promoting London to students, in an analogous manner to its promotion of the city for tourism. Similarly, the websites promoting tourism in Scotland and Wales, both have specific sections targeting students. Furthermore, there is political pressure to decentralise the provision of education to areas which exhibit negative net-migration of students. For example, one of the arguments for founding the University of the Highlands and Islands was to keep students in Northern Scotland. However, it is not clear what the economic impacts of these student flows are. How significant are the impacts? Do they perhaps balance out? What sort of places are the 'winners' and 'losers' from the process? What is the impact of different types of students?

Students have for a long time been an important group of consumers in specific locations. For example Blake & McDowall (1967) illustrate their relative importance for the university town of St Andrews in Scotland. However, participation rates in the UK increased sharply in the 1990's (Blanden & Machin 2004), as they did elsewhere in Europe (Gallice 2009). In 2007 the OECD average of HE entrants as share of the corresponding age group was 56%, with the UK slightly under this average at 55% (OECD n.d.). Therefore, university students play a significant role in the economy and their pattern of expenditures and displacements has important implications.

Research has mostly focussed on the positive aspects of students' consumption expenditures (e.g. Love & McNicoll 1988, Steinacker 2005) or used simple assumptions to correct for endogeneity of income sources (see Hermannsson et al. 2012, for a discussion of this point). Recent work suggests a broader range of transmission channels to the local economy, such as through labour supply and the housing market (Allinson 2006, Munro et al. 2009, Munro & Livingston 2012, Sage et al. 2012). Furthermore, that the impacts are not necessarily all positive (Munro et al. 2009). An approach is needed that accounts for both the role of

income and expenditure in shaping the impact of students' consumption, as well as students' mobility and heterogeneity.

This paper specifies an interregional student consumption expenditure impact model in order to examine the spatial expenditure and displacement patterns of different student types. The model is illustrated through an application to Scotland. The focus is on the City of Glasgow, which is Scotland's largest student centre, its wider city region in the Strathclyde area and the rest of Scotland. The location of the institution of study is combined with post code level data on place of domicile and term time residence, to determine movers, commuters and stayers. Then the expenditure and displacement pattern of each group of students is quantified. A three region interregional Input-Output model of a student city, its city-region and the wider host regional economy is applied to examine spill-over effects. The model is augmented to identify flows of wage income and consumption expenditures across boundaries.

The analysis reveals that the output impact of students' consumption expenditures spill-over regional boundaries. This occurs in two stages. First through direct interregional expenditure and displacement effects where mobile students exert a positive impact upon their region of study but a negative impact upon their region of domicile. Second through 'knock-on' impacts, which spill over regional boundaries. Furthermore, it is not only the location of the HEIs that matters for shaping the local level consumption impact of students, but also the composition of the student body and economic structure. The student populations benefit not only the university cities, but also their wider city regions.

The paper is structured as follows. The next section presents a brief overview of previous work on the impacts of students. The third section sets out the model. The fourth section applies the model to conduct an interregional analysis of the consumption and displacement impacts of students in Scotland. Final section concludes.

2 Previous Research

A number of studies have examined the role of students as consumers, effectively treating them like tourists (e.g. Cook 1970, Florax 1992, Love & McNicoll 1988, Steinacker 2005). Often this is carried out as part of an analysis of the host institution's expenditure impacts (e.g. Armstrong 1993, Bleaney et al. 1992, Brownrigg 1973, Harris 1997, Hermannsson et al. 2012, Love & McNicoll 1990). Typically these studies determine the direct expenditures of students and then apply a demand-driven model, such as Keynesian multiplier or Input-Output to trace multiplier impacts. Typically the geographical scale is regional or local.

In principle such impact studies are straightforward and follow well established procedures (Armstrong & Taylor 2000, Miller & Blair 2009). In practice, however, it can be difficult to determine to what extent student's consumption is additional to the host economy. This has resulted in simplifying assumptions, of which are two main conventions. One incorporates only the expenditures of in-coming students (e.g. Kelly et al. 2004), the other includes all student expenditures, irrespective of their origin (e.g. Harris 1997). This issue is re-examined by Hermannsson et al. (2012), who draw on student income and expenditures surveys to determine empirically to what extent their consumption expenditures are additional to the host economy. They find that for Scotland about half of indigenous students' expenditure is not additional as these are funded through household transfers and local wage income. This reveals a significant positive impact for local students, albeit muted vis-á-vis external students.

More recently work in urban and planning studies has examined the variety of influence students exert on their local economy using surveys and case studies (Allinson 2006, Munro et al. 2009, Munro & Livingston 2012, Sage et al. 2012). Although not resulting in detailed quantitative estimates of impact, this work has contributed an important qualitative point: namely that the local impacts of students are not necessarily uniformly positive (Munro et al. 2009, Munro & Livingston 2012).

Most work on students acknowledges in principle that they are mobile and indeed often the main point of the impact studies is to provide evidence for the export stimulus driven by incoming students. However, it remains to be analysed how students impact upon their origin as well as the destination. Hitherto the spatial dimension of students' consumption impacts has received limited attention. Usually the focus is on what happens in the student centres, but what is the impact upon those regions that experience a net out-migration of students? Such a story is not just a purely positive one about expenditure injection, but might also highlight negative aspects, i.e. the displacement of consumption in the region of origin.

3 Model

An Input-Output model is modified to accommodate an interregional analysis of consumption expenditures and displacements of heterogeneous students. First, the model is extended to allow for the displacement of expenditures and different types of students. Then it is disaggregated into regions. To simplify the exposition a two region model is presented. Extending this to n regions is straightforward, as is illustrated in the following section.

3.1 Input-Output impact analysis

Demand driven models are frequently used to capture the total spending effects of institutions, projects or events. These analyses incorporate the multiplier, or knock-on, impacts of any expenditure injection, obtained by summing the subsequent internal demand feedbacks within the economy. For a detailed account of IO-based impact studies see Armstrong & Taylor (2000), Loveridge (2004), Miller & Blair (2009).

The derivation of the demand-driven multipliers draws on the notion that exogenous expenditure determines endogenous economic activity. In the standard Leontief Input-Output approach the endogenous vector of final outputs, q is determined by the exogenous vector of final demands, f, through the operation of a multiplier matrix. This can be summarised as:

$$\mathbf{q} = (\mathbf{I} - \mathbf{A})^{-1}\mathbf{f} \tag{1}$$

where $(\mathbf{I} - \mathbf{A})^{-1}$ is the Leontief inverse (Miller & Blair 2009, Ch. 2). The Leontief inverse identifies the indirect and induced effects attributed to exogenous demand stimulus. Indirect effects arise through increased demands for intermediate goods and, with Type-II multipliers, induced effects are generated through the impact of increased household income on consumption demand.

3.2 Applying Input-Output to students' consumption expenditures

Building on the standard Leontief model, presented in equation 1, it is straightforward in principle to determine the output impact of students' consumption expenditures. All that is needed is to determine the final demand expenditures on the output of local sectors attributable to students ($\hat{\mathbf{f}}$). Then the Leontief inverse can be used to determine indirect (and, where appropriate, induced) impacts.

Using the gross consumption expenditures of students as the starting point, three adjustments have to be made in order to arrive at the vector of final demands for the output of local sectors attributable to students. Firstly, we need to know to what extent the gross expenditures are exogenous to the local economy (in line with the conventional IO distinction between exogenous and endogenous). Secondly, to what extent exogenous expenditures are spent on the output of local sectors (adjusting for direct imports) and thirdly, to determine which sectors the expenditures go to. Therefore, the final demand attributable to students of type n ($\hat{\mathbf{f}}^{\mathbf{n}}$) can be identified as:

$$\hat{\mathbf{f}}^{\mathbf{n}} = \mathbf{v}c^n x^n (1 - \delta) \tag{2}$$

where $\mathbf{v}$ is a vector that reveals the sectoral breakdown of students' consumption expenditures, c^n is the average gross consumption expenditures of student type n, x^n is the share of gross consumption expenditures of student group n that is exogenous and δ is the direct import share. Exogenous consumption expenditures can also be represented as gross consumption expenditures less consumption supported by endogenous income, i.e. the consumption that students are displacing:

$$c^n x^n = c^n - d^n \tag{3}$$

where d_n^s is the average displaced expenditures of student type n. This is important for testing if this switching of expenditures occurs over space. Substituting 3 into 2 final demand of students can be represented as:

$$\hat{\mathbf{f}}^{\mathbf{n}} = \mathbf{v}(c^n - d^n)(1 - \delta) \tag{4}$$

To further clarify this distinction the vector of student's final consumption demand can be disaggregated into two vectors of expenditures ($\mathbf{e}_n$) and displacements ($\mathbf{f}_n$):

$$\hat{\mathbf{f}}^n = \mathbf{e}^n - \mathbf{d}^n \tag{5}$$

These can be represented as:

$$\mathbf{e}^n = \mathbf{v_c} c^n (1 - \delta) \tag{6}$$

$$\mathbf{d^n} = \mathbf{v^c} d^n (1 - \delta) \tag{7}$$

3.3 Interregional impact of expenditures and displacements

Following standard approach (Leontief 1986, Miller & Blair 2009, Turner et al. 2007) the model can easily be extended to two regions. Equation 1 identifies the key equation determining the $N \times 1$ vector of output $\mathbf{q}$ in the single region inputoutput framework. This becomes region 1 in a 2-region world and the element $\mathbf{f}$ (final demand) is separated into local final demand in region 1 for commodities produced in region 1 (**f11**) and export demand in region 2 for region 1 commodities (**f12**). Similarly for region 2, final demand for region 2 commodities is split into export demand in region 1 (**f21**) and local demand in region 2 (**f22**). This can be presented as:

$$\begin{bmatrix} \mathbf{q}_{11} & \mathbf{q}_{12} \\ \mathbf{q}_{21} & \mathbf{q}_{22} \end{bmatrix} = \begin{bmatrix} 1-\mathbf{A}_{11} & -\mathbf{A}_{12} \\ -\mathbf{A}_{21} & 1-\mathbf{A}_{22} \end{bmatrix} \begin{bmatrix} \mathbf{f}_{11} & \mathbf{f}_{12} \\ \mathbf{f}_{21} & \mathbf{f}_{22} \end{bmatrix} \tag{8}$$

where elements $a_i j^r s$ of the $N \times J$ sub-matrices A^{RS} show the transactions between sector i in producing region r and using sector j in consuming region s.

$$\hat{\mathbf{F}} = \begin{bmatrix} \mathbf{e}_{11} - \mathbf{d}_{11} & \mathbf{e}_{12} - \mathbf{d}_{12} \\ \mathbf{e}_{21} - \mathbf{d}_{21} & \mathbf{e}_{22} - \mathbf{d}_{22} \end{bmatrix} \tag{9}$$

Equation 9 shows the matrix of final demand expenditures attributable to students in a two region setting. The final demand expenditures destined for Region 1 are composed of the elements $\mathbf{e}_{11} - \mathbf{d}_{11}$ and $\mathbf{e}^s_{12} - \mathbf{d}^s_{12}$, where the former captures the final demand expenditures and displacements that both originate and are incurred within region 1, whereas the latter describes the final demand expenditures and displacements that originate in region 2 but are incurred in region 1. Similarly, the second row shows expenditures and displacements that originate in region 2.

For analysing the impact of students consumption expenditures two spatial definitions are relevant: the student's region of domicile, or home region, denoted by the subscript H and where the student studies at university, denoted by the subscript U. Four types of students are identified. The case of locals is straightforward. Their region of study and region of domicile is the same, so that expenditures directly impact upon the local economy (region 1) and displaces expenditures within the local economy as well.

$$\hat{\mathbf{F}}^L = \begin{bmatrix} \mathbf{e}^L_{11} - \mathbf{d}^L_{11} & 0 \\ 0 & 0 \end{bmatrix} \tag{10}$$

For commuters, some expenditures are incurred in the region of study (region 1) and some in the region of domicile (region 2). Equally expenditures are displaced both within the region of study and the region of domicile, so that:

$$\hat{\mathbf{F}}^C = \begin{bmatrix} 0 & \mathbf{e}^C_{12} - \mathbf{d}^C_{12} \\ 0 & \mathbf{e}^C_{22} - \mathbf{d}^C_{22} \end{bmatrix} \tag{11}$$

A mover leaves his region of domicile to attend university in another region. In this case all the expenditures are incurred in the region of study, along with some displacements. Whereas additional displacements are incurred in the region of domicile but no expenditures.

$$\hat{\mathbf{F}}^{\mathbf{M}} = \begin{bmatrix} 0 & \mathbf{e}_{12}^{M} - \mathbf{d}_{12}^{M} \\ 0 & -\mathbf{d}_{22}^{M} \end{bmatrix} \tag{12}$$

External students bring in an expenditure stimulus from exports, which is exogenous to the host economy, apart from those elements that may be supported by income earned locally.

$$\hat{\mathbf{F}}^{E} = \begin{bmatrix} -\mathbf{d}_{11}^{E} & 0 & \mathbf{e}_{1*}^{E} \\ 0 & 0 & 0 \end{bmatrix} \tag{13}$$

4 Expenditures and displacements of students in Scotland

To apply the model it is necessary to determine the spatial expenditure profiles of different student types and then determine the number of each student type by region. Once this has been determined it is possible to derive the expenditure and displacement impacts of different types of students and analyse how these spill over regional boundaries.

Provided the spatial expenditure and displacement patterns of students' consumption expenditures can be identified, it is possible to determine the expenditures and displacements driven by a representative student of each type within a 3-region setting. Then it is straightforward to multiply the interregional expenditure and displacement matrices by the number of students of each type to determine the aggregate final demand impact.

The matrices of interregional expenditures and displacements of each student type by region of domicile (H) and region of study (H) can be summarised in the general matrix F_n^{UH}, where n is the type of student, U is the region of study and H is the region of domicile. It follows that the aggregate final demand impact of students studying at institutions in a particular region can be determined as the sum of the products of each of the representative student's expenditure-displacement matrix (F_n^{UH}) and the number of the respective student type (S_n^{UH}). The aggregate impact for a particular region, say Glasgow, can be represented as:

$$\hat{F}_{GLA} = \sum_{(n=1)}^{4} \sum_{(H=1)}^{4} S_n^{GH} F_n^{GH} \tag{14}$$

For the final demand impact of students in all three of the regions identified in Scotland this further becomes:

$$\hat{F}_{SCO} = \hat{F}_{GLA} + \hat{F}_{RST} + \hat{F}_{ROS} = \sum_{(n=1)}^{4} \sum_{(U=1)}^{3} \sum_{(H=1)}^{4} S_n^{UH} F_n^{UH} \tag{15}$$

That is to say, it is the product of the expenditure-displacement pattern (F) and FTE number (S) of 4 different types of representative students summed across 3 regions of study (U) and 4 regions of origin (H). Given these details it is easy to determine the final demand impact of each student type, studying in a particular region, upon each of the three regions GLA, RST and ROS.

4.1 Glasgow city-region and the rest of Scotland

The student centre that is the main focus of this paper is Glasgow, which is the largest city in Scotland, with a city-region (comprising Glasgow (GLA) and the rest of Strathclyde (RST)) of approximately 2.1 million inhabitants [1]. GLA is a separate administrative unit but is economically interdependent with the RST and the Rest of Scotland (ROS). The ROS is identified as a residual, to allow the spatial boundaries of the study to conform to Scotland. The Strathclyde region is Scotland's largest population and economic centre, containing 41.7% of its population and 41.1% of total employment. At its centre is the City of Glasgow, which is linked via an extensive suburban rail network to the rest of the Strathclyde region. Key economic and social indicators for these areas are given in Table 1 and Figure 1 provides a map of the three sub-regions.

Table 1: Key social and economic indicators for each IO-region in 2006.

		GLA	RST	ROS	SCO
Population		580,690	1,555,374	2,980,836	5,116,900
	% of total	11%	30%	58%	100%
Employment	FTEs	313,535	448,296	1,089,529	1,851,360
	% of total	17%	24%	59%	100%
Gross Domestic Household Income Per Head		11,968	12,975	13,319	13,071
	% of average	92%	99%	102%	100%

[1] This is a wide definition of Glasgow city-region encompassing the whole of the former Strathclyde Regional Council (SRC) area outside Glasgow. This includes the council areas of East and West Dunbartonshire; Helensburgh and Lomond; East, North and South Ayrshire; Inverclyde; East Renfrewshire and Renfrewshire; North and South Lanarkshire. The SRC was abolished in 1996 but many public services in the area are still provided at the Strathclyde level, such as Strathclyde Police, Strathclyde Fire and Rescue Service, and the Strathclyde Partnership for Transport, which runs public transport in the region.

Table 2: Origins and destinations of people who travel between Scottish addresses for work (head-count/column %). Own calculations, based on flow data from 2011 UK census.

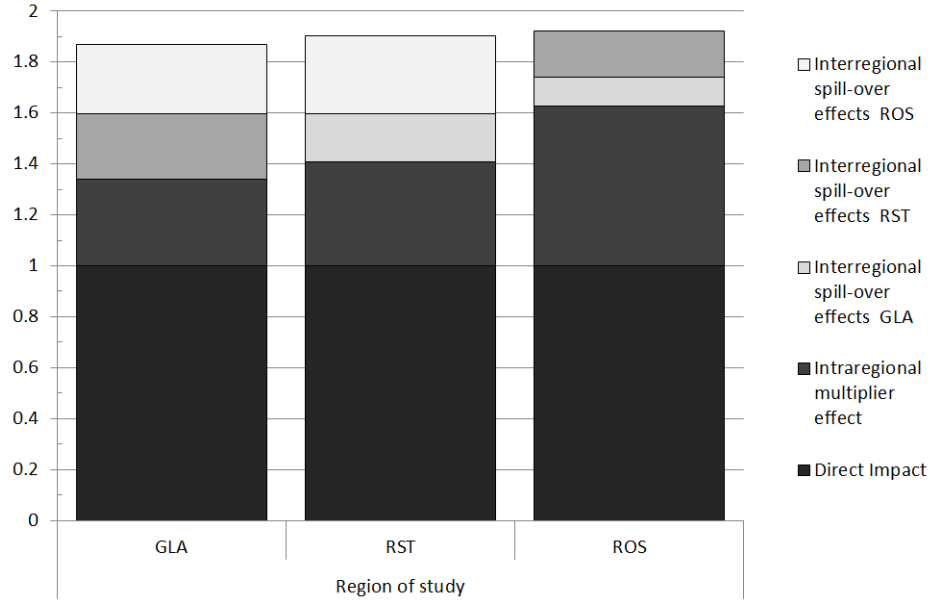
		Place of work							
		GLA		RST		ROS		SCO	
Residence	GLA	157,278	49%	36,799	9%	11,234	1%	205,312	10%
	RST	137,774	43%	375,908	87%	30,627	3%	544,310	28%
	ROS	25,258	8%	17,804	4%	1,173,415	97%	1,216,477	62%
		320,310	100%	430,511	100%	1,215,276	100%	1,966,099	100%

Figure 1: 3 Sub-Region Map of Scotland

Within Strathclyde the main focus is on the Glasgow City Council jurisdiction, which spans an area of 175 km^2 and included 581 thousand inhabitants in 2006. Roughly 313 thousand full time equivalent jobs are found in Glasgow, which is approximately 17% of total employment in Scotland. This is a much larger share of Scotland-wide employment than Glasgow's population share would suggest to the extent that (as is illustrated in Table 2) four out of every ten jobs in the city are taken by in-commuters, primarily originating from other parts of the Strathclyde region.

The rest of the Strathclyde region (RST) has somewhat different economic characteristics than Glasgow (GLA). In terms of population it is approximately 3 times the size of Glasgow. However, there are only 1.4 times as many jobs in RST. The lower job density in RST is explained by significant out-commuting to seek employment in GLA.

Figure 2: Interregional Type-II output multipliers of students' consumption expenditures.



The interregional Leontief inverse determines how final demand drives knock-on impacts both within the region directly impact and across other regions. This is obtained from the three region interregional IO-table for Scotland constructed by Hermannsson (2013) and the student expenditure vector is from (Kelly et al. 2004). The structure of these effects can be summarised as interregional multipliers. As Figure 2 reveals the largest share of knock-on impacts are realised inside the region where the expenditures occur, this is particularly the case for the ROS, which is the largest region and hence more self-contained. However, for GLA and RST a significant share of the knock-on impacts spill over into the other regions. For example, looking at Glasgow, for every 1 of final demand for the output of local sector's an additional 34p of output is supported within GLA and a further 26p and 27p in RST and ROS, respectively. Of the knock-on impacts driven by consumption expenditures in Glasgow just under two thirds spills over to other regions.

Table 3: Derivation of per student spending of different student types separately identifying direct impacts for region of study (U) and region of domicile (H), £.

	Student type and location of impact			
	Local	Mover		ROW
Expenditure and income category	U	U	H	U
Gross average student spending (c_n^s)	6,230	6,230		6,230
Income from employment	-1,945	-1,945		-1,945
Within household transfers	-453		-453	
Other income	-570		-570	
Income shortfall	-1,073		-1,073	
Spending attributable to new commercial credit	346	346		
Exogenous average per student spending ($c_n^s - d_n^s$)	2,535	4,631	-2,096	4,285
Direct imports ($-\delta(c_n^s - d_n^s)$, δ=32%)	-816	-1,491	675	-1,380
Final demand per student (f_n^s) £	1,719	3,140	-1,421	2,905

4.2 Spatial distribution of students' consumption expenditures and displacements

I adopt the consumption attribution of Hermannsson et al. (2012, Table A3) to determine the expenditure and displacement pattern of individual student types. Details on the income and expenditures of Scottish students are obtained from the survey by Warhurst (2009). Information on expenditures is used to determine the overall level of expenditures and information on income sources is used to determine the extent to which consumption expenditures are endogenous or exogenous to the economy. More specifically, gross expenditures (c_n^s) are adjusted for endogenous funding sources (d_n^s), i.e. 'Income from employment'; 'within household transfers'; 'other income'; and 'income shortfall'. However, an estimate for the new commercial credit taken out by students is added back. Table 3 reveals how the consumption expenditures and displacements of individual students by type are divided across the region of study (U) and the region of domicile (H). The first case is that of Local students, as presented in the 2nd column of the table. As the two regions coincide ($U = H$) expenditures and displacements occur within the same region.

For Scottish movers 'gross expenditures', 'income from employment' and 'spending attributable to new commercial credit' all occur within the region of study, while the 'Within household transfers', ' Other income' and 'Income shortfall' all displace expenditures within the region of domicile. As the table reveals, for both commuters and movers, the impacts in the two regions add up to the single region impact of Scottish students.

No survey evidence is available for the expenditures of non-UK students. Therefore, their expenditure level is taken to be identical to that of Scottish students as identified by Warhurst (2009). Similarly in the absence of more detailed information, the simplifying assumption is adopted that ROW students participate in the labour market to the same degree as estimated for Scottish students (and hence $d = 1,945$). Further-

Table 4: Full-time campus-based HE-students in Scotland in the academic year 2012 13

Sub-population	**FTEs**
Students domiciled in Scotland	132,649
Students registered at Scottish HEIs	175,899
Students residing in Scotland	175,140
- thereof from Scotland	112,032
- thereof from RUK	19,655
- thereof from ROW	43,452
Scottish students registered at RUK HEIs	21,573
Scottish students with term-time addresses in the RUK	20,617
Total	**175,140**

more, δ is the direct import share, which is equal across all student groups and fixed at 32.2% (equal to that of households in the Scottish IO-tables).

A similar approach is taken for commuters, except the spatial distribution of their incomes and expenditures is not as clear ex ante as for those that physically move. Therefore I adopt the assumption that the spatial distribution of students' incomes and expenditures is in line with that of households on average in each of the sub-regions of the IO-table. Interregional income and expenditure patterns from the IO-table are used to determine the spatial distribution of commuters' expenditures and displacements. 'Within household transfers', ' Other income' and 'Income shortfall' all displace expenditures within the region of domicile. 'Gross expenditures' and 'spending attributable to new commercial credit' is attributed to the region of study and region of domicile in line with the extent to which household consumption in the region of domicile is sourced from the region of study. Similarly 'income from employment' is divided pro-rata between the two regions in line with income flows in the IO-table.

4.3 HE students in Scotland

Data on the student population are obtained from the Higher Education Statistics Agency's (HESA) students in Higher Education database. This database is compiled from administrative records supplied by UK HEIs and contains post-code level information about the student's domicile, the location of the campus attended and the term-term time address. Using these three addresses it is possible to distinguish between different types of students and determine their origin and destination. Key indicators of the student population in 2012/13 are reported in Table 4.

Scotland attracts a significant student population. In aggregate, there are approximately 30% more students living in Scotland, than are domiciled in Scotland. Within the aggregate there are counteracting flows. In particular, approximately 16% of Scottish domiciled students move to the RUK for studies. However, this is offset by an equally large inflow of students from the RUK. Furthermore, there is a large inflow of

students from the Rest of the World (ROW) with foreign students making up a quarter of the HE-student population in Scotland[2].

More than two thirds of Scottish students do not move out of their home region to attend higher education. Of these 56,971 (61%) live in the ROS, 25,335 (27%) in Glasgow and 10,465 (11%) in RST. Many of these commute from their region of domicile to their region of study. This is detailed in Table 5. Nearly two thirds (16,676) of all student commuters travel from addresses in RST to attend HEIs in Glasgow. Just over 10% of commuters travel from ROS to GLA and other flows are smaller.

Approximately 30% of Scottish domiciled students move between regions in Scotland to attend HEIs. This results in a net-outflow of students for ROS and RST, but a net gain for Glasgow. This pattern is reinforced by student migration between Scotland and the RUK, where ROS and RST experience a net outflow, but Glasgow a net-gain.

Table 5: Students commuting to and from addresses in Scotland in the academic year 2012/13.

	Domicile IO Regions				
Term time address	ROS	RST	GLA	Inward commuting	Net-commuting
ROS	0	1,768	554	2,322	-744
RST	340	0	1,336	1,676	-16,768
GLA	2,725	16,676	0	19,402	17,512
Outward commuting	3,066	18,445	1,890	23,400	0

Looking only at UK-domiciled students, GLA is a clear winner attracting a net-migration of just over 12,000 students. This is slightly less than the net-outflow from RST and ROS. On balance, therefore, Scotland faces negative net-migration of students vis- à -vis the RUK. However, with the exception of RST, this is more than off-set by a significant in-flow of students from the ROW. This suggests that student centres like Glasgow have their population boosted as a result of students and vice-versa for the wider-city region. In this 3-region structure the ROS in an aggregate of several sub-regions where this dynamic is likely to be repeated at smaller scales.

[2]Unfortunately records are not kept for UK students going overseas to study. The traditional view is that this is modest, although interest has been increasing in recent years.

Table 6: Studetns that move to study within Scotland in the academic year 2012/13.

	Domicile IO Regions			
Term Time Address	ROS	RST	GLA	Total
ROS	0	5,595	1,529	23,142
RST	576	0	394	1,155
GLA	8,139	3,030	0	14,620
Total	27,710	9,637	2,531	59,534

Table 7: Impact of migration of UK-domiciled students by sub-region.

	ROS	RST	GLA
Inward migration from other regions in Scotland	7,124	970	11,168
Outward migration to other regions Scotland	-8,714	-8,624	-1,923
Inward migration from RUK	16,018	185	3,452
Outward migration to RUK	-18,996	-1,013	-608
Net-migration of UK domiciled students	-4,568	-8,482	12,089

Table 8: Migration of students by type and sub-region.

	ROS	RST	GLA
Net migration to/from other parts of Scotland	-1,590	-7,655	9,245
Net migration to/from RUK	-2,978	-827	2,844
Inward migration from ROW	32,334	831	10,937
Measured net migration of HE students	27,766	-7,651	23,026

5 Results

5.1 Impact of local students

As the region of domicile and the region of study are the same, the impact of local students is straightforward. The stimulus originates and impacts in the same place. However, subsequent multiplier, or knock-on, impacts are dispersed through all three regions. This is demonstrated for the case of local students in Glasgow in Table 9. The first four columns show the final demand, or direct impact, attributed to local students in Glasgow. The columns show the spatial origin of the impact, while the rows reveal the destination. The final four columns aggregate the direct and knock-on impacts. Just over two thirds of these are incurred locally in Glasgow and conversely just under a third spills over to the other regions. Table 10 sums up the impacts of local students in all three regions. The magnitude of the impact on the home region is driven by the number of students. And spill-over impacts to other regions are shaped by the economic structure as depicted by the interregional multipliers, with more leakagae occuring in the smaller regions.

Table 9: Final demand and knock-on impacts of local students studying in Glasgow (GLA) (£, m).

	Final demand				Direct and induced				Gross output			
	GLA	RST	ROS	Total	GLA	RST	ROS	Total	GLA	RST	ROS	Total
GLA	19.4	0	0	19.4	6.6	0	0	6.6	26.0	0	0	26.0
RST	0	0	0	0	5.0	0	0	5.0	5.0	0	0	5.0
ROS	0	0	0	0	5.3	0	0	5.3	5.3	0	0	5.3
Total	19.4	0	0	19.4	16.9	0	0	16.9	36.2	0	0	36.2

5.2 Movers

Movers provide a positive injection into their location of study, but displace expenditures in their home region. This is summarised for students based in Glasgow Table 11. Students domiciled in RST and

Table 10: Final demand and knock-on impacts of local students studying in GLA, RST and ROS (£, m).

	Direct				Knock-on				Direct and knock on			
	GLA	RST	ROS	Total	GLA	RST	ROS	Total	GLA	RST	ROS	Total
GLA	19.4	0.0	0.0	19.4	6.6	8.2	11.0	25.8	26.0	8.2	11.0	45.1
RST	0.0	43.7	0.0	43.7	5.0	17.9	18.1	40.9	5.0	61.5	18.1	84.6
ROS	0.0	0.0	98.0	98.0	5.3	13.4	61.4	80.1	5.3	13.4	159.4	178.2
Total	19.4	43.7	98.0	161.1	16.9	39.5	90.4	146.8	36.2	83.1	188.5	307.9

ROS are attributed with final demand expenditures of £m35.1 in Glasgow. In turn, these students displace expenditures at their place of domicile. Most significantly in the ROS (£m -11.6), but to a lesser extent in the RST (£m -4.3). These positive and negative final demands in turn trigger both positive and negative indirect and induced multiplier effects. As the net impact on final demand is positive so the aggregate multiplier effects are also positive. However, these are not equally distributed across the sub-regions. Overall, the expenditure impact of Movers studying in Glasgow on the Scottish economy as a whole is £m 35.1. However, this is composed of a positive impact upon GLA (£m44.9) which is partially offset by a negative impact upon the ROS (£m-10.6). Interestingly, despite the negative displacement impacts of out-migrating students, overall there is a slight positive impact upon the RST (£m 0.8). This occurs as the spill-over of knock-on impacts from Glasgow outweighs the negative displacement impacts due to the close economic linkages between GLA and RST.

Table 11: Final demand and knock-on impacts of movers studying in GLA (£, m).

	Direct				Knock-on				Direct and knock on			
	GLA	RST	ROS	Total	GLA	RST	ROS	Total	GLA	RST	ROS	Total
GLA	0.0	9.5	25.6	35.1	11.9	-0.8	-1.3	9.8	11.9	8.7	24.3	44.9
RST	0.0	-4.3	0.0	-4.3	9.0	-1.8	-2.1	5.1	9.0	-6.1	-2.1	0.8
ROS	0.0	0.0	-11.6	-11.6	9.6	-1.3	-7.2	1.0	9.6	-1.3	-18.8	-10.6
Total	0.0	5.2	14.0	19.2	30.5	-3.9	-10.7	15.9	30.5	1.3	3.3	35.1

Table 12: Final demand and knock-on impacts of movers studying in RST (£, m).

	Direct				Knock-on				Direct and knock on			
	GLA	RST	ROS	Total	GLA	RST	ROS	Total	GLA	RST	ROS	Total
GLA	-0.6	0.0	0.0	-0.6	-0.2	0.6	-0.1	0.3	-0.8	0.6	-0.1	-0.3
RST	1.2	0.0	1.8	3.0	-0.1	1.2	-0.2	1.0	1.1	1.2	1.7	4.0
ROS	0.0	0.0	-0.8	-0.8	-0.2	0.9	-0.5	0.3	-0.2	0.9	-1.3	-0.5
Total	0.7	0.0	1.0	1.7	-0.5	2.8	-0.8	1.5	0.2	2.8	0.2	3.2

Tables 12 and 13 show the impact of movers based in RST and ROS respectively. In both these cases there is a positive impact on the host region of study, but an overall negative impact upon the regions of domicile. The impact of all the Scottish interregional movers is summarised in Table 14. Overall, there is a positive impact upon Scotland as a whole (£m 62.1), but this is distributed unevenly across the regions. Glasgow particularly profits from this student mobility (£m42.7) and to a lesser extent the far larger region

Table 13: Final demand and knock-on impacts of movers studying in ROS (£, m).

	Direct				Knock-on				Direct and knock on			
	GLA	RST	ROS	Total	GLA	RST	ROS	Total	GLA	RST	ROS	Total
GLA	-2.2	0.0	0.0	-2.2	-0.7	-1.5	2.5	0.3	-2.9	-1.5	2.5	-1.9
RST	0.0	-7.9	0.0	-7.9	-0.6	-3.2	4.1	0.3	-0.6	-11.2	4.1	-7.6
ROS	4.8	17.6	0.0	22.4	-0.6	-2.4	14.0	11.0	4.2	15.1	14.0	33.3
Total	2.6	9.6	0.0	12.2	-1.9	-7.2	20.6	11.6	0.7	2.4	20.6	23.8

of ROS (£22.2). The overall loser is RST, which suffers a negative impact of £m-2.9. The direction of this impact is not surprising as it is a sub-region with a large student age population and limited HE provision. However, this impact is much tempered by interregional spill-over of multiplier impacts from GLA and ROS.

Table 14: Final demand and knock-on impacts of movers studying in GLA, RST and ROS (£, m).

	Direct				Knock-on				Direct and knock on			
	GLA	RST	ROS	Total	GLA	RST	ROS	Total	GLA	RST	ROS	Total
GLA	-2.7	9.5	25.6	32.3	11.0	-1.7	1.1	10.4	8.3	7.8	26.7	42.7
RST	1.2	-12.3	1.8	-9.2	8.3	-3.8	1.8	6.4	9.5	-16.0	3.6	-2.9
ROS	4.8	17.6	-12.4	10.0	8.8	-2.8	6.3	12.3	13.6	14.7	-6.1	22.2
Total	3.3	14.8	15.0	33.1	28.1	-8.3	9.2	29.0	31.4	6.5	24.2	62.1

5.3 Commuters

As we saw in Table 5 a significant number of students reside in their region of domicile but commute to attend an HEI outside their home region. Most of these attend an HEI in Glasgow. The impact of this flow is summarised in Table 15. These in-commuters bring significant benefits to the city of Glasgow. Of the direct impact, just over two thirds (£m 22.9) is incurred in Glasgow, whilst the remainder is incurred in the regions of domicile, RST (£m 9.0) and ROS (£m 7.3), respectively. This is offset slightly by the multiplier impacts, which spill-over from Glasgow into RST and ROS. Therefore, in the end, just over half of the total impact (£m 32.4) is incurred in Glasgow, whilst the remainder is split between RST (£m 16.2), and ROS(£m 14.1).

Table 15: Final demand and knock-on impacts of Commmuters studying in GLA (£, m).

	Final demand				Direct and induced impacts				Gross output			
	GLA	RST	ROS	Total	GLA	RST	ROS	Total	GLA	RST	ROS	Total
GLA	0.0	21.8	1.2	22.9	7.8	1.3	0.4	9.5	7.8	23.1	1.6	32.4
RST	0.0	6.9	0.0	6.9	5.9	2.8	0.6	9.3	5.9	9.7	0.6	16.2
ROS	0.0	0.0	3.5	3.5	6.3	2.1	2.2	10.6	6.3	2.1	5.7	14.1
Total	0.0	28.7	4.7	33.3	19.9	6.2	3.2	29.4	19.9	34.9	7.9	62.8

Another way to look at this is to focus on the region where most of the commuting students come from, the RST. The impact attributable to commuting students living in RST is reported in Table 16. Just over half of the overall impact is incurred in Glasgow (52%, £m 30.8) and 21% in the ROS (£m 12.4). 28% of

the impact of these students can be attributed to their home region RST. However, ultimately the impact is moderated by multiplier impacts spilling across boundaries as only 23% of the final demand stimulus of these student's consumption expenditures is incurred in the RST.

Table 16: Final demand and knock-on impacts of commuting students living in RST (£, m).

	Final demand				Direct and induced impacts				Gross output			
	GLA	RST	ROS	Total	GLA	RST	ROS	Total	GLA	RST	ROS	Total
GLA	0.0	21.8	0.0	21.8	7.4	1.4	0.3	9.1	7.4	23.1	0.3	30.8
RST	0.0	7.4	0.0	7.4	5.6	3.0	0.5	9.1	5.6	10.4	0.5	16.4
ROS	0.0	2.6	0.0	2.6	5.9	2.3	1.6	9.8	5.9	4.8	1.6	12.4
Total	0.0	31.7	0.0	31.7	18.9	6.7	2.4	28.0	18.9	38.4	2.4	59.7

Once the impact of all the commuter flows within Scotland has been estimated, as is reported in Table 17, it is clear that the economy of Glasgow is the primary beneficiary absorbing 46% of the total impact. However, again it is worth stressing that the total impact is moderated through the economic structure as a disproportionate share of the knock-on impacts are incurred in RST and RST. Glasgow received 29

Table 17: Final demand and knock-on impacts of commuters studying in GLA, RST and ROS (£, m).

	Direct				Knock-on				Direct and knock on			
	GLA	RST	ROS	Total	GLA	RST	ROS	Total	GLA	RST	ROS	Total
GLA	1.0	21.8	1.2	23.9	8.1	1.7	0.8	10.7	9.1	23.5	2.0	34.6
RST	1.5	7.4	0.1	9.0	6.1	3.7	1.3	11.2	7.6	11.1	1.5	20.2
ROS	0.7	2.6	4.0	7.3	6.5	2.8	4.6	13.9	7.3	5.3	8.6	21.2
Total	3.2	31.7	5.3	40.2	20.8	8.1	6.7	35.7	24.1	39.8	12.0	75.9

5.4 External students in Scotland

As is revealed in Table 18, students moving from the rest of the UK to study at Scottish HEIs provide a significant demand injection through their consumption expenditures in Scotland. By far, the largest share of this impact is incurred in the ROS (18%, £m46.1) with 18% going to Glasgow (£m 10.0) and only 1% to the RST. The RST, however, benefits significantly from the indirect and induced effects of this stimulus, with 17% of the knock-on impacts going to RST (£m 11.4) 17% to Glasgow and 61% to the ROS. The aggregate impact of these incoming students for Scotland is £m 1092.2, of which 72% are incurred in the ROS, 17% in Glasgow and 11% in the RST.

Table 18: Final demand and knock-on impacts of RUK students coming to Scotland (£, m).

	Direct					Knock-on				Direct and knock on				
	GLA	RST	ROS	RUK	Total	GLA	RST	ROS	Total	GLA	RST	ROS	RUK	Total
GLA	0.0	0.0	0.0	10.0	10.0	3.4	0.1	5.2	8.7	3.4	0.1	5.2	10.0	18.8
RST	0.0	0.0	0.0	0.5	0.5	2.6	0.2	8.6	11.4	2.6	0.2	8.6	0.5	11.9
ROS	0.0	0.0	0.0	46.5	46.5	2.7	0.2	29.2	32.1	2.7	0.2	29.2	46.5	78.6
Total	0.0	0.0	0.0	57.1	57.1	8.7	0.5	42.9	52.1	8.7	0.5	42.9	57.1	109.2

The converse of this in-migration, is the significant flow of Scottish students going to study at HEIs in the RUK. The impacts are analysed in Table 19. The direct impacts primarily affect the ROS. Of the overall Scotland-wide expenditure displacements, 92% (£m27) are incurred in the ROS, while only 3% and 5% affect GLA and RST, respectively. Again, interregional spill-over of multiplier impacts acts to distribute these impacts mover evenly across the regions, so that overall 79% (£m -44.6) can be attributed to ROS, whilst £m -4.5 (8 %) and £m -7.2 (13%) are incurred in GLA and RST, respectively.

Table 19: Final demand and knock-on impacts of Scottish students going to RUK (£, m).

	Direct					Knock-on				Direct and knock on				
	GLA	RST	ROS	RUK	Total	GLA	RST	ROS	Total	GLA	RST	ROS	RUK	Total
GLA	-0.9	0.0	0.0	0.0	-0.9	-0.3	-0.3	-3.0	-3.6	-1.2	-0.3	-3.0	0.0	-4.5
RST	0.0	-1.4	0.0	0.0	-1.4	-0.2	-0.6	-5.0	-5.8	-0.2	-2.0	-5.0	0.0	-7.2
ROS	0.0	0.0	-27.0	0.0	-27.0	-0.2	-0.4	-16.9	-17.6	-0.2	-0.4	-43.9	0.0	-44.6
Total	-0.9	-1.4	-27.0	0.0	-29.3	-0.8	-1.3	-24.9	-27.0	-1.6	-2.7	-51.9	0.0	-56.3

Once the impacts of incoming and outgoing students have been added up (see Table 20) approximately two thirds of the direct impacts (£m 19.5) are incurred in ROS and the remaining third (£m 9.2) in Glasgow. The RST suffers a modest negative impact on balance (£m -0.9). Once all the effects have been added up it is clear that all three regions benefit from the net-flow of students between Scotland the RUK. Not surprisingly the biggest benefits are reaped where there is significant HE provision. The net-impact upon Glasgow is boosted by a relatively immobile indigenous student population and although the direct impacts upon RST are negative, the overall impacts are positive, due to spill over impacts from Glasgow and ROS.

Table 20: Final demand and knock-on impacts of students moving between Scotland and RUK (£, m).

	Direct					Knock-on				Direct and knock on				
	GLA	RST	ROS	RUK	Total	GLA	RST	ROS	Total	GLA	RST	ROS	RUK	Total
GLA	-0.9	0.0	0.0	10.0	9.2	3.1	-0.2	2.2	5.1	2.3	-0.2	2.2	10.0	14.3
RST	0.0	-1.4	0.0	0.5	-0.9	2.3	-0.4	3.6	5.6	2.3	-1.8	3.6	0.5	4.7
ROS	0.0	0.0	-27.0	46.5	19.5	2.5	-0.3	12.2	14.5	2.5	-0.3	-14.8	46.5	34.0
Total	-0.9	-1.4	-27.0	57.1	27.8	8.0	-0.8	18.0	25.2	7.1	-2.3	-9.0	57.1	53.0

Finally, Table 21) shows the impact of students from the Rest of the World coming to Scotland to study. This clearly benefits all the regions, approximately in line with their share of the overall HE provision. However, unfortunately data is not available on the outward mobility of Scottish students going further afield than the RUK.

5.5 Aggregate impact of students

The aggregate impact of all student types is presented in Table **??** below. Once these are added up, the negative displacement impacts are cancelled out by positive expenditure impacts. However, these net impacts

Table 21: Final demand and knock-on impacts of students from the ROW (£, m).

	Direct		Knock-on				Direct and knock on				
	ROW	Total	GLA	RST	ROS	Total	GLA	RST	ROS	ROW	Total
GLA	31.8	31.8	10.8	0.5	10.5	21.8	42.6	0.5	10.5	53.6	107.1
RST	2.4	2.4	8.1	1.0	17.3	26.4	10.6	1.0	17.3	28.8	57.7
ROS	93.9	93.9	8.7	0.7	58.9	68.3	102.6	0.7	58.9	162.2	324.4
Total	128.1	128.1	27.6	2.2	86.7	116.5	155.8	2.2	86.7	244.6	489.2

are not distributed evenly across regions. Once the impacts of all student types have been aggregated this reveals that all regions enjoy a positive demand impact from students' consumption expenditures. However, given the different types of regions examined

Table 22: Final demand and knock-on impacts of all students in Scotland by origin and region of study(£, m).

Studying in GLA

	Direct						Knock-on				Direct and knock on					
	GLA	RST	ROS	RUK	ROW	Total	GLA	RST	ROS	Total	GLA	RST	ROS	RUK	ROW	Total
GLA	18.5	31.3	26.7	10.0	31.8	118.3	40.3	0.5	-0.9	39.9	58.8	31.8	25.8	10.0	31.8	158.2
RST	0.0	2.6	0.0	0.0	0.0	2.6	30.3	1.1	-1.5	29.9	30.3	3.7	-1.5	0.0	0.0	32.5
ROS	0.0	0.0	-8.0	0.0	0.0	-8.0	32.3	0.8	-5.0	28.1	32.3	0.8	-13.1	0.0	0.0	20.0
Total	18.5	33.9	18.7	10.0	31.8	112.9	102.9	2.3	-7.4	97.8	121.4	36.2	11.2	10.0	31.8	210.7

Studying in RST

	Direct						Knock-on				Direct and knock on					
	GLA	RST	ROS	RUK	ROW	Total	GLA	RST	ROS	Total	GLA	RST	ROS	RUK	ROW	Total
GLA	0.2	0.0	0.0	0.0	0.0	0.2	0.1	9.4	0.0	9.4	0.3	9.4	0.0	0.0	0.0	9.6
RST	2.7	42.2	1.9	0.5	2.4	49.9	0.1	20.4	-0.1	20.4	2.8	62.6	1.9	0.5	2.4	70.2
ROS	0.0	0.0	-0.3	0.0	0.0	-0.3	0.1	15.3	-0.2	15.2	0.1	15.3	-0.6	0.0	0.0	14.8
Total	3.0	42.2	1.6	0.5	2.4	49.7	0.2	45.1	-0.3	44.9	3.2	87.3	1.3	0.5	2.4	94.7

Studying in ROS

	Direct						Knock-on				Direct and knock on					
	GLA	RST	ROS	RUK	ROW	Total	GLA	RST	ROS	Total	GLA	RST	ROS	RUK	ROW	Total
GLA	-2.0	0.0	0.0	0.0	0.0	-2.0	-0.7	-1.4	26.6	24.5	-2.6	-1.4	26.6	0.0	0.0	22.5
RST	0.0	-7.5	0.0	0.0	0.0	-7.5	-0.5	-3.1	43.7	40.1	-0.5	-10.5	43.7	0.0	0.0	32.7
ROS	5.5	20.1	71.0	46.5	93.9	237.2	-0.5	-2.3	148.6	145.8	5.0	17.8	219.6	46.5	93.9	382.9
Total	3.6	12.7	71.0	46.5	93.9	227.7	-1.7	-6.7	218.8	210.4	1.9	5.9	289.9	46.5	93.9	438.1

All students

	Direct						Knock-on				Direct and knock on					
	GLA	RST	ROS	RUK	ROW	Total	GLA	RST	ROS	Total	GLA	RST	ROS	RUK	ROW	Total
GLA	16.8	31.3	26.7	10.0	31.8	116.6	39.7	8.4	25.6	73.7	56.5	39.7	52.3	10.0	31.8	190.3
RST	2.7	37.4	1.9	0.5	2.4	45.0	29.9	18.4	42.1	90.4	32.6	55.8	44.1	0.5	2.4	135.4
ROS	5.5	20.1	62.6	46.5	93.9	228.8	31.9	13.8	143.3	189.0	37.4	33.9	206.0	46.5	93.9	417.8
Total	25.1	88.8	91.3	57.1	128.1	390.3	101.4	40.7	211.1	353.1	126.5	129.4	302.4	57.1	128.1	743.5

6 Conclusions

This paper shows how an interregional input-output model can be used to analyse consumption impacts and displacements. This is illustrated through an application to higher education students within a city region and its host regional economy. Students are a heterogeneous group that provides both positive expenditures stimulus and negative expenditure displacement over space. This application combines accounting data on students' expenditures and post code level data on their origins and destinations to construct a spatial expenditure and displacement profile for four different student types: locals, commuters, movers and externals. This shows that at a local level mobile students can shift consumption demand over space. For regions with a net inflow this is positive, but negative for net outflow regions.

From a policy point of view the analysis shows that it is not only the location of the HEIs that matters for shaping the local level consumption impact of students, but also the composition of the student body and economic structure. Expenditure spill-over effects are important in some cases. Therefore it can be argued more generally that higher education institutions benefit not only the student cities themselves, but also the city region. This is of course due to the proximity to the student centre and hence more distant places are unlikely to benefit similarly. Therefore, it would be useful to obtain comparable results for peripheral regions.

It should be noted that this study analyses solely the impact of students as consumers providing a demand side-stimulus. However, students interact with their host economy through a wider range of channels, such as through labour supply (Munro et al. 2009). Furthermore, students typically become graduates and there is some evidence that the location of study can influence their choice of future residence (e.g. Montgomery & Beeson 1993, Bound et al. 2004). In this role they further stimulate their host economy such as through labour productivity (Bradley & Taylor 1996, Harmon et al. 2003), knowledge exchange (Faggian & McCann 2006), externalities (Moretti 2004*a*,*b*) and potential socioeconomic feedback, such as on crime (Machin et al. 2011). Therefore, for future research it would be desirable to examine students, not only as mobile consumers, but also in their many other roles that influence the economy, such as a flexible labour force. This would require an approach that explicitly identifies the supply-side of the economy, such as a through an applied general equilibrium model. Furthermore, it would be useful to consider the entire 'supply-chain' from students to graduates.

The modelling framework is likely to have additional applications in other cases where the income and expenditure aspects of consumption are disjoined over space. Such issues often feed acrimony between constituencies (Hewings et al. 2001, Hewings & Parr 2007). An example of this would be transfer payments.

Benefit payments are funded through taxes, thereby displacing consumption of some groups, while supporting the consumption of others. Often the 'winners' and 'losers' from such policies are geographically polarised. A recent example of this is criticism of incentives for new house building in England, which are funded through levies on local governments but accrue to those areas with the most buoyant housing demand. This has been criticised for being effectively a transfer from north to south[3]. This kind of framework would allow an analysis the extent to which such transfers shift demand over space.

[3]http://www.guardian.co.uk/politics/2012/dec/29/cuts-councils-newcastle-liverpool-sheffield

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