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Expenditure Impacts of Higher Education Institutions and their Spatial Distribution: Glasgow City Region v the Rest of Scotland

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Several previous studies have established that higher education is a significant sector in the Scottish economy. The most recent of these find the expenditure of Higher Education Institutions (HEIs) and their staff support approximately 4% of gross output in Scotland, based on conventional multiplier based impact attribution. If the role of Scottish Government funding is discounted (due to the binding budget constraint imposed by the Barnett funding mechanism) this is still a sizeable 2%; indicating that higher education is a significant export sector (for details see: Hermannsson et al 2013ab). It has long been recognised that higher education as a sector is even more important for the local economies where the HEIs are concentrated. For example, in a 1966 issue of the Scottish Journal of Political Economy Blake and McDowell settle the argument, which is more important for the economy of St Andrews, the university or the golf course.

This article analyses the role of higher education in the economy of Glasgow (GLA) and the rest of the Strathclyde regions (RST). The aim is to compare and contrast the impact of the west coast institutions to the impacts of HEIs in the rest of Scotland (ROS). In particular the aim is to examine the degree to which the spatial distribution of HE activities between the West and the ROS is determined by Scottish Government funding decisions and to what extent this is driven by success at securing external students and funding.

This analysis is based on Hermannsson (2012), which utilises a comprehensive income and expenditure database for HEIs in Scotland (Hermannsson et al, 2010) constructed for the year 2006. This is augmented by analysing some broad income trends since 2006 to determine the subsequent changes in the Glasgow HE sector and its relative position vis-à-vis the rest of Scotland. The focus of this article is only on the role of the HEIs themselves. However, the associated impacts of students' consumption expenditures are equivalent to about 20% of the expenditure impacts of HEIs (Hermannsson et al 2013 a).

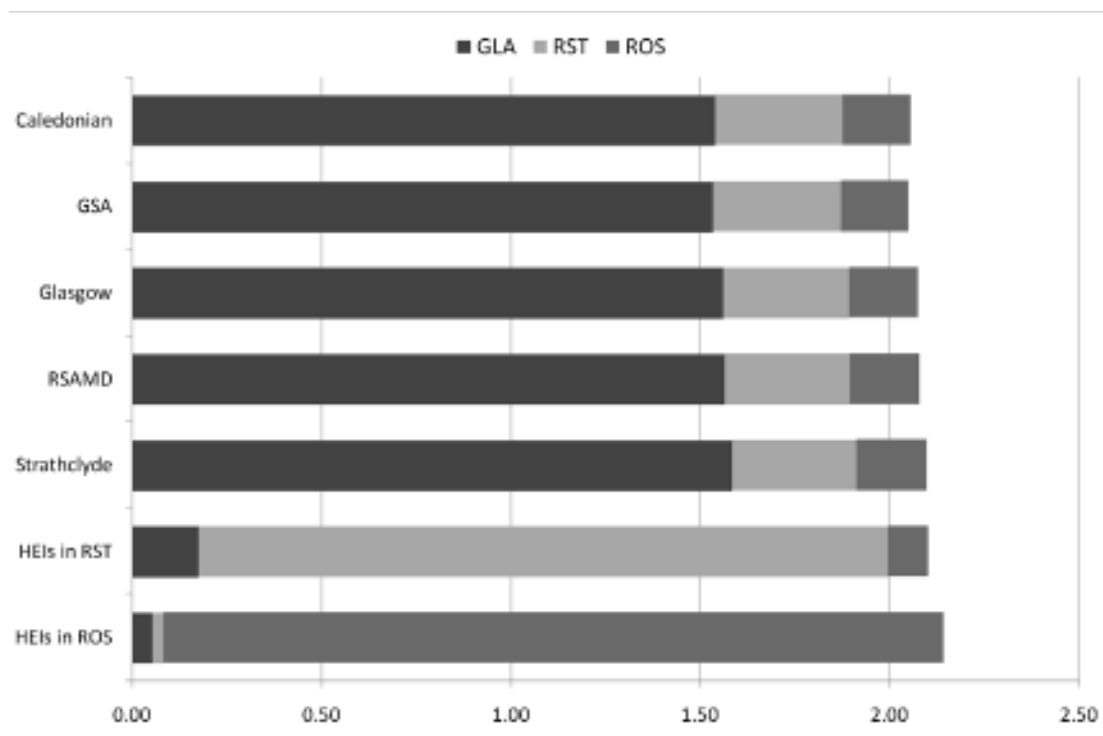
As argued here the simple expenditure impacts of HEIs are significant and any changes in these are immediately felt in the institutions' host communities. However, in the longer term probably the single most important economic impact driven by HEIs is through increasing the skills of participants in the labour market. Every year this increase in human capital enhances the productivity of the labour force, augmenting the capacity of the economy and stimulating competitiveness (Hermannsson et al 2010). Furthermore, there are a range of wider impacts from education in general and some from higher education in particular. These include technological spillovers, the benefits of education to private individuals (happiness, child rearing, marital success, longevity etc.) and various socioeconomic feedbacks such as on health, crime rates, civic institutions etc. These impacts are potentially very large although the evidence base is weaker than for the more directly observable labour market impacts. For details of this point see (McMahon 2004) and for a review of the available evidence on different types of economic impacts of universities I refer to Hermannsson & Swales (2010).

Expenditure impacts of HEIs

Determining the sub-regional and interregional expenditure impacts of the HEIs themselves is a relatively straightforward matter, given the Input-Output database, which identifies each HEI as a separate sector and furthermore identifies the spatial distribution of their expenditures. The figure below reveals the interregional Type-II output multipliers for the Glasgow HEIs (Caledonian, GSA, Glasgow, RSAMD and Strathclyde) and two aggregate sectors comprising the HEIs in RST and ROS, respectively.

The output multipliers show how £1 of final demand translates into an output impact and how it is distributed spatially across Scotland. For example, imagine that the University of Strathclyde were to receive an exogenous injection of £100m, say in the form of increased fees from overseas students, we can infer from the interregional Type-II output multiplier that this would result in a Scotland-wide output impact of approximately £210m. Output in Glasgow would be stimulated by approximately £160m, while output in the rest of the Strathclyde region and the rest of Scotland would be boosted by approximately £30m and £20m, respectively.

Figure 1 Interregional Type-II output multiplier of the HEI sectors identified in the 3-region GLA-RST-ROS HEI disaggregated IO-table.



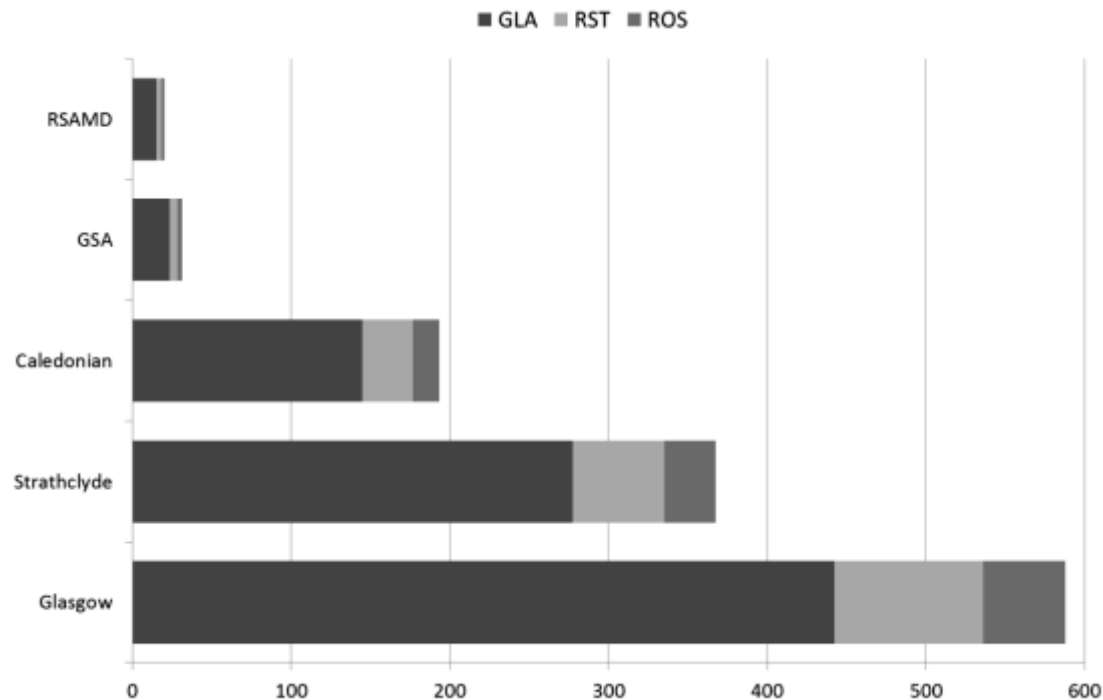
As the diagram reveals, most of the knock-on impacts are incurred within the HEIs' host regions, most markedly for the aggregated impacts of universities located in the larger regions RST and ROS. Glasgow is the most open region with significant knock-on impacts occurring in the other two regions, particularly in RST.

Figure 2 reveals the absolute output impact of individual universities located in Glasgow on the Glasgow, RST and ROS economies. Overall the Glasgow HEIs drive a Scotland-wide output impact of £1.2 bn. This amounts to approximately 0.7% of total output in Scotland. As the output impact is the product of the institutions' final demand and its output multiplier, scale is a significant driver of impact. In this regard the University of Glasgow is the biggest institution, generating approximately half of the total impact of all five Glasgow HEIs.

As Figure 2 reveals these impacts are not confined solely to the institutions' host regions, but are distributed through knock-on effects to other sub-regions. The output multipliers are a scale-independent measure of the HEIs' expenditure impacts. However, Figure 3 serves as a reminder that the institutions

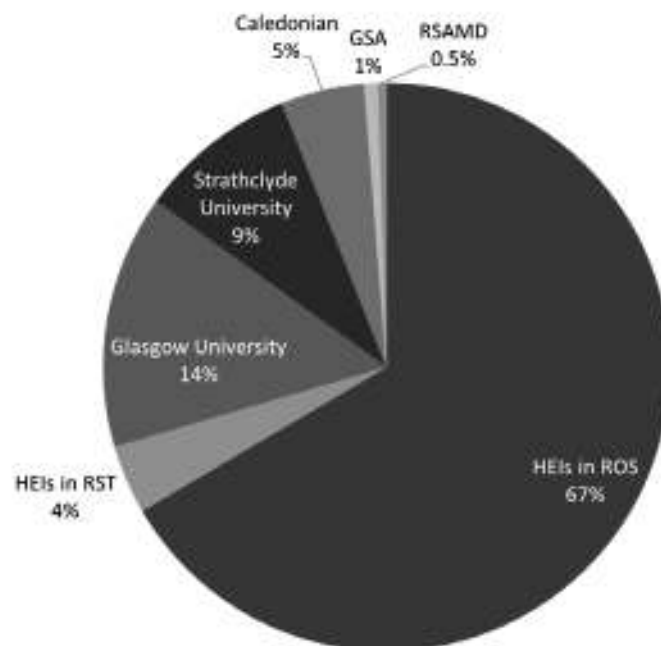
vary greatly in scale, which, given the similarity of Scotland-wide multipliers (Hermannsson *et al*, 2010b) is a key driver of total expenditure impacts.

Figure 2 Interregional Type-II output impacts of HEIs in Glasgow. Horizontal bars represent absolute impact (£ millions), disaggregated by sub-region of impact.



The HEIs in ROS sector is composed of 13 HEIs in the ROS and the HEIs in RST is a composite of the two institutions in the Strathclyde region, Bell College and the University of Paisley, which in fact have now merged to form the University of the West of Scotland. The five Glasgow HEIs therefore represent approximately 30% of the total expenditure impacts of the sector in Scotland.

Figure 3 Percentage-breakdown of the Type-II output impact of HEIs in Scotland



Interregional distribution of HEI activities and impacts within Scotland

Figure 4 reveals where the stimuli of the HEI-sector originate and how they spread across Scotland through knock-on impacts. The rows indicate the origin of the stimulus while the columns reveal the location of impact. For example, looking at the top row, this depicts the impact of HEIs in Glasgow and how these are spread across Scotland. Reading across we can see that Glasgow HEIs exert an impact of £904m upon Glasgow itself, drives £192m of output in the rest of the Strathclyde region and £106 in the rest of Scotland. The rightmost value sums this up to reveal a Scotland-wide impact of HEIs in Glasgow of £1,201m. If we work our way down the GLA column in the table we see what impacts the HEIs in different parts of Scotland exert upon Glasgow. The local HEIs cause an impact of £904m upon their host city while HEIs in the rest of the Strathclyde region have an impact upon Glasgow to the tune of £13m and the HEIs in the rest of Scotland drive an output impact of £67m in the city. The sum of the column reveals that all HEIs in Scotland drive £984m of output within the City of Glasgow. Generally, for the HEIs in each sub-region, most of the impacts are felt within their host region, although significant impacts spill over to other regions. For example the HEIs in the rest of Scotland (RST) generate a Scotland-wide output impact of £159m. Of this, £138m or 87% occur within the host region while £13m are felt in GLA and £8m in the ROS. Of this, £138m or 87% occur within the host region while £13m are felt in GLA and £8m in the ROS.

Figure 4 spatially disaggregated Type-II output impact of HEIs in Scotland. Rows indicate location of HEIs and columns reveal location of impact (£m).

		Location of impact			SCO total
		GLA	RST	ROS	
Location of HEI	GLA	904	192	106	1,201
	RST	13	138	8	159
	ROS	67	35	2,604	2,706
SCO total		984	365	2,717	4,066
– % of SCO total		24%	9%	67%	100%

HEIs in Glasgow receive approximately 31% of the income of the HEIs sector in Scotland. A noteworthy feature of these results, however, is that Glasgow only reaps 24% of the output impacts of the overall HEIs sector in Scotland. If we take a look at GLA and RST in conjunction (the whole of the Strathclyde region) we saw in Section 4.1 that HEIs in this area receive approximately 34% of the income of the overall sector in Scotland. However, the region receives approximately 33% of the output impact of the HEIs sector in Scotland. Thereby it is evident that a significant share of the spillovers from Glasgow are captured in the RST. On balance, however, it is clear that due to interregional linkages, the Strathclyde region captures less of the output impact of the HEIs sector in Scotland (33%) than the scale of the HEIs in Strathclyde (34% of the income of the Scotland-wide sector) would suggest. From the point of view of policy discourse in Scotland, this is of further interest as Glasgow and the Strathclyde region are perceived to host a relatively large share of the HEIs sector vis-à-vis the rest of Scotland, or at least command a respectable share of the sector given the relative scale of the area.

As we see from Figure 5, this perception holds from the narrow perspective of HEIs in Glasgow as part of Glasgow city. For the narrow city council area the HEIs are certainly over-represented relative to the city's share of overall population in Scotland¹. However, as I argue in Chapter 3, Glasgow and the rest of the Strathclyde region are economically very interdependent and can be treated as a single functional entity. Looking at the Strathclyde region as a whole HEI capacity is relatively under-provided vis-à-vis the rest of Scotland. Due to the interregional economic structure of Scotland this imbalance is further exacerbated as the Strathclyde region as a whole enjoys less of the output impact of HEIs than the scale of the area's HEIs sector would suggest.

Figure 5 Share of population, HEIs sector and output impacts of HEIs by region in Scotland.

	GLA	RST	ROS	Scotland (GLA+RST+ROS)	Strathclyde area (RST + GLA)
Population 2006 (headcount)	580,700	1,443,900	3,092,300	5,116,900	2,024,600
% of row total	11%	28%	60%	100%	40%
Income of HEIs (£ millions)	627	78	1,359	2,065	706
% of row total	30%	4%	66%	100%	34%
Output impact of HEIs (£ millions)	984	365	2,717	4,066	1,349
% of row total	24%	9%	67%	100%	33%

Does this result imply that the HEIs sector is not equitably spread across space in Scotland, with the rest of Scotland being favoured at the expense of the Strathclyde area? As we know, just over one half of the sector's funding comes from the Scottish Government, so perhaps the question should be raised if spatial distribution of HEIs' income in Scotland reflects a relative underperformance of the HEIs in the Strathclyde area when it comes to competing for income from students' fees and research grants? HEIs in Glasgow and the rest of the Strathclyde area tend to be more dependent upon funding from the devolved government than HEIs in the rest of Scotland. To address this I turn to Figure 6, which shows the income by source for the aggregate HEI-sectors in each of the three regions.

Figure 6 Income of HEIs in GLA, RST and ROS disaggregated by source (Scottish Government and other funding) for 2006.

	GLA	RST	ROS	Scotland (GLA+RST+ROS)	Strathclyde area (RST + GLA)
Scottish government funding (£ millions)	364	65	700	1,129	429
% of row total	32%	6%	62%	100%	38%
Other income of HEIs (£ millions)	263	14	659	936	277
% of row total	28%	1%	70%	100%	30%
Total income of HEIs (£ millions)	627	78	1,359	2,065	706
% of row total	30%	4%	66%	100%	34%

Looking at the HEIs in the Strathclyde area as a whole they receive 38% of all Scottish Government funding for HEIs. This is still slightly less than the area's population share would imply. However, when we look at the other sources of funding it is the extent to which the Strathclyde area is at a disadvantage vis-à-vis the rest of Scotland that is striking. Only 30% of the other income of HEIs in Scotland can be attributed to the HEIs in the Strathclyde area, where 40% of the population reside, whereas the remaining 70% can be attributed to the HEIs in the rest of Scotland, where 60% of the population reside. What drives this relative underperformance of the HEIs sector in the Strathclyde area is beyond the capacity of this analysis to answer. However, as a large share of the other funding category is external to the Scottish economy (UK-wide and international research funding and tuition fees) it is clear that a considerable boost to the Scottish economy could be obtained by raising the share of exogenous income of the Strathclyde HEIs to the same level as for those institutions in the rest of Scotland.

Looking at the HEIs in Strathclyde in aggregate 61% of their income comes from the Scottish Government while 39% comes from other sources. The same ratios for the HEIs in the rest of Scotland are 52% and 48%. If Scottish Government funding were held constant but the HEIs in Strathclyde could raise their share of other income to 48%, this would mean additional income for the Strathclyde HEIs sector to the tune of £119 m ((429/0.52)-706=119). This amounts to just under 17% of the aggregated income of HEIs in GLA

and RST. Whether this is possible seems to be granted by the performance of HEIs in ROS. Whether this is feasible is an altogether more complicated matter. For example, would additional efforts at drawing in external funding and students substitute or complement efforts to train the indigenous population? If research grants and external students are complementary to efforts at training graduates for the local labour market then the outcome is all-round positive. However, if these income earning activities are at the detriment of efforts geared towards the host economy then these goals are conflicting and it cannot be determined *a priori* if boosting the Strathclyde HEIs' share of other funding is ultimately beneficial to the Scottish economy.

Trends from 2006

Figure 7 Scottish HEIs, total income in £000s, 2006-2012.

	2006	2007	2008	2009	2010	2011	2012
The University of Aberdeen	156,983	172,563	186,253	216,723	227,091	221,026	217,014
University of Abertay Dundee	32,455	34,395	36,074	37,812	36,252	37,054	34,164
Bell College	19,924	21,748					
The University of Dundee	163,971	175,791	191,379	207,687	219,090	229,211	223,316
Edinburgh College of Art	14,707	17,147	16,945	16,503	17,966	26,157	
Edinburgh Napier University	81,351	88,823	99,350	100,392	105,708	106,173	103,971
The University of Edinburgh	435,569	477,062	555,319	591,533	633,979	650,829	700,887
Glasgow Caledonian University	97,644	100,441	103,551	111,381	115,862	113,512	107,435
Glasgow School of Art	15,799	17,437	18,330	19,462	21,403	22,544	23,303
The University of Glasgow	312,372	361,743	397,005	421,152	439,471	450,195	439,839
Heriot-Watt University	99,545	110,564	117,820	134,501	142,662	150,359	155,647
Queen Margaret University Edinburgh	27,570	27,409	31,013	35,174	33,552	34,041	34,346
The Robert Gordon University	75,084	79,188	86,567	91,720	94,324	93,017	88,669
Royal Conservatoire of Scotland	10,378	11,765	12,790	13,169	14,749	15,648	16,543
The University of St Andrews	108,762	118,331	129,123	147,061	155,788	165,706	170,242
SRUC	43,659	44,096	44,878	47,424	49,776	55,002	54,540
The University of Stirling	83,663	88,872	92,922	96,946	101,948	102,184	99,086
The University of Strathclyde	191,054	203,994	219,275	230,654	230,664	230,016	224,965
University of the Highlands & Islands	35,365	43,754	47,951	52,167	68,174	62,190	57,428
University of the West of Scotland	58,481	63,451	95,395	91,742	95,479	95,917	91,017
Total	2,064,336	2,258,574	2,481,940	2,663,203	2,803,938	2,860,781	2,842,412

Before concluding it is useful to have a quick look at headline indicators for the income of Scottish HEIs and the extent to which this is dependent on funding council grantsⁱⁱ. The two broad trends observed since 2006 is that the income of the HEIs has risen and they are less dependent on the Scottish Funding Council (and hence the Scottish Block Grant) for their income. I shall elaborate on each point in turn. As Figure 7 reveals the total income of the sector has grown significantly in absolute terms in the 7 year period since 2006. With most of the growth occurring in the first half of the period, while the sector has been stagnant in nominal terms since 2010. Over the 7 year period the average annual growth rate comes to about 4.7%, while average annual UK CPI inflation stood at approximately 3.4% in the same period. Hence there's been a modest growth in real terms.

Going back to the regional definitions presented earlier there is marked difference in how this has affected individual sub-regions. Looking at Figure 8 it is clear that the income of HEIs in Glasgow has kept up with inflation, while the RST has shrunk in real terms and HEIs in the ROS have grown in real terms and above the Scottish average.

Given the current climate of public sector austerity it is interesting to analyse how the composition of the HEIs income has evolved over this period. A headline indicator that provides a succinct overview is the share of grants from the Scottish Funding Council in the total income of HEIs. A graphical summary of how this ratio has evolved is provided in Figure 9. Over time this dependency on the funding council has

decreased for Scotland as a whole as well as for HEIs in Glasgow and the Rest of Scotland. Conversely the RST is increasingly dependent on funding council grantsⁱⁱⁱ.

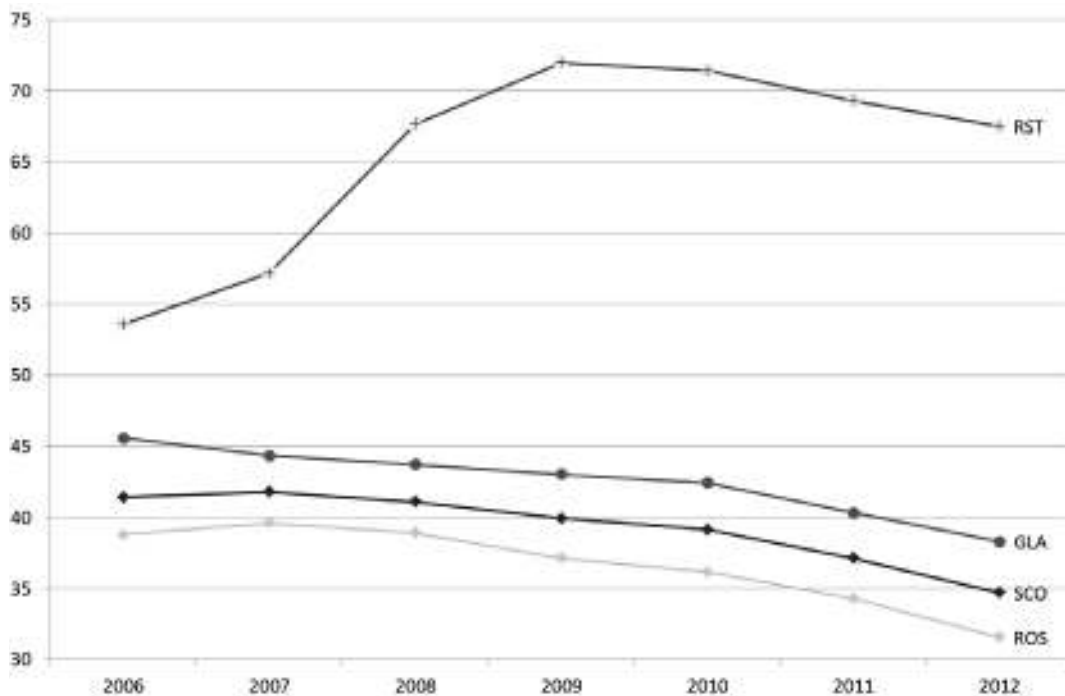
Figure 8 Scottish HEIs, total income in £000s, 2006-2012 aggregated by regions and average annual growth rates.

Sub-region	2006	2007	2008	2009	2010	2011	2012	Growth rate p.a.
GLA	627,247	695,380	750,951	795,818	822,149	831,915	812,085	3.8%
RST	78,405	85,199	95,395	91,742	95,479	95,917	91,017	2.2%
ROS	1,358,684	1,477,995	1,635,594	1,775,643	1,886,310	1,932,949	1,939,310	5.2%
Total (SCO)	2,064,336	2,258,574	2,481,940	2,663,203	2,803,938	2,860,781	2,842,412	4.7%

Conclusions

An analysis of the institutional expenditure impacts reveals that these clearly cut across sub-regional boundaries in Scotland. Most explicitly this was evident for the Glasgow HEIs where 25% of their Scotland-wide output impacts were felt outside their host region. This is due to the economic structure of their host sub-region Glasgow, which is very open, as reflected in the scale of wage payments to the rest of the Strathclyde region and to a lesser extent to the rest of Scotland. Perhaps unsurprisingly the HEIs in the largest sub region (ROS) exhibit the least tendency for impacts to spill-over onto neighbouring sub-regions, with 96% of the output impacts incurring within the region.

Figure 9 Ratio of total funding council grants to total income (%)



Furthermore, I analyse how HEI activities are distributed across the three regions by comparing shares of HEI expenditures with population shares. From this perspective HEIs are clearly over-represented in Glasgow. However, as I have suggested earlier it is misleading to view Glasgow in isolation as it is, in functional terms, very much part of the Strathclyde region. When focusing on the Strathclyde region as a whole (GLA+RST) it is evident that relative to the regions' population, HEI activity is under-represented vis-à-vis the rest of Scotland. When the output impacts (final demand + 'knock-on') of the HEIs are examined the Strathclyde region is at a further loss as an even greater share of output impacts is experienced in the ROS than of direct impacts. A casual observation would suggest that this reflects an in-equitable

distribution of HEI funding across Scotland. However, this is not as straightforward as it may initially appear. Once HEIs income has been disaggregated into Scottish Government funding and other income sources it turns out that public funding is allocated approximately in line with population shares between the whole of the Strathclyde area (GLA+RST) and the rest of Scotland (though the Strathclyde area seems to be, if anything, slightly favoured by the Scottish Government). However, the HEIs in the rest of Scotland appear to be better able to draw income from sources independent of the binding public sector budget constraint imposed by the Barnett formula, i.e. external research funding and students' tuition fees. In principle therefore the HEIs in the Strathclyde region should be able to emulate the success of their counterparts in the rest of Scotland. I calculate that if these were able to complement their public income with external funds to the same extent as the HEIs in the ROS this could result in an additional income of £119m for the Strathclyde HEIs (a 16.8% increase in total income). This should be technically feasible given the precedent of the other Scottish HEIs (although clearly not a light task). However, it is an open question whether this would be desirable for the Scottish economy. If a focus on external income complements the HEIs' capacity for building human capital it is clearly a good thing overall. However, if there is some trade-off between focusing on external competitiveness of the institutions and their role in producing graduates for the local labour market, the outcome would be ambiguous. This is because the cultivation of human capital brings sizeable economic benefits through expanding the supply-side of the economy.

Looking at income trends since 2006 reveals that the income of HEIs in Scotland as a whole has risen in real terms during this period. However, this has occurred more slowly in Glasgow than the rest of Scotland. HEIs in Glasgow and the rest of Scotland have been able to grow their share of funding coming from sources independent of the Scottish Funding Council and decrease their exposure to funding from the Scottish Block Grant.

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ⁱ Universities are central place phenomena and therefore it may not be surprising that Glasgow, as Scotland's largest city, benefits from their presence. A further interesting aspect is to what extent Edinburgh benefits from the presence of HEIs. In population terms Edinburgh is about 80% of the size of Glasgow, but maintains an HEI sector that in income terms is approximately 101% of the size of the Glasgow sector.

ⁱⁱ These numbers are extracted from the HEIDI database, maintained by the Higher Education Statistics Agency (HESA).

ⁱⁱⁱ After amalgamation into the University of the West of Scotland this now just a single HEI.