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# The impact of higher education institutions (HEIs) on the Scottish economy: New evidence from an HEI-disaggregated input-output approach

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## Abstract

*This paper measures the regional demand impacts on output and employment of Scottish Higher Education Institutions (HEIs) based on Input-Output tables for the year 2006. The HEI disaggregated table was developed from existing Input-Output tables using supplementary data from HESA and purchasing data for Scottish universities. We calculate direct, indirect and induced impacts. Most of the existing literature focuses on individual institutions by employing Keynesian Multiplier or Input-Output analysis. This paper adds to the literature by providing the first systematic study of all individual HEIs using a common framework of analysis. The results suggest that HEIs may have substantial regional economic impacts both in terms of output and employment. Furthermore analysis of the HEIs' income sources suggests they are more export intensive than is commonly acknowledged, which motivates a re-evaluation of the appropriate counterfactual in regional impact studies of HEIs.*

*Keywords: HEIs, University Impact, Input-Output.*

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## Introduction and background

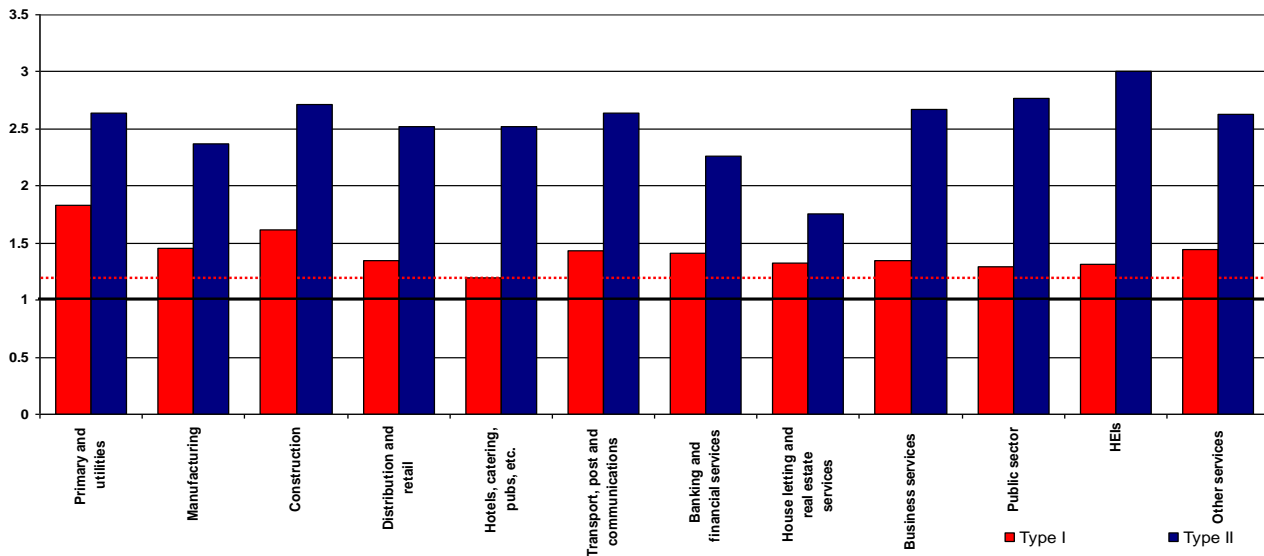
There is now significant, and growing, policy interest in the regional economic impacts of Higher Education Institutions (HEIs) in the UK generally, and in Scotland in particular. The Scottish Government has recently emphasised the important role that it expects universities to play in helping Scotland emerge from the current economic downturn (JFTTU, 2008). Furthermore, the Scottish Government has proposed that universities be recognised as a “key sector” in their own right, in return for ensuring that they align their public-funded activities with the objective of increasing sustainable economic growth. (Universities are the seventh key sector identified by the Scottish Government, the others being: Creative Industries; Energy; Financial and Business services; Food and Drink; Life Sciences and Tourism.) More recently still, Universities Scotland (2009) issued a report that included a review of evidence relevant to assessing the impact of HEIs in Scotland. This paper provides an update of evidence relevant to one important dimension of HEIs, namely their behaviour as businesses, who buy goods and services and employ labour.

There is a considerable body of research on the impact of higher education institutions (HEIs) on their local economies (see for example McGregor et al 2006, Florax 1992). Recently much of this research has focussed on the supply-side impact of HEIs – that is how HEIs affect the productive capacity and competitiveness of their host economy. In this paper, however, we focus exclusively on the more tangible spending, or demand-side, impact of HEIs: that is, how their spending on wages, goods and services affects the local economy. Through the years, several impact studies have been conducted for Scottish HEIs, following the pioneering study for the University of St. Andrews by Blake & McDowell (1967).

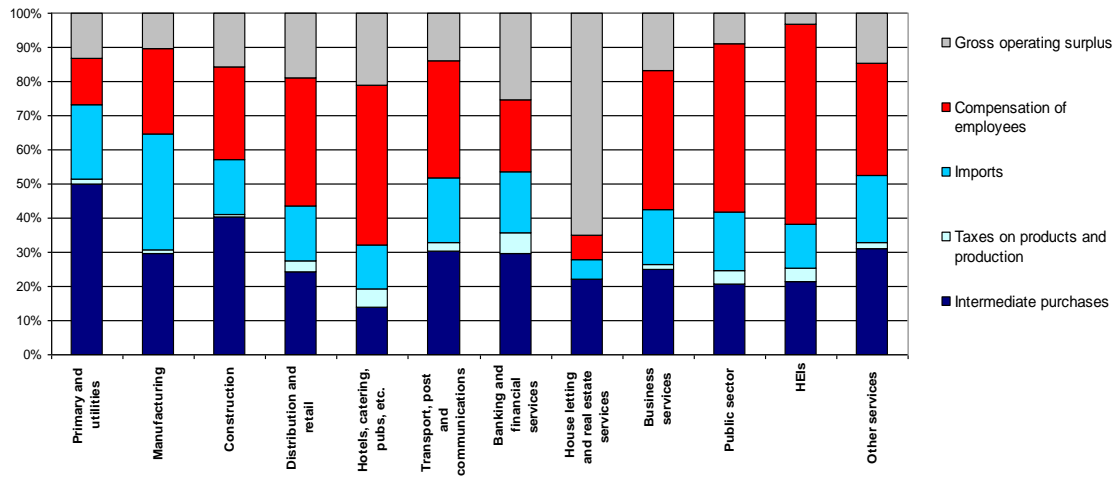
Our analysis is based on an Input-Output table for Scotland, which has been modified to identify individual HEIs as separate production sectors. This allows us to conduct various simulations of the regional impact of all Scottish HEIs, individually and as a group, addressing their economic characteristics systematically within a single framework. When assessing the demand-side regional impact of HEI expenditures we can progress from a quantifiable starting point, the direct spending of the institution and its students, trace this spending through the regional economy and identify an overall impact. From this restricted view, HEIs are usually treated as a source of exogenous demand stimulus to their local economy.

Whether measured in absolute or relative terms Higher Education Institutions (HEIs) constitute a significant industry in Scotland. When everything is included, that is institutional and student spending, and additional knock on effects, the HEIs have a GDP impact of approximately £3bn or 3.3% of total Scottish GDP. This economic activity supports approximately 61,000 FTE jobs, which constitutes about 3.4% of total employment in Scotland.

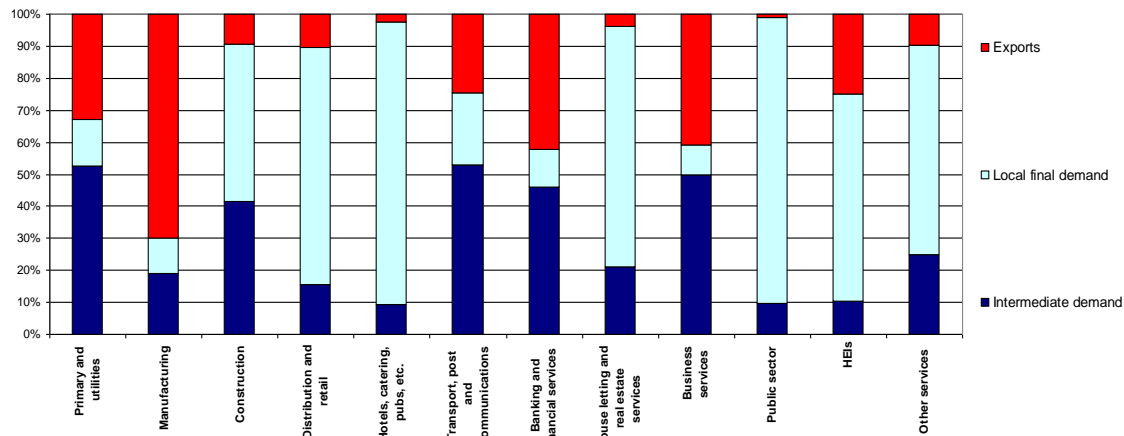
**Figure 1 Output multipliers of Scottish industries at a 12-sector level of aggregation**



**Figure 2 Expenditures of Scottish industries at a 12-sector level of aggregation**



**Figure 3: Income of Scottish industries at a 12-sector level of aggregation**



## Economic characteristics of HEIs

Knock-on effects are important in explaining the economic role of HEIs as their (Type II) output multiplier (which includes the impact of the demand stimulus in increasing employment, incomes and therefore consumption, as well as on intermediate purchases) is among the very highest of sectors in the Scottish economy. When purchases from other Scottish industries and spending of staff are aggregated, they reveal an output multiplier of 3. This means that every one pound spent by a Scottish HEI generates an increase in Scottish output of three pounds.

To put this in perspective, the Type-I and Type-II multipliers for broad Scottish industrial sectors are shown in Figure 1. Type-I multipliers quantify the knock-on effects from local sourcing of intermediate inputs. Their values range from about 1.2 to 1.8. Type-II multipliers also include the knock-on effects of additional wage spending by households and therefore take a higher value. These range from approximately 1.7 to 3, with the HEI sector being at the very top of the range.

The multiplier values are heavily dependent on the extent of initial expenditure leakages from the local economy. Where these leakages are large, the multiplier values are small. Leakages include imports, tax payments and the companies' gross operating surplus, so that in sectors where these expenditures are important, the corresponding multipliers will be low. Typically Type-II multiplier values are high for services whose inputs are to a large extent labour. On the other hand in manufacturing, raw materials and manufactured goods are used intensively as inputs. These are typically more import intensive and therefore leakages occur from the local economy, reducing the multiplier value. Figure 2 shows the expenditure patterns in the economy for the same 12 aggregate –sectors. Examining these data reveals that HEIs expenditure is dominated by wages: little is spent on servicing capital (gross operating surplus), which strengthens the multiplier. Comparing the multiplier of HEIs to the public sector in general indicates that spending on the former results in a bigger overall impact as more expenditure is retained within the local economy.

## Economic impacts

Institutional spending accounts for approximately 80% of the impacts of HEIs, while that of students' forms the remaining 20%. It should be noted however that students' tuition fees contribute to institutional spending (as HEIs income) and are therefore not attributed to student impacts in order to avoid double counting. The spending of students who come to study in Scotland from the rest of the UK and the rest of the World is unambiguously additional to the Scottish economy. However opinions differ as to what extent the impact of local students should be attributed to university impacts. The critical question to answer is what the students would be doing if not studying at a Scottish university. If the answer is that the students would be studying elsewhere, their spending as students in Scotland

is additional to the economy as their expenditure is retained locally instead of being switched elsewhere. If, on the other hand, we assume students would have entered the local labour market instead there is no net-effect on Scotland from their spending as students. No doubt reality typically lies somewhere between these two extreme assumptions. However, in the absence of survey evidence that could be used to motivate the degree of additionality of Scottish students' spending, making the judgement is left to the reader and the impact of each student group is reported separately.

Table 1 shows the demand-side impact of individual Scottish HEIs on Scottish GDP and employment. The figures used here are based on data from the Higher Education Statistical Agency (HESA), which identifies 20 HEIs in Scotland. Recently Bell College and the University of Paisley have merged to form the University of the West of Scotland, but this is yet to be reflected in the statistics. These economic impacts vary widely between institutions, reflecting their scale. Individual HEIs are relatively homogeneous in terms of their expenditure patterns, which are dominated by wages. However their income levels, and therefore expenditure levels, differ significantly. The two biggest institutions, Edinburgh and Glasgow, generate 36% of the total Scottish impact. Adding the next two, Strathclyde and Aberdeen, increases the impact to 54%.

## Exports and the sources of income

Even if HEIs are generally thought of as public institutions (though they are not in fact part of the public sector) there is an element of competition among them for students (and the subsequent funding or tuition fees they bring) and for research funding at a UK, European and international levels. A quarter of HEIs income is from exports to the RUK and the ROW. This income is contingent upon their success in competitive bidding for research funding and in attracting fee-paying students. Comparing the income of Scottish HEIs to the public sector in Scotland reveals a significant difference in that the export earnings of the public sector amount to only around 1% of total income.

In 2006 the export income of Scottish HEIs had a GDP impact of £611 m and supported 13,107 jobs. This source of income is significant for the Scottish economy as it supports 0.63% of GDP and 0.74% of employment. The relevance of these income sources is reinforced by the fact that the amount of export income can vary, and indeed it has. Over a four-year period from 2001/2002 to 2005/2006 it increased by 34%, resulting in an additional 3,326 jobs and £ 155m in GDP. This estimate neglects the further impacts we would expect from the spending of additional foreign students. It is clear that the export success or failure of Scottish HEIs is likely to have significant repercussions for Scotland's economy.

On aggregate 53% of HEIs income is from Scottish Government sources and 22% from other sources, including services rendered. Evidently HEIs' funding from

**Table 1: GDP and employment impact of Scottish HEIs and student spending (£m)**

	GDP £ m					Employment FTE				
	HEI spending	Student impacts			Total	HEI spending	Student impacts			Total
	SCO	RUK	ROW		SCO	RUK	ROW			
Aberdeen	189	24.97	5.15	11.53	230	4,553	440	91	205	5,289
Abertay	38	8.90	1.12	3.97	52	960	157	20	71	1,207
Bell College	25	10.42	0.07	0.07	36	667	183	1	1	853
Dundee	196	31.04	6.65	10.90	223	4,878	547	118	193	5,736
ECA	18	2.62	1.47	2.22	24	436	46	26	39	548
Edinburgh	498	33.50	21.43	23.56	577	11,274	590	380	418	12,663
Caledonian	119	41.81	2.67	5.64	169	2,783	737	47	100	3,667
GSA	19	2.53	1.46	1.78	25	495	45	26	32	597
Glasgow	375	48.31	7.29	12.81	443	8,140	851	129	227	9,348
Heriot-Watt	116	4.79	2.40	24.25	147	2,625	84	43	431	3,182
Napier	96	21.16	2.26	13.17	133	2,239	373	40	234	2,886
Paisley	69	23.42	0.49	3.46	97	1,693	413	9	61	2,176
QMUC	33	9.62	1.77	3.54	48	794	170	31	63	1,057
Robert Gordon	89	23.05	2.07	10.05	124	2,143	406	37	178	2,764
RSAMD	12	1.48	0.52	0.51	15	316	26	9	9	360
St Andrews	129	8.05	8.61	11.93	158	3,081	142	153	212	3,587
SAC	51	2.11	0.16	0.15	54	1,305	37	3	3	1,348
Stirling	99	17.43	3.18	5.83	125	2,494	307	57	103	2,961
Strathclyde	225	41.86	2.32	16.29	285	5,223	737	41	289	6,291
UHI	28	12.24	0.28	0.56	41	973	373	40	234	1,620
<b>Total impact</b>	<b>2,404</b>	<b>369</b>	<b>71</b>	<b>162</b>	<b>3,026</b>	<b>57,071</b>	<b>6,662</b>	<b>1,302</b>	<b>3,104</b>	<b>68,140</b>
<b>% Of SCO total</b>										
<b>GDP/employment</b>	<b>2.7%</b>	<b>0.4%</b>	<b>0.1%</b>	<b>0.2%</b>	<b>3.3%</b>	<b>2.9%</b>	<b>0.3%</b>	<b>0.1%</b>	<b>0.2%</b>	<b>3.4%</b>

the Scottish Government is the single most important source of funding, but HEIs differ significantly from the public sector, in general, in terms both of their pattern of income and their expenditures.

## Conclusion

We have explored the impacts of HEIs, considered as businesses, on the Scottish economy as well as the impacts of the expenditure of students. Scottish universities are major employers and some of them attract a significant number of students from outside Scotland. In order to estimate these impacts we use official data to construct an Input-Output table for Scotland for the year 2006 where we have treated individual HEIs as separate sectors. Our estimates show that based on “shut down” or “hypothetical extraction” assumptions the (Type II) GDP impact of Scottish universities is approximately £2.4bn. Furthermore the

impact of student expenditures is estimated to be £603m. As was expected, the impacts of individual institutions are closely related to their size, while the impacts from student expenditure depends on the ability of an individual institution to attract students from the rest of the UK and the rest of the world. GDP Impacts of individual universities range from £12m for the RSAMD to £498m for the University of Edinburgh. Impacts of total student expenditure for individual universities range from £2.4m for the Scottish Agricultural College to £78.6m for the University of Edinburgh. When considering only the impact of incoming students, GDP impact range from £45m for the University of Edinburgh to £0.14m for Bell College. The impact of the HEIs themselves dominates that of student spending in a ratio of approximately 4 to 1, when considering every student, and approximately 10 to 1 if only incoming students are considered.

We have looked beneath the aggregate impact to reveal how changes in different sources of HEIs' income affect the Scottish economy. Just over half of HEI income comes from the Scottish Government. A little over a quarter of the HEIs' income comes from sources outside Scotland in the form of research grants and tuition fees of foreign (non-EU) students. The amount of this external income is contingent upon the success of Scottish HEIs at attracting students and winning research grants. We estimate the GDP impact of HEIs external income at £611 m, or equivalent to 0.74% of Scottish GDP.

It is worth recalling that the impacts that we explore here relate to universities as businesses, which focuses attention on their impact on the demand side of the economy. HEIs also exert significant effects on their host regions through supply side impacts, for example, by raising the skill levels of the regional labour force, and through knowledge exchange activities. Our future research will seek to measure these additional impacts of HEIs.

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