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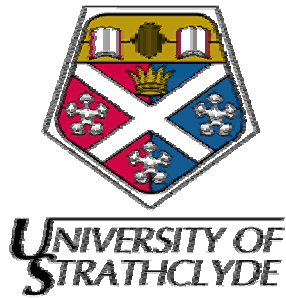
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The impact of the University of Strathclyde on the economy of Scotland and on the City of Glasgow



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Introduction

Over the last decade, there has been significant and growing interest in the role of higher education in the economy. In the early 1990s in Scotland serious interest began to be expressed in ways to estimate the impact of higher education institutions (HEIs) on the economy. A study of the impact of the University of Strathclyde on the Scottish Economy was first undertaken by members of the current project team in 1992¹ and was followed by the first sector-wide study of Scottish Higher Education in 1995.²

The early studies of higher education in the economy were primarily driven by the prevailing political and economic climate of the time, with the government seeking evidence to justify public investment in higher education. However as the 1990s progressed, (and particularly post- Dearing³), the macroeconomic importance of higher education began to be more fully recognised. Considerably more attention began to be paid to economic issues affecting higher education, such as private and social rates of return to graduation.

Subsequent rapid developments in Communications and Information Technology and the related growth of the so-called knowledge-based economy pushed higher education very quickly up the national economic agenda. This was not only in terms of how to maximise the return to public investment in higher education but also in recognition that higher education may now be key to the UK's economic

¹ *The Impact of the University of Strathclyde on the Economy of Scotland* I H McNicoll 1992

² See *The Impact of Scottish Higher Education on the Economy of Scotland* I H McNicoll COSHEP 1995

³ The National Committee of Inquiry into Higher Education HMSO 1997 (the 'Dearing Committee')

competitiveness. As the recent Lambert report (December 2003) emphasises, the UK's future economic prosperity is regarded as being closely linked to its ability to innovate and higher education is now seen as being of central importance in the drive to move the UK economy 'up the value chain'.⁴

Higher education's role in the regional economy is now receiving significant renewed policy attention. The most fundamental contribution of a university to its region is currently being seen in terms of its ability to transfer knowledge to the surrounding economy through its graduates as well as through research and innovation. Regional Economic Development Agencies are being strongly urged to take a proactive approach to working with universities to maximise the potential for supporting innovation and knowledge transfer between universities and surrounding business and industry. In Scotland higher education has come to be seen as key to economic development, playing a pivotal role in the drive to achieve a 'smart successful Scotland'.⁵

However it remains the case that a university's actual existence as a large business entity continues to be of key importance in stimulating economic activity in the surrounding region – irrespective of any intrinsic value attached to its educational outputs. Indeed, few major industries in the UK base arguments for their industry's economic importance on the intrinsic or 'intangible' value of the goods and services they produce. To take another important Scottish industry as an example, the Whisky Industry does not seek government support based on arguments about the relative merits of their product, but rather on the importance of the jobs created and export

⁴ *Lambert Review of Business-University Collaboration* HM Treasury December 2003

⁵ See a range of policy documents and reports e.g. *Research and Knowledge Transfer in Scotland* SHEFC 2002, *The Competitiveness of Higher Education in Scotland* Scottish Executive 2004

earnings generated.⁶ The 2003 Lambert Report highlighted that the relative economic importance of universities within their cities and regions has actually grown substantially with universities now forming a significant part of the economic base of a region, particularly as more ‘traditional industries’ have declined.⁷ While there may be a very strong belief that long term economic success depends on encouraging the ‘knowledge business’ in which universities engage, it is recognised that the Higher Education Sector is still important as a major industry in itself. The only hard indicators of higher education’s economic value cited by Lambert related to the overall generation of output and employment by UK HEIs.⁸

The interest in the economic impact of higher education has led to the early studies of both Scottish and UK Higher Education being updated and extended.⁹ However it is now 12 years since the very first study of Strathclyde University (which arguably set the core policy agenda for subsequent work)¹⁰ was undertaken. It is timely to take a fresh look at the University of Strathclyde’s impact on Scotland.

The current study was undertaken in Spring 2004 and focuses primarily on those aspects of the University of Strathclyde’s contribution to the economy that can currently be quantified and measured in conventional economic terms such as output, employment and export earnings. Key economic characteristics of the University as a

⁶ This issue was discussed at ‘*The impact of higher education on the economy*’ Kelly, McLellan & McNicoll Presentation to Society for Research in Higher Education Conference ‘*Overcoming the Tyranny of Geography*’ Inverness June 2004

⁷ See Lambert 2003 *ibid* (Section 5 ‘Regional Issues’)

⁸ Lambert refers to figures previously produced for all UK HE by the authors of the present report.

⁹ See McNicoll, Kelly & McLellan COSHEP 1999, Kelly, Marsh & McNicoll, Universities UK 2002, McNicoll, Kelly & McLellan, Universities Scotland 2003

¹⁰ As noted in *Universities and Communities* (Goddard et al) CVCP 1994, the 1992 Strathclyde study also set new methodological standards in the use of input-output analysis for the quantification of HE impact.

large business are examined, including its income, expenditure and employment. Modelled estimates are made of the economic activity generated in other sectors of the economy, both throughout Scotland and also within the City of Glasgow, through the secondary or 'knock-on' effects of the expenditure of the University, its staff and its students. Overall the study presents an up-to-date and detailed examination of the University of Strathclyde's quantifiable economic contribution to both the City of Glasgow and to Scotland as a whole.

The study was conducted by Ursula Kelly and Donald McLellan of the Information Resources Directorate of the University of Strathclyde working with Emeritus Professor Iain McNicoll, who served as Technical Adviser on the study.

Methodology and Data Sources

This study presents an assessment of the University of Strathclyde's impact on the economies of Scotland and the City of Glasgow during the academic and financial year 2002-2003, which was the most recent year for which data were available.

The study utilised a two-stage approach to the estimation of the economic impact of the University. The study team firstly used a purpose-designed model of the Scottish economy to analyse the impact of the University of Strathclyde on Scotland. The team then undertook off-model sub-regional analysis to estimate the share of this total impact that was likely to have been generated within the City of Glasgow. The model used was a "Type II" input-output model, previously developed by the team - the

Scottish Labour Market Intelligence Model¹¹ which is based on actual Scottish data and covers 128 separate industries, 371 occupations and 30 levels of qualification. For the purposes of this study the core model matrices were updated using the most recent Scottish Executive Input-Output Tables (2000) and Labour Force Survey data. Details of the mathematical specification of the model are contained in an earlier project report¹², which also outlines the particular theoretical ‘vision’ underlying the input-output approach. Notes on the updating of the model are included here in Appendix 4.

The team conducted off model sub-regional analysis to estimate the share of the University’s impact on Scotland that was likely to have accrued to its host city of Glasgow. There is a fundamental logic to the approach adopted, in that the University of Strathclyde’s impact on any Glasgow industry must have a minimum of zero (0% share of Scottish industry impact) and a maximum equal to the calculated impact on the equivalent Scottish industry as a whole (100% share of Scottish industry impact) . Of course, in reality the Glasgow shares of Scottish impact will typically lie between 0% and 100%. This approach to estimating impact shares had been successfully implemented in previous regional impact studies undertaken by the authors, most recently in studies of London Higher Education for the London Development Agency and a study of the University of Liverpool in the North West Region of England.¹³ Relevant information on aspects of the Glasgow economy was drawn from a range of

¹¹ See *The Scottish Labour Market Intelligence Model Professional Edition* McNicoll, Marsh & Kelly, ©University of Strathclyde 2001

¹² *The Scottish Labour Market Intelligence Project Final Report* McMicoll, Melling & Marsh 1998

¹³ See also, for example, *The impact of Forestry on the Output of the UK and its Member Countries* McGregor and McNicoll Regional Studies Vol 26 No 1 and ‘Measuring FE’s impact on Regional Economies’ McNicoll and Kelly, College Research Vol 2 No 1

sources including publications of the Glasgow Economic Forum, Scottish Enterprise Glasgow and the Glasgow Joint Economic Strategy document.

The study benefited from the full cooperation of the University of Strathclyde in providing access to all relevant data on its income, expenditure and employment as well as on student numbers and domiciles. A copy of the purpose-designed questionnaire used for the study is included as Appendix 1.

Of particular note was the assistance given to the study team by the University of Strathclyde Purchasing Department who provided a significant degree of detail on the University's non-staff purchasing expenditure, both in terms of commodity type and supplier location. This enabled the study team to construct a Strathclyde University-specific expenditure vector for incorporation into the economic model rather than relying solely on expenditure patterns previously observed for other Scottish higher education institutions. The outcomes therefore reflected as closely as possible the particular expenditure characteristics of the University of Strathclyde. The study-specific University data was used in conjunction with a range of published sources, including Higher Education Statistics Agency data and the DFES 2002/03 Student Income and Expenditure Survey (Callender & Wilkinson.) A reference and bibliography section is included as Appendix 5.

The primary focus of the study was the University of Strathclyde as an operating business. However the study also examined the impact of the off-campus expenditure of students from outside Scotland who were studying at the University of Strathclyde

as well as the off-campus expenditure of visitors attracted to the University from other regions of the UK and from overseas.

The expenditure of Scottish domiciled students and visitors was *excluded* as arguably any monies expended by Scottish domiciled persons (other than that spent specifically in relation to higher education, which will be captured within the University of Strathclyde accounts) cannot be regarded as additional to the Scottish economy but would have been spent in Scotland anyway.

SECTION ONE:

**Economic Characteristics of the University of
Strathclyde**

1.1 The University of Strathclyde: The income base

As earlier discussed, one of the underlying policy drivers for an interest in a university's contribution to the economy has sometimes been to seek to justify public investment in higher education or to maximise the return to public expenditure.

While no one would argue against the need for proper accountability for public monies, in discussions on the need to achieve 'value for money' it is sometimes erroneously assumed that universities are public sector bodies and are wholly supported by public funds. In actual fact, no UK higher institution belongs to the public sector and very few (if any) derive 100% of their income from the public purse.

The University of Strathclyde is no exception in this regard, being a private non-profit-making institution, founded in 1796 and granted a Royal Charter in 1964.

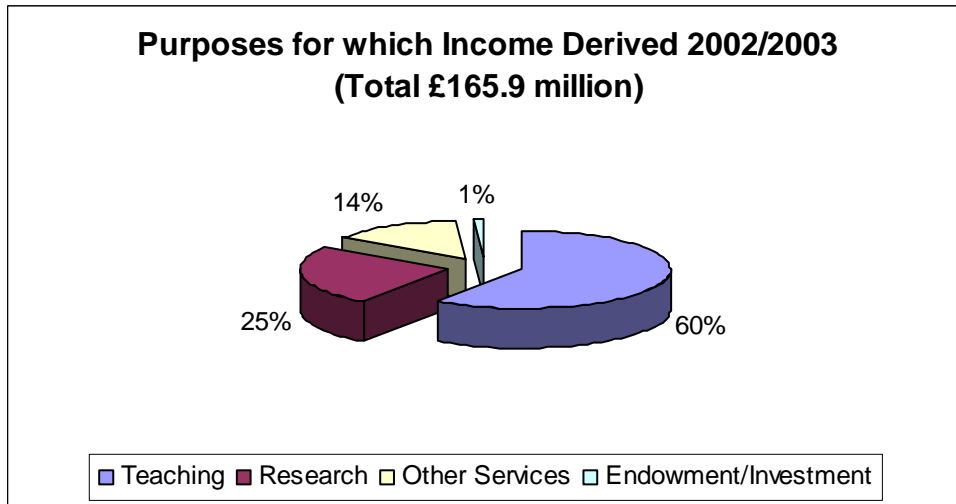
However while all higher education institutions engage in broadly the same portfolio of activities – i.e. teaching, research and other services, there can be considerable diversity among the actual sources of income and the balance of activity undertaken, depending on the particular specialisations of the institution under examination.

The University of Strathclyde provided the study team with detailed information on the University's sources of income and the broad purposes for which it was earned.

In 2002/03 the University of Strathclyde had a total income of £165.9 million, which defines a substantial business operation by any standards. The University received revenue in the shape of Funding Council Grants, Tuition Fees, Research Grants and Contracts, together with payments for a wide range of other services as well as an element of endowment and investment income. In terms of the broad purposes for

which the University derived income from all sources, the proportions are shown in Figure 1 below:

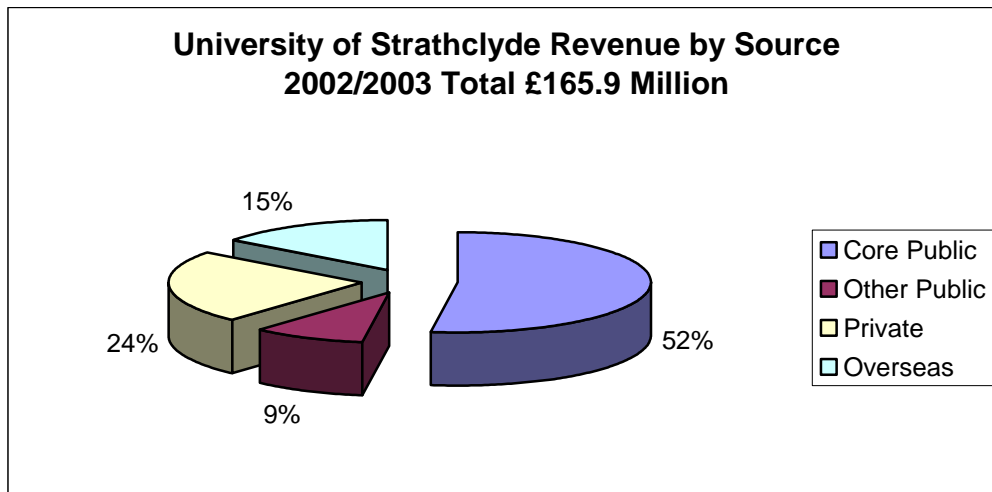
Figure 1: University of Strathclyde Income by broad purpose



As Figure 1 illustrates, the majority of the University’s revenue (85%) was directly related to teaching and research activity. However it is worth noting that 15% of the University’s revenue was earned from the delivery of other services and for other general purposes. A large proportion of this relates to commercial services such as residence and catering operations (which represented over 37% of ‘Other Services’ above) or direct knowledge transfer –related activity such as consultancy and intellectual property income (which made up nearly 15% of ‘Other Services’ above).

It is informative to also examine the client sources of the revenue earned. Without further analysis it might be assumed that because 85% of the University’s revenue is generated for teaching and research related purposes, this is likely to be the proportion of public sector financial support. However in 2002/03 only 61% of the University’s income was derived from public sources of any kind, with 39% of the University’s income being monies earned from private sector and overseas clients.

Figure 2: University of Strathclyde Revenue Sources 2002/03

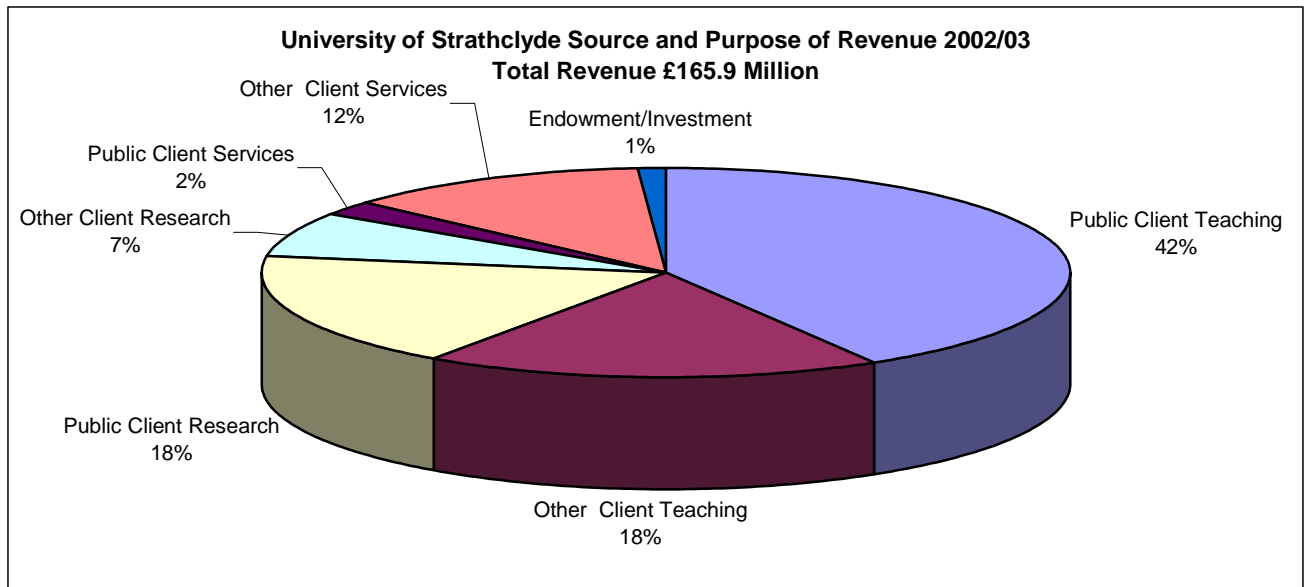


As Figure 2 reveals, 'Core' public sector income only accounted for 52% of the University of Strathclyde's revenue. 'Core' public sector funding is defined as Higher Education Funding Council Grants together with academic fee payments from public sector agencies. Strathclyde attracted a further 9% of revenue from other public sector sources – these monies are usually won on a competitive basis for a range of services.

Broadly speaking, all public sector income to a university is 'competitive' in one way or another. However competition for 'Core' public sector funding tends to be 'intra-sectoral' – with HEIs mainly competing against each other for domestic students and with Funding Council monies tied to student numbers, research assessment exercise outcomes and the achievement of other government targets. 'Other' Public Funding reflects more 'inter-sectoral' competition, and to attract this 9% of its income the University of Strathclyde will have been in competition with government research institutes, private consultancy firms and other bodies as well as other universities.

Closer analysis of the sources and purposes of revenue received by the University sheds more light on the balance between public and other client sponsored activity.

Figure 3: Balance of Revenue 2002/03



It is possible for illustrative purposes to compare the University of Strathclyde's balance of revenue sources and types with the Scottish HEI average.¹⁴ The comparison is presented in Table 1 overleaf.

There are a number of interesting differences in the pattern of revenue sources for the University of Strathclyde compared to the all-Scotland average. In particular the University receives a significantly higher proportion of its income from tuition fees paid by private sector and overseas clients(18%) than the Scottish average (8.9%).

Overall the University attracts 15% of its income from international sources compared to 10% for the Scottish average.

¹⁴ The proportions for all Scottish HEIs are sourced from the 2003 Universities Scotland Study (McNicoll, Kelly & McLellan) and relate to the previous financial year 2001/02. However the proportions are unlikely to have changed significantly between one financial year and the next.

Table 1: Balance of Revenue Sources and types: Strathclyde compared to all Scottish HEIs (Percentages)

* Note that totals may not add to 100% due to rounding.

Income by Source →	Core UK Public		Other UK Public		UK Private		Overseas(incl. EU)		Total	
Income by Type ↓	Strathclyde	All Scottish HEIs	Strathclyde	All Scottish HEIs	Strathclyde	All Scottish HEIs	Strathclyde	All Scottish HEIs	Strathclyde	All Scottish HEIs
Funding Council Grants	43.3	41.7	0.0	0.0	0.0	0.0	0.0	0.0	43.3	41.7
Tuition Fees & Education grants	9.0	9.7	0.0	0.0	9.7	3.5	8.3	5.4	27.1	18.6
Research Grants & Contracts	0.0	0.0	7.2	10.5	4.5	6.5	2.5	2.3	14.2	19.3
Other Services rendered	0.0	0.0	0.3	1.9	1.8	3.7	0.2	0.7	2.3	6.2
Other income-other	0.0	0.0	1.9	3.7	6.4	7.8	3.6	1.2	11.9	12.6
Endowment & Investment Income	0.0	0.0	0.0	0.0	1.2	1.5	0.0	0.0	1.2	1.5
Total	52.3	51.4	9.4	16.0	23.6	22.9	14.7	9.6	100.0	100.0

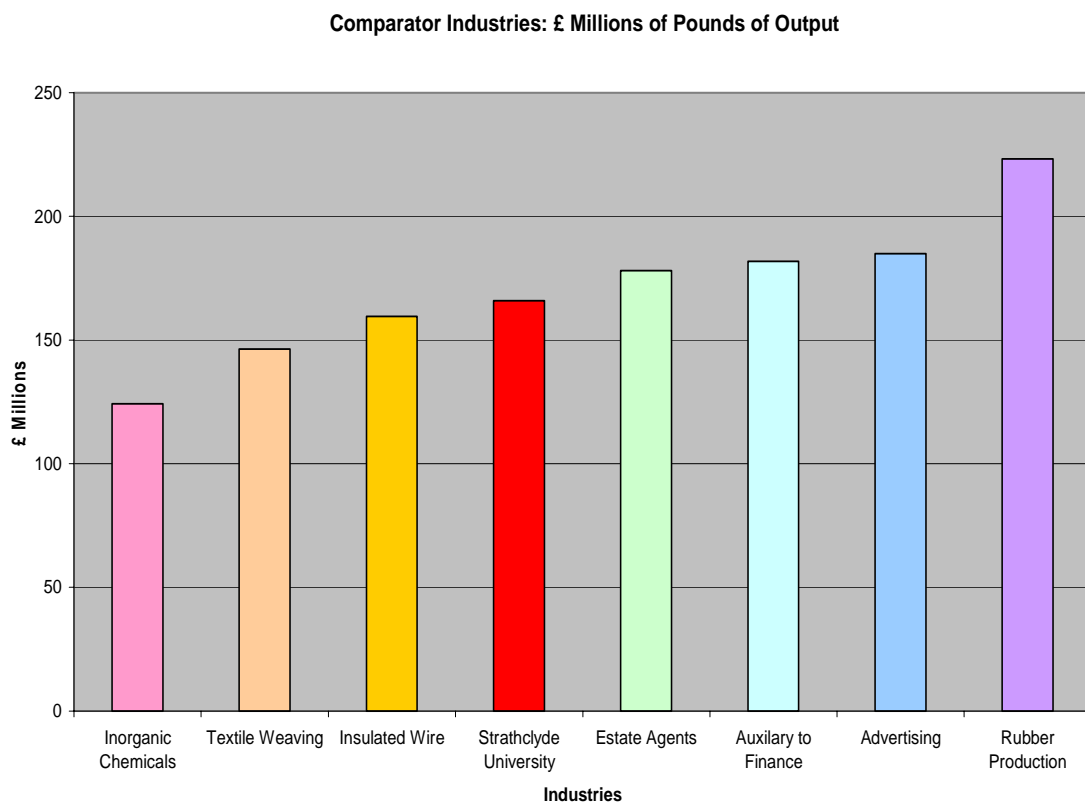
It is beyond the scope of this study to explore in detail the underlying reasons for the differing income patterns. However it is worth noting that the University is one of the largest UK providers of professional and postgraduate education and the University's most recent strategic plan (2003) indicates that the University has placed considerable emphasis on encouraging a diverse student base. It is expanding programmes for international students and expanding continuing professional development tuition. The University's success in attracting a large proportion of private and overseas tuition fee income is congruent with its stated strategic aims.

A detailed breakdown comparison of revenue sources, giving the balance between EU and Other Overseas as well as between Scottish and Rest of UK sources is included in Appendix 2.

1.2 Gross Output

In national accounting terms, HEI revenue is equivalent to gross output as defined for all firms and industries. With revenue of £165.9 million in 2002/03, the University of Strathclyde is clearly a substantial business. To give an indication of its importance, comparisons with the output of some other Scottish industries were made.¹⁵

Figure 4: Gross Output: Comparator Industries



The above comparison is indicative rather than absolute – but bearing in mind that the comparators relate to the output of a range of *industries* rather than single

¹⁵ Output for comparator industries was sourced from the Scottish Executive 2000 Input Output Tables. Clearly the data therefore relates to a separate year, however it gives a ‘feel’ for where the University is placed.

organizations it demonstrates that in output terms Strathclyde must be considered a serious economic player in Scotland.

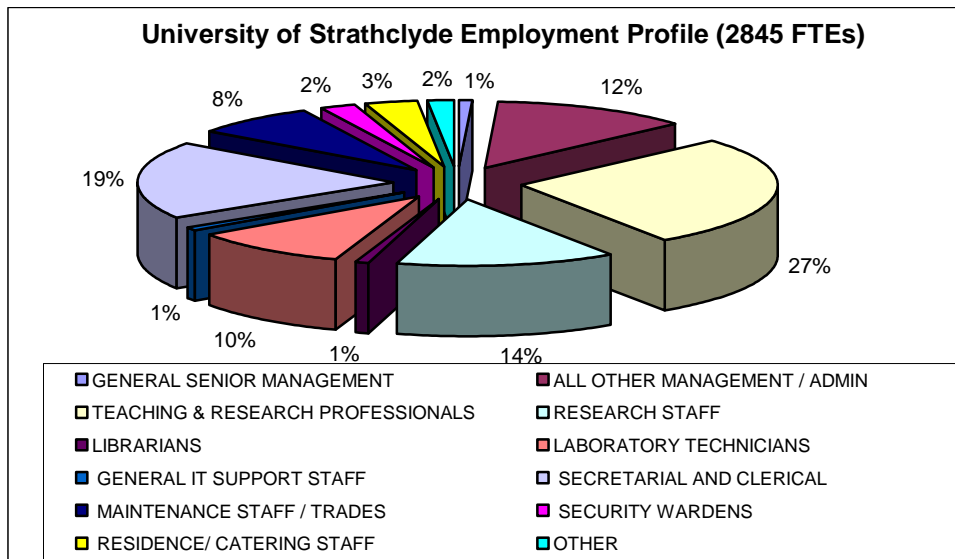
1.3 Employment Profile of the University of Strathclyde

The role of universities as major employers in their regions has been an aspect of higher education which has attracted interest for a number of years. The University of Strathclyde provided information on its staffing profile to enable analysis. A ‘snapshot’ taken of staff numbers and types in 2002 revealed that the University employed over 3248 people in a range of full-time and part-time positions. Converting the information provided to Full-Time Equivalent jobs¹⁶ gave a total of 2845 FTE jobs.

The primary mission of the University of Strathclyde is to undertake teaching and research. However in order to deliver its activities the University is reliant on a very wide range of staff employed in many different occupations.

¹⁶ The conversion rate used is that of 1 part-time job = 0.5 FTE, which is the standard rate of conversion used by the Office of National Statistics.

Figure 5: Employment Profile of the University of Strathclyde



It can be observed from Figure 5 that 41% of University staff are academics (27% teaching and research professionals, together with 14% research only staff.)

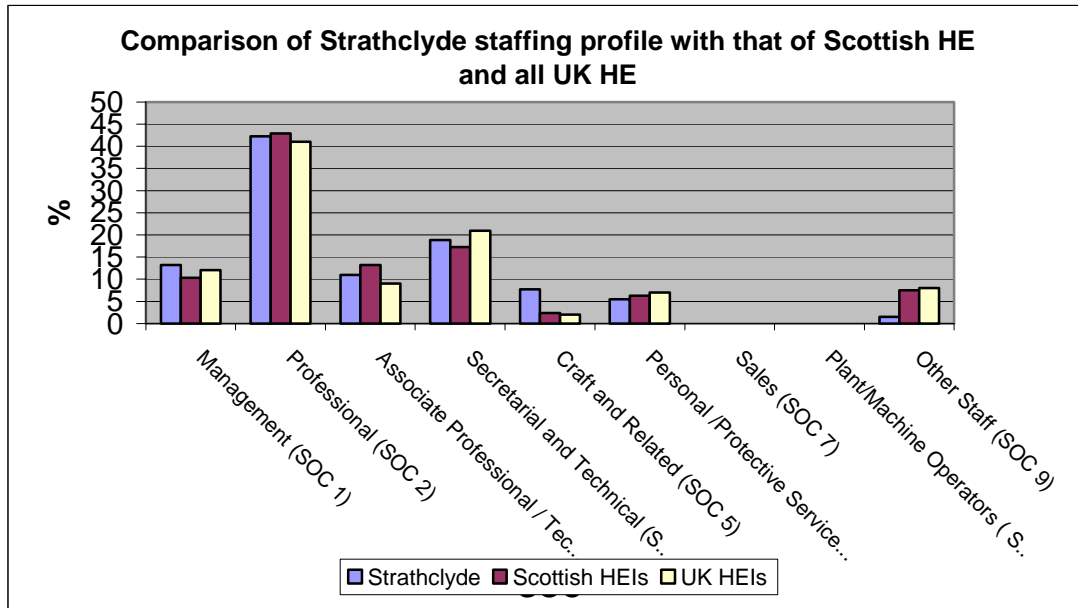
However perhaps the most significant point is that the majority of university staff are not academics but occupy a wide range of other posts including administration, technical, secretarial and ancillary posts.

The staffing profile of the University of Strathclyde is broadly in line with that of Scottish HE as a whole and so the balance between academic and support staff is not unusual (the FTE balance across all Scottish HEIs is 42% academic 58% other staff)¹⁷. Previous studies of higher education have highlighted this characteristic of HEI employment, in that it tends to reflect the extensive infrastructural support needs of a university. In order to deliver its main business of teaching and research the University has a substantial Estate with two campuses to maintain – including laboratories, lecture theatres and offices as well as residential accommodation, catering and sports/recreation facilities. This requires significant numbers of skilled

¹⁷ Universities Scotland 2003 op cit

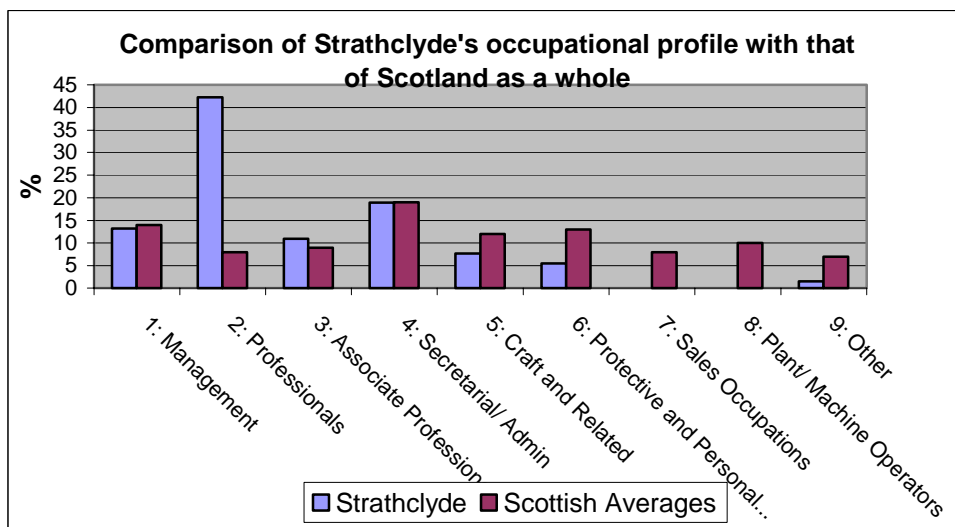
and professionally qualified support staff together with a wide range of clerical and ancillary staff. Figure 6 below illustrates how broadly similar the Strathclyde employment profile is with that of all Scottish HE and all UK HE.

Figure 6: Comparison of Strathclyde staffing profile with that of all Scottish HE and all UK HE



Higher education institutions however tend to have a very different employment profile from the economy as a whole.

Figure 7: Comparison's of Strathclyde's occupational profile with that of Scottish employment as a whole



As Figure 8 illustrates, the majority of Strathclyde University employment is concentrated in Standard Occupational Classifications 1 – 4 (Managers, Professionals, Associate Professionals, Secretarial & Clerical), which tend to be of a skilled nature. Given the large proportion of academic staff it is not surprising that Strathclyde appears specialised in SOC2 Professional Occupations (professionally qualified staff such as Librarians also come into this category.) The University also demonstrates some specialisation in Associate Professional occupations. These occupations reflect a layer of skilled technical support - for laboratories, IT support, etc. There is a slight underspecialisation in management occupations compared to Scottish employment as a whole. Underlying reasons for this include the particular management characteristics of Strathclyde, which has a layer of ‘academic management.’ ‘Academic managers’ tend to be drawn from the academic staff to undertake management positions (such as Head of Department) on a ‘secondment basis’ for a fixed period, after which they return to full-time academic duties. Such staff will usually continue to be formally classified as holding an academic rather than permanent ‘management’ position.

1.3 Students at the University of Strathclyde

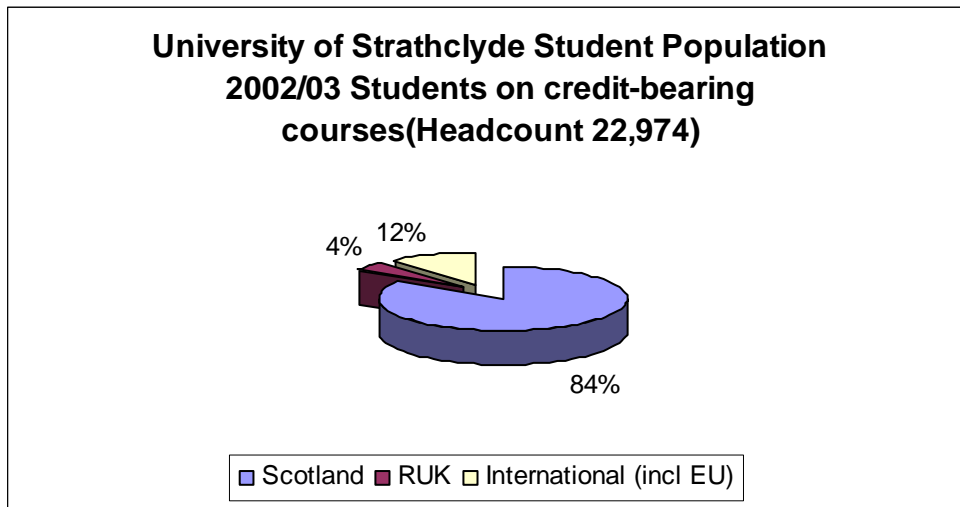
An important aspect to the role a University plays in the regional economy relates to the provision of educational opportunities for both local and non-local residents and its resultant contribution to the regional skills base. Strathclyde University reported that in 2002/03 there were nearly 23,000 students registered on credit-bearing courses at the University with very many more participating in non-credit-bearing evening class and recreational learning programmes.¹⁸ The range of educational opportunities provided is clearly key to the University's longer term and fundamental contribution to its host economy, both in terms of increasing Scotland's absorptive capacity¹⁹ and to raising its profile elsewhere through the attraction of both international students and students from elsewhere in the UK. However it remains difficult to place a 'hard' economic value on this contribution and methodologies for doing so are still very much in their infancy. There is however another, very obvious economic contribution (which *can* be estimated) made by the University through its students and that is in the money it attracts to Scotland from other parts of the UK and from overseas.

Strathclyde has a strong Scottish base, with around 84% of the 23,000 students registered on credit-bearing courses being of Scottish domicile. 4% of students come from other parts of the UK and 12% are international students (with 3% from EU countries and 9% from other countries).

¹⁸ For instance over 3000 people participate in Senior Studies Institute programmes every year. The Senior Studies Institute provides a wide range of learning opportunities for the Over-50 age group.

¹⁹ An important aspect in relation to successful knowledge transfer from the university to the region is recognised as a region's own ability to absorb knowledge, which can be determined by the existing skill set within surrounding business and industry (Cohen & Levinthal 1990). Through its graduates, diplomates and provision of professional development training a University can significantly contribute to building such capacity.

Figure 8: Composition of student population



So while the University continues to directly serve Scottish residents through the provision of education, it also attracts a significant number of students from outside Scotland, particularly from overseas. These students make payments directly to the University for fees, accommodation, etc. They also bring their personal spending power to bear off-campus. All monies expended by these groups represent an injection into the Scottish economy. This will be discussed in more detail in Section Two.

SECTION TWO: Generating Economic Activity in Scotland

2.1 The Modelled Impact on Scotland of University of Strathclyde

Expenditure

The first section of this study has shown the University of Strathclyde to be a significant Scottish business, with substantial output and providing employment for over 3,200 people, in addition to providing educational opportunities for many more.

Yet this is not the end of the story, as according to multiplier theory certain expenditures and payments made by the University of Strathclyde also generate further economic activity through other Scottish sectors through knock-on or multiplier effects. These effects generally comprise two key types of economic interaction.

Indirect Effects: The University of Strathclyde purchases goods and services from other sectors in order to support business, thereby stimulating activity in those industries from which they purchase supplies. The supplying industries also make purchases from other suppliers in order to fulfil the orders from the University of Strathclyde and those suppliers in turn make purchases, so the effects ripple throughout the economy.

Induced Effects: The University of Strathclyde has a substantial wage bill (over £100 Million in 2002 -2003) and its employees spend their wages on consumer goods and services. This creates wage income for employees in other sectors, who also spend their income and so on, impacting on another series of different individuals.

This study set out to analyse and estimate the economic activity generated by the University of Strathclyde through its expenditure. As explained earlier, a two-stage process was adopted:

- The impact of the University's expenditure on Scotland was modelled, using a purpose-designed model of the Scottish economy.
- Off-model sub-regional analysis was conducted to estimate the share of resultant impact that accrued specifically to the University's host city of Glasgow.

2.2 Expenditure by the University of Strathclyde

In 2002 -2003 the total expenditure by the University of Strathclyde amounted to £165.3 Million , which was very similar to its total revenue in that year of £165.9 Million. Higher education institutions (HEIs) are non-profit making institutions (NPISH or Non-Profit-making Institutions Serving Households in national accounts terminology) and are typically *revenue-maximisers* (rather than *profit-maximisers*.) Therefore it is fairly usual for an institution's expenditure in any given year to be much the same as income in that year. (See previous studies for comparisons.²⁰) In the context of this study it is the University's operating expenditure in the study year that is relevant. A summary breakdown of expenditure by the University of Strathclyde is shown below in Figure 9.

²⁰ See, for example, Kelly, Marsh & McNicoll Universities UK 2002 op cit, McNicoll, Kelly & McLellan Universities Scotland 2003 op cit

Figure 9: Summary Breakdown of Expenditure by the University of Strathclyde 2002 –2003

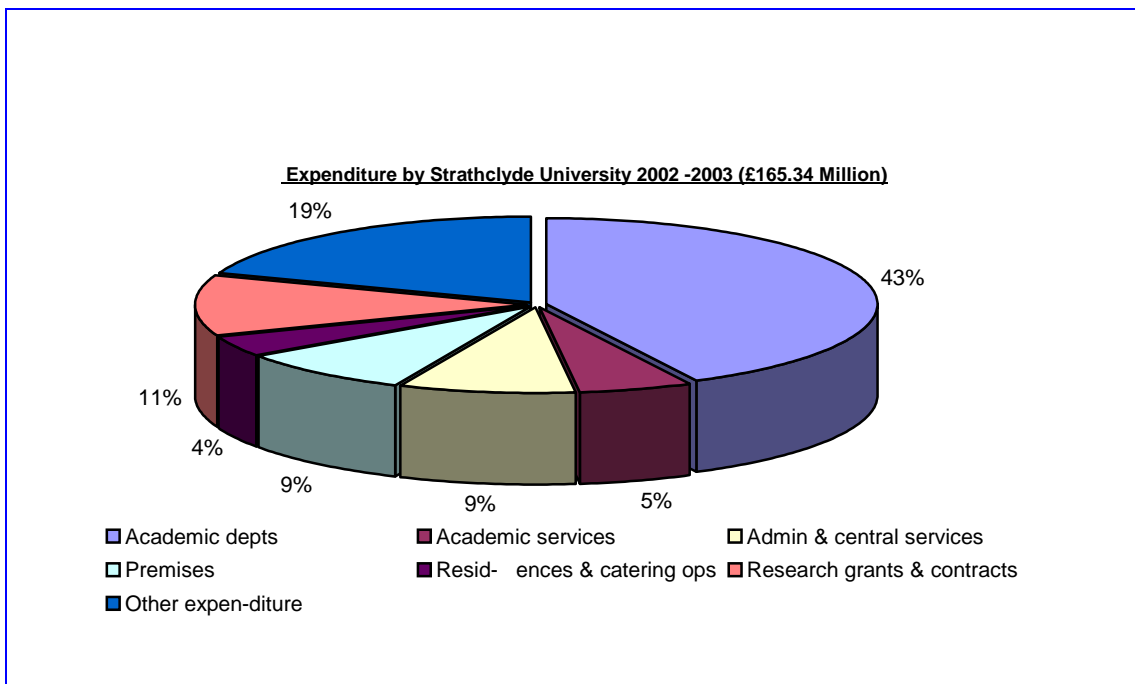


Figure 9 above illustrates the broad categories within which the University would normally present details of expenditure – for example in annual reporting of data to the Higher Education Statistics Agency (HESA). This functional breakdown of expenditure is of limited utility for incorporating into economic models of impact, which require details of the purchase of products and commodities from individual supplying industries. However the University of Strathclyde was able to provide detailed information on expenditure, by commodity and service type as well as broad geographical region of supplier location²¹. This enabled a Strathclyde-specific expenditure vector in the correct format to be created for incorporation into the model.

²¹ The University Purchasing Department tracks all University purchases above £5k with any individual supplier

Incorporating the disaggregated expenditure estimates into the input output model enables the calculation of:

Sectoral Gross Output: This is measured in monetary units and (for most industries) is approximately equivalent to turnover or gross receipts. For distribution and transport industries, it is a measure of gross margins.

Employment: measured in terms of full – time equivalent jobs (physical units) where 1 part time job = 0.5 of a full time job.

2.3 Output Generated by University of Strathclyde Expenditure

The modelled output results for Strathclyde are summarised in Table 2 below.

Table 2: Economic Activity Generated by the University of Strathclyde 2002 – 2003

	Economic Activity Generated by the University of Strathclyde within Scotland
Total University Expenditure	£165.3 Million
Of Which Expenditure on Scottish Goods and Services	£ 132.6 Million
Secondary or ‘Knock –on’ Output generated in other sectors of the economy	£103.7 Million
Total Output Generated (i.e. Direct Strathclyde Output of £165.9 Million Plus Secondary Effects)	£269.6 Million

In 2002 –2003 The University of Strathclyde spent £165.34 Million of which £132.6 Million was estimated to have been spent on *Scottish* goods and services, including labour services.

A total output within Scotland was generated of £269.6 Million, of which £165.9 Million was the output of the University of Strathclyde and £103.7 Million was output generated in *other* Scottish industries. The sectoral pattern of secondary or knock-on output generated is illustrated in Figure 10 below.

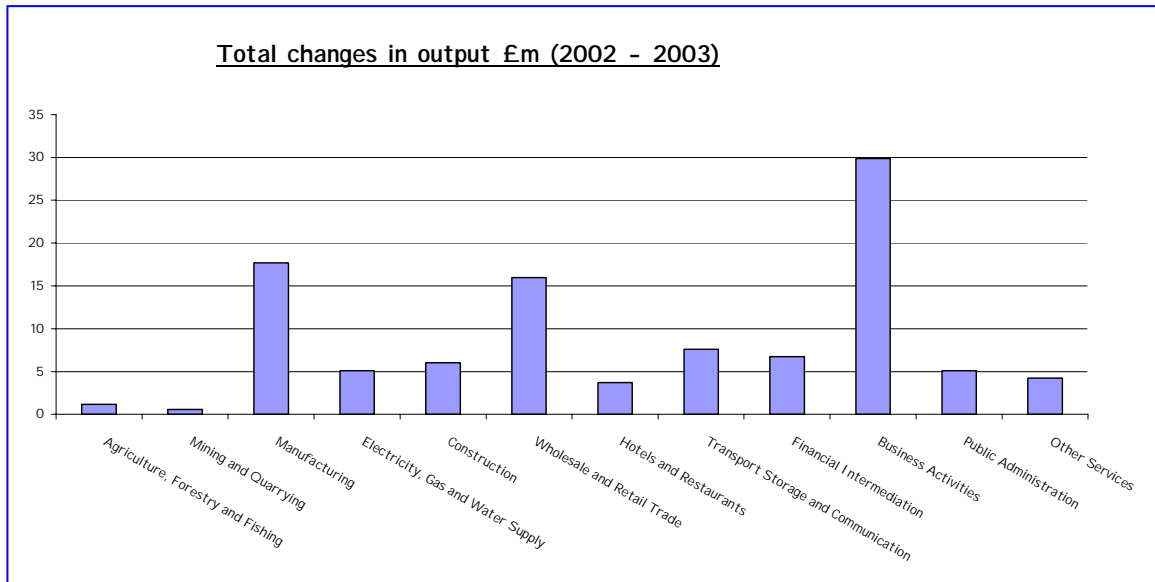


Figure 10: Knock -On Output Generated by the University of Strathclyde in the Scottish economy, by Sector 2002–2003 (£ 103.7 Million).

Output impacted across the whole range of Scottish industries with an emphasis on Manufacturing, Wholesale and Retail trades and on Business activities. Given the dominant nature of labour payments within the University of Strathclyde’s expenditure, the outcome pattern of this secondary impact was inevitably strongly influenced by the nature of household income and expenditure interactions. This

explains the presence of relatively high multiplier effects in sectors such as the Wholesale and Retail Sector and in Business Activities.

Why Business Activities? Tracing this impact through the model revealed that about 10% of this impact was on Renting of Dwellings, about 20% on Lawyers/Accounting and Architectural services, about 25% was spent on other Business Services, about 15% on Computer Services, with the remaining 30% impacted upon Finance and Banking. While a significant proportion of this impact (around 40%) will be due to the actual expenditure of the University, another proportion (as much as 60%) was driven by the expenditure of the staff themselves.

The output multiplier for the University of Strathclyde in relation to the Scottish economy was 1.63. Therefore for every £1 million of University of Strathclyde output, a further £0.63 million is generated in other sectors of the Scottish economy.

2.4 Employment Generated by the University of Strathclyde

The analysis of direct employment within the University of Strathclyde is an element of Section one of this report. This highlighted that 2845 FTE jobs were provided directly by the University in 2002 -2003. However, the secondary or ‘knock –on effects’ of the expenditure of the University and its employees means that further FTE jobs are generated outside the University.

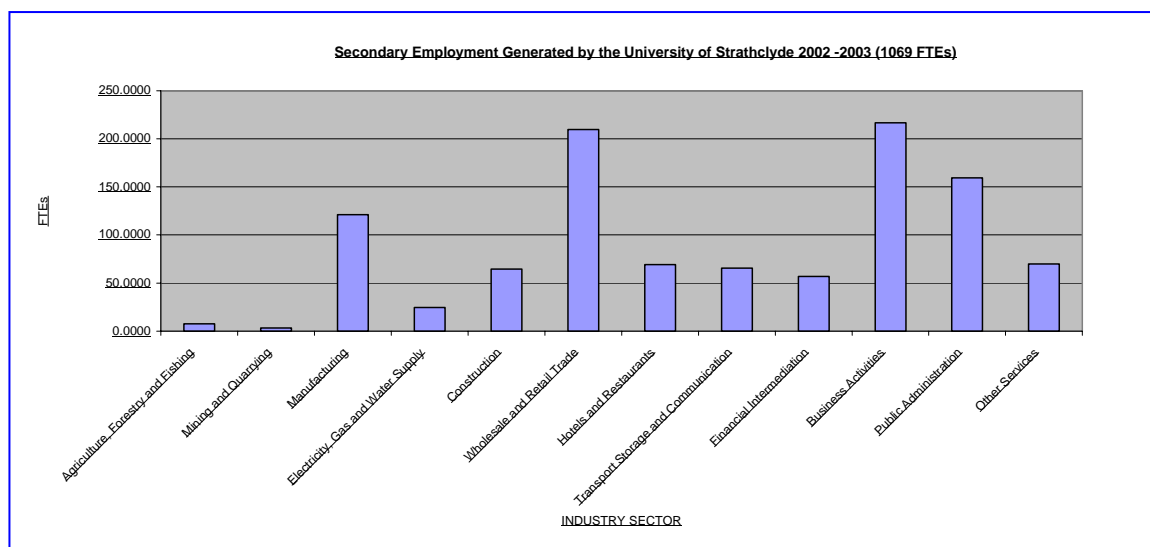
Overall, a total of 1069 FTE jobs were estimated to have been created in other Scottish industries by the expenditures of the University of Strathclyde in 2002-2003. The modelled estimates of the secondary employment generated are shown below in Table 3:

Table 3: Total Secondary or Knock-on Employment Generated by The University of Strathclyde

Description	Total	Proportion Spread of Secondary Employment
Agriculture	8	0.70%
Mining and Quarrying	3	0.30%
Manufacturing	121	11.40%
Electricity, Gas and Water Supply	25	2.30%
Construction	65	6%
Wholesale and Retail Trade	210	19.60%
Hotels and Restaurants	69	6.50%
Transport, Storage and Communication	65	6.10%
Financial Intermediation	57	5.30%
Business Activities	217	20.30%
Public Administration	159	14.90%
Other Services	70	6.50%
Total	1069	100%

In particular jobs were created in Manufacturing (11.4 per cent), Wholesale and Retail Trade (19.6 per cent), Business Activities (20.3%) and Public Administration (14.9%). The employment impact of Financial Intermediation (5.4%), Construction (6%), Transport Storage and Communications (6.1%), Hotels and Restaurants (6.5%) and Other Services (6.5%) was significant but less pronounced in the makeup of secondary employment. The sectoral impact is illustrated in chart form in Figure 11 below.

Fig 11: Secondary Employment Generated by the University of Strathclyde, by sector



Therefore in 2002 –2003 the University of Strathclyde generated 3914 FTE Jobs across Scotland as a whole of which around 73 % were in the University of Strathclyde itself and 27% in other Scottish industries. The employment multiplier for the University of Strathclyde within the context of Scotland as a whole is 1.38 meaning that for every 100 FTE jobs in the University of Strathclyde itself, another 38 were created in other Scottish industries. (Some comparisons with other industries will be discussed in Section 2.5 following.)

Occupational Profile of Employment Generated by the University of Strathclyde

In Section One the occupational profile of University of Strathclyde employment was compared with Scotland as a whole. The occupational profiles of employment generated through secondary effects can now be compared with the profile of

employment within the University of Strathclyde and also with the profile of employment across all industries in Scotland as a whole. This is shown in Figure 12.

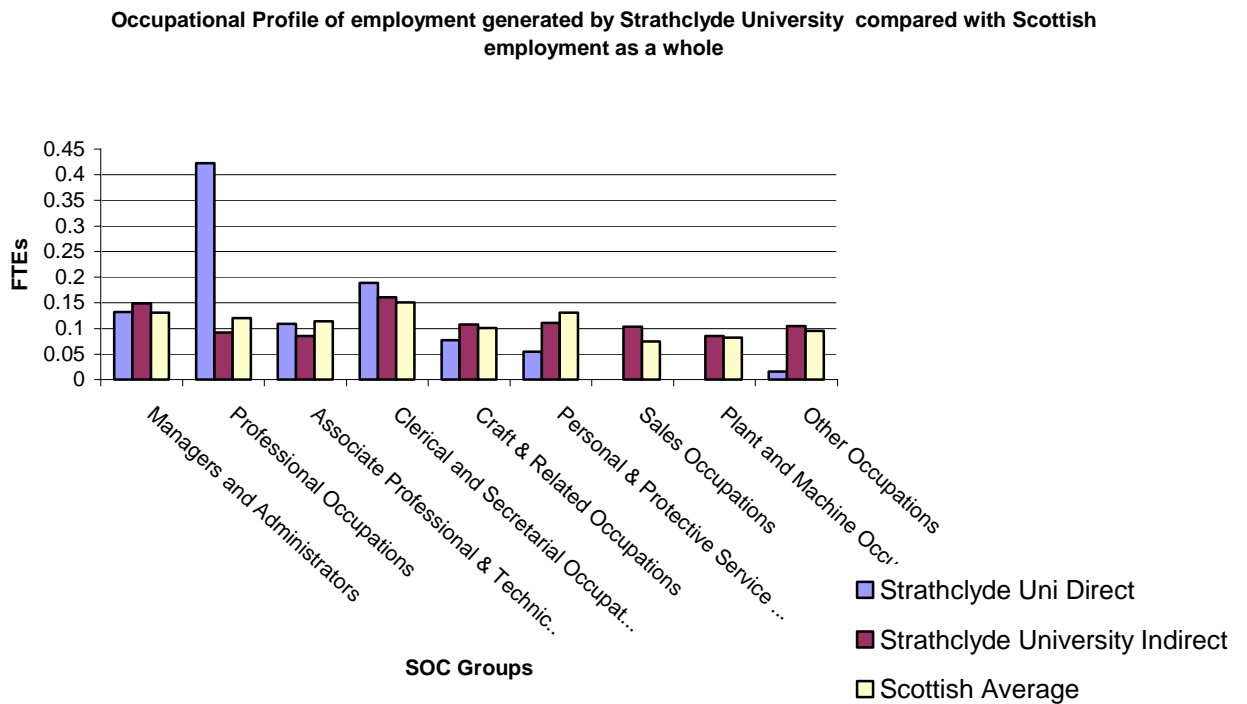


Figure 12: The Occupational profile of employment generated by The University of Strathclyde compared with Scottish employment as a whole

As discussed in Section one, the occupational profile of the University of Strathclyde is institution-specific, reflecting functions and activities undertaken by the University itself. However, knock-on employment effects of the institution are much more widely spread across all Scottish industries, so that the occupational profile of the knock-on jobs created are much more akin to that of the Scottish economy as a whole. This is entirely consistent with what would be expected through Type II multiplier effects, which tend to be realised across the entire range of Scottish industries.

2.5 Multipliers

In general terms, a multiplier is a ratio relating the aggregate effect on economic activity arising from an initial injection to that initial injection. Multipliers have two general purposes;

- (a) they provide summary measures of the nature and extent of the interactions between the initial injection and the rest of the economy;
- (b) they provide aggregate estimates of the “impact” on the economy of a change in the size of the initial injection.

Obviously a wide range of specific “multipliers” can be determined and quantified but a relatively small number have been found to be useful and relevant. These multipliers have been calculated for Strathclyde University and are noted below.

The **output multiplier** defines the domestic purchasing linkages. A sector which purchases a higher than average proportion of its operating requirements from domestic sources (including labour purchases) will have a higher Type II output multiplier.

Output Multiplier Calculations

For Strathclyde University as an HEI institution specifically, an Output Multiplier can be defined as:

$$\frac{\text{Total Output Generated by University of Strathclyde}}{\text{Output of University of Strathclyde}}$$

Defined as such, the value of the output multiplier for Strathclyde University was 1.63. That is for every £1 of output of the University itself, an additional £0.63 of output was generated in other Scottish industries.

A sector which purchases more imported goods and services will have a relatively low Type II multiplier. The output multiplier can be compared with other sectors, some examples are presented below. Those selected below are chosen as sectors of policy relevance within the Scottish economy (Table 4)²²

Table 4: Scottish Type II Output Multipliers

INDUSTRY / DESCRIPTION	SIZE OF OUTPUT MULTIPLIER
Strathclyde University	1.63
All Scottish Services	1.80
Public Administration	1.63
Computer Services	1.72
Other Business Services	1.62
Electronic Components	1.42

From the input- output model used in this analysis the Type II output multiplier for Strathclyde University is somewhat lower than the 1.80 average for Scottish service industries and for Computer Services at 1.72. Alternatively it is comparable to the value of Public Admin and to Business Services. These are all fairly labour intensive industries. With a high proportion of their expenditure therefore being on labour, which tends to be ‘localised’; their output multipliers would be expected to be higher than a manufacturing sector such as Electronic Components which is likely to have a higher propensity to import.

²² Comparator Multipliers are sourced from the Scottish Executive 2000 Input Output Tables.

Comparison of Employment Multiplier Values for the University of Strathclyde with Other Scottish Sectors

Labour – intensive industries have smaller Type II employment multipliers than capital – intensive industries. This reflects their greater tendency to utilize labour directly rather than through external purchasing of goods and services. The difference is illustrated in Table 5 through comparisons of the employment multipliers for the same basket of industries viewed previously.

TABLE 5: Scottish Type II Employment Multipliers

INDUSTRY / DESCRIPTION	SIZE OF EMPLOYMENT MULTPLIER
Strathclyde University	1.38
All Scottish Services	1.6
Public Administration	1.59
Computer Services	1.95
Other Business Services	1.24
Electronic Components	2.01

Table 5 illustrates that although Strathclyde University has a lower employment multiplier (that is it is relatively more labour-intensive) than the average for Scottish services and considerably lower than that of Public Admin it is slightly higher than the similar Type II employment multiplier for Other Business Services. The employment multiplier for Electronic Components is higher than other industries demonstrating its capital-intensive nature.

2.6 The impact of Strathclyde Student expenditure

As highlighted in Section one of this report, while the vast majority of Strathclyde students are Scottish, around 12% of students are international and around 4% are from the rest of the UK. These students all make payments directly to the University of Strathclyde for fees, accommodation, etc and the impact of these monies are captured within the University's impact discussed previously. However students do not confine their expenditure solely to within the University precincts but buy a wide range of goods and services off-campus. Indeed, as practically all Strathclyde university student accommodation is on a 'self-catering' basis, local off-campus retail outlets are the main places for students to purchase food and other catering supplies. Not all students live on campus either, in which case the private rented sector benefits from their need for accommodation. Even a casual observer will note that around any University there is a proliferation of cafes, snack bars, pubs and shops that seem to draw a large proportion from their business from students.²³

The expenditure of all students attracted to the University of Strathclyde from outside Scotland represents an injection into the Scottish economy. In addition the expenditure of international students represents international export earnings for Scotland and an injection into the UK economy as a whole. In recent years increasing attention has been paid by policy makers (both in Scotland and in the rest of the UK) to the potential of the higher education sector to generate foreign exchange through the attraction of international students and a number of initiatives have been launched to support HEIs in promoting UK higher education abroad. Recent reviews

²³ Conversations with Glasgow Taxi Drivers also reveals an astonishing familiarity with the University Calendar and term times - local taxi drivers appear to value student business very highly.

of higher education in Scotland²⁴ have also highlighted the important economic contribution of international students. It is important to note at this point that *all* students from outside the UK ‘count’ in this regard, whether they are from the EU or further afield. While EU students may pay lower fees to the University than students from other countries, EU students have just as much need²⁵ to spend money off-campus as students from other countries and their spending is just as effective in generating economic activity as the expenditure of a Malaysian, American or African student.

With regard to students from the rest of the UK who are studying at Strathclyde, all of their expenditure represents an injection into the Scottish economy, although it is not ‘additional’ to the UK as a whole.

Therefore the study team sought to model the impact of the off-campus expenditure of international students and students from the rest of the UK as this can legitimately be viewed as impact attributable to the University since the main purpose of the students’ presence in Scotland is to study at the University of Strathclyde.

The impact of the expenditure of Scottish students was excluded from the analysis as, following the same arguments above, the expenditure of Scottish domiciled students cannot be viewed as additional to the Scottish economy, since it is very likely that the monies would have been expended in Scotland in any case. (It is worth pointing out however that if the students would have otherwise left Scotland if they had not decided to study at the University of Strathclyde, it could be argued that the

²⁴ Such as the *Framework for Higher Education in Scotland HE Review Phase 2*

²⁵ To the best of the project team’s knowledge no specific surveys of international student expenditure have been conducted in the UK.

University contributed to the *retention* of monies within Scotland. However it was beyond the scope of the present study to analyse this aspect.)

2.7 Student Expenditure data and the modelling process

A specific expenditure survey of Strathclyde students was not envisaged for the present study. Instead the study team drew on a range of available published and unpublished data, including budgeting guidelines for students issued by the University as well as a recent DFES Research Report on domestic student expenditure in 2002/03.²⁶ In the absence of survey data on international students specifically, it was decided to assume that international student expenditure would be similar to that of domestic students.

The per capita figure for annual student expenditure chosen was that which equated to the median expenditure (excluding fees) during the academic year of a student studying outside London as observed by Callender & Wilkinson²⁷ (a figure of £6519). The academic year in this case includes the short Christmas and Easter Vacations but not the Summer Vacation, and hence relates to around 9 months expenditure. To the extent that numbers of postgraduate students will in fact be studying in Strathclyde and incurring expenditure over the full 12 month year rather than 9 months, this per capita figure can be regarded as conservative.

From University of Strathclyde data, the relevant student populations amounted to 2647 international students and 1024 students from the rest of the UK. To avoid

²⁶ 2002/03 *Student Income and Expenditure Survey* Claire Callender and David Wilkinson DFES Research Report No 487 2003

²⁷ *ibid*

double-counting, any monies paid to the University of Strathclyde by the relevant groups of students²⁸ was stripped out to derive expenditure totals for incorporation into the model. Given that there was no reason to believe that Strathclyde students' expenditure patterns would differ from those previously observed for other UK HE students, the team utilised the same expenditure coefficients vector that had been constructed for earlier studies of higher education. The results are shown in table 6 below:

Table 6: The Impact of International and students from the rest of the UK (RUK) attending the University of Strathclyde on the Scottish Economy

	International Students	RUK Students
Total Off – Campus Expenditures	£14.7 Million	£5.3 Million
Expenditures on Scottish Goods and Services	£8.4 Million	£3.0 Million
Total Output Generated Throughout Scottish Economy	£19.3Million	£7.3 Million
Employment Generated Throughout Scottish Economy	218 FTE jobs	82 FTE jobs

Students are not normally regarded as 'tourists'; however it is worth noting in practical terms that international students and students from other parts of the UK are equivalent to 'long-stay tourists' and the economic activity generated by their off-

²⁸ As previously explained, payments made to the University are captured within the University's accounts and within its impact.

campus expenditure can be directly attributed to the University, since it acts as the magnet attracting the students (and their spending power) to Scotland.

2.8 The additional impact of visitors to the University of Strathclyde

There is another area of University activity that should be noted, which is the role the University can play in the attraction of visitors to Scotland both from overseas and from the rest of the UK. The expenditure of University Business and Leisure Visitors contributes to Scotland's economy in the same way as that of students.

The role of universities in the attraction of visitors to a region is a matter which is beginning to attract policy attention across the UK. In Scotland the area tourist boards have recognised for quite some time that University academics can play an extremely important part in the attraction of major international conferences. Over the last decade the City of Glasgow has become a major conference and convention destination, with the development of extensive conference facilities. The Greater Glasgow & Clyde Tourist Board have estimated that 50% of their Convention Sales are linked to the 'Ambassadors Programme', which is a programme designed to encourage and support prominent professionals, particularly university academics, in persuading international learned societies to bring their conference to the city.²⁹

Universities can also provide holiday accommodation for leisure visitors, group tours, summer school visitors as well as individual visiting academics. The full impact of visitors to Scotland attracted by the University of Strathclyde specifically is difficult to assess as there is currently insufficient survey or other data on this type of visitor.

²⁹ These can be very large conferences such as the upcoming 2005 International Special Education Conference (c. 1000 delegates) or the 2006 International Congress of Parasitology (c.2,500 delegates) to give just two examples

For example, while 50% of the Glasgow Convention business may be related in large part to University academic activity, this will not all be related directly to University of Strathclyde staff but also University of Glasgow, Caledonian University and that of other professional bodies in the city. However to begin to achieve a preliminary indication of the role of this activity, a conservative estimate can be made by examining the number of accommodation bednights directly provided by the University of Strathclyde to visitors.

The University's Residence and Catering Department indicated that the relevant annual figure for accommodation provided to external visitors amounted to 93,305 visitor bednights. These were provided for both business and leisure visitors from the rest of Scotland, the rest of the UK and from overseas. It covered a wide range of business, individual visitors, international summer schools, Group Tours, conferences and other major events. Many events hosted by the University are regular and repeat business – such as the International Pipe Band Competition which comes to the University every year. Another interesting example is that of the entire university campus bedstock being given over for at least 1 week in summer 2004 to accommodating the hundreds of additional personnel being drafted in for the British Open Golf Competition at Royal Troon. These are activities of the University which may not be well known or recognised. As earlier analysis of the University's income has indicated however, this type of business makes up an important part of the University's overall revenue. It also brings thousands of people into Scotland and into Glasgow.

The team sought to model the impact of the off-campus expenditure of international visitors and those from the rest of the UK. The Residence and Catering Office does not currently record the geographical origins or purpose of trip for every visitor, so estimates needed to be made of the proportion of visitors from the rest of the UK and internationally. This was done by combining the 'best estimates' of the residence and catering office staff together with examination of Finance Office income data. The University Finance Office had sought to identify for the team the proportion of residence and catering visitor income from different sources – and had indicated the broad split of income received from overseas visitors, Rest of UK visitors and Scottish visitors. The team applied the same proportions to visitor numbers as those relating to visitor payments, which resulted in an estimate of visitors as follows:

- International Visitors: 71.5% (27% Leisure, 44.5% Business)
- RUK Visitors: 16% (4.5% Leisure, 11.5% Business)

Scottish visitors made up the remaining 12.5%. This suggests a very large volume of international visitor business compared to visitors from the rest of the UK; however this is not inconsistent with other aspects of the University's activity. We have previously observed that of all non-Scottish students studying at the University, by far the majority are international students rather than students from the rest of the UK. Indeed many University staff have commented that one of the University of Strathclyde's particular features is that it is better known internationally than in the rest of the UK.

Information on estimated per diem visitor spend was obtained from Travel Trends 2002 and Star UK³⁰ and payments to the University for residence and catering were stripped out to avoid double counting in the same way as had been done for calculating student off-campus expenditure. The results of the modelled impact are shown in Table 7 below.

Table 7 The Impact of Visitors to the University of Strathclyde on the Scottish Economy

	ROW Visitors	RUK Visitors
Total Off – Campus Expenditures	£5.6 Million	£0.6 Million
Expenditures on Scottish Goods and Services	£3.2 Million	£0.4 Million
Total Output Generated Throughout Scottish Economy	£8 Million	£0.9 Million
Employment Generated Throughout Scottish Economy	108 FTE jobs	12 FTE jobs

³⁰ *Travel Trends 2002* (ONS) gives an estimated £124 per diem spend for international business visitors and £64 per diem for international leisure visitors. Star UK indicated an estimated £57 per diem spend for visitors from the rest of the UK to Scotland.

2.9 Summary of overall economic impact of the University of Strathclyde on Scotland

Summarising the totality of the impact of all of the elements of expenditure analysed in this section, it is possible to observe the total impact of the University of Strathclyde's activity on the Scottish economy. This is shown in Table 8 below.

Table 8: Summary of Overall impact of the University of Strathclyde on the Scottish Economy 2002-2003

Description	Strathclyde University	ROW Students	RUK Students	ROW and RUK Visitors	Total
Direct output	£165.9 million	0	0	0	£165.9 million
Total Output Generated in Scotland (Direct Plus Knock on)	£269.6 million	£19.3 million	£7.3 million	£8.9 million	£305.1 million
Direct Employment	2845 FTEs	0	0	0	2845 FTEs
Total Employment Generated in Scotland (Direct plus 'knock on')	3914 FTEs	218 FTEs	82 FTEs	120 FTEs	4334 FTEs
Export Earnings	£24.3 Million	£14.7 million	0	£5.6 million	£44.6 million

In total, in 2002/2003 the activity of the University of Strathclyde generated an estimated £305 million of output and supported over 4330 FTE jobs throughout Scotland. The last row of the summary table in Table 8 relates to the University's export earnings and the revenue it was responsible for attracting into the Scottish economy. With regard to export earnings, all foreign exchange attracted into Scotland by the University represents export earnings for the entire country and a positive contribution to the Balance of Trade. For Strathclyde this was nearly £45 million in

2002 -2003, which represented around 15% of all Scottish HE sector export earnings. This comprised the £24.3 million of overseas revenue earned directly by the University, combined with the £14.7 million off-campus expenditure of its overseas students and the £5.6 million expenditure of overseas visitors. This was also equivalent to over 1.5% of all Scottish Service Sector exports as observed by the Scottish Council for Development and Industry (SCDI).³¹

³¹ Source: SCDI *Survey of Scottish Sales & Exports 2000* The SCDI figures on Scottish Service Sector exports relate to 2000, which is the most recent available report the team could obtain, where the Strathclyde figures relate to 2002/03. However it is unlikely to be significantly different and gives an illustrative indication of the relative importance of Strathclyde's ability to generate foreign exchange for Scotland.

**SECTION 3: The Impact of the University
of Strathclyde on the Economy of Glasgow
City**

3.1 The Estimated Impact of the University of Strathclyde on the Glasgow Economy

The main results reported within Section two relate to the calculated impact of the University of Strathclyde on the Scottish economy taken as a whole. An analysis performed at this level of spatial impact allows the maximum use of existing data and most importantly allows the knock-on effects to be estimated using a pre-existing, purpose designed Scottish economic model.

As has been noted previously, the Scottish (SLMI) model employed was constructed using internationally-recognised Input-Output methodology, drawing on official Scottish statistics. Thus the strategy adopted provided the most accurate and detailed results possible in a cost-effective manner.

However, while the impact of the University of Strathclyde on the Scottish economy is of significant interest in itself, it was recognised that there may also be policy interest in obtaining estimates of the impact of the University on its host city of Glasgow. The definition of Glasgow utilised here is one which corresponds to the City of Glasgow, rather than to the much wider Greater Glasgow area. The definition of Glasgow City matches the definition of Glasgow City Council regarding boundaries³².

As has been outlined in the earlier section on Methodology and Data Sources, the first stage of analysis was to investigate the impact of Strathclyde University on the

³² The Following Postcodes were identified as defining the Glasgow City Area. **G1-5, G11-15, G20-23, G31-34, G40-45, G51-53, G61-62, G64-66, G69, G81**. For further details see Appendix 3.

Scottish economy. In the absence of a Glasgow-City specific economic model, the study team conducted off-model analysis to estimate the share of the University’s impact on the Scottish economy that was likely to have accrued to the City of Glasgow itself.

The approach adopted was to estimate the Glasgow City share of the University of Strathclyde’s impact according to the proportion of Glasgow City Output relative to Scottish output as a whole, refined to reflect local employment characteristics and purchasing patterns. There are a range of personal and leisure services which are likely to be highly localised. Therefore it can be said with certainty that the University’s impact will have a greater tendency to accrue in some Glasgow City industries than in others.

The study team identified a number of industries which could be regarded as ‘local’ industries. These are presented in Table 9 while a full explanation of the underlying procedure adopted for the identification is included in Appendix Three.

Table 9: Sectors Defined as ‘Local’ for the purposes of the study

Gas Supply
Retail Distribution
Hotels, Catering and Pubs
Owning and Dealing in Real Estate
Health and Veterinary Services
Other Service Activities

In order to calculate Glasgow City's share of the University's economic impact the study team allocated 100% of the economic impact accruing in industries defined as 'local' to impact on Glasgow City itself whereas the impact of the remaining 'non – local' or 'National' industry sectors was regarded as being only the proportion of Glasgow City's output relative to Scottish Output taken as a whole.

Results were calculated in this manner for the impact of the University itself in the form of a 'stand –alone' business and also for the impact of the University's ROW and RUK students and visitors.

Secondary or 'knock-on' output generated in Glasgow City by the University of Strathclyde's expenditure.

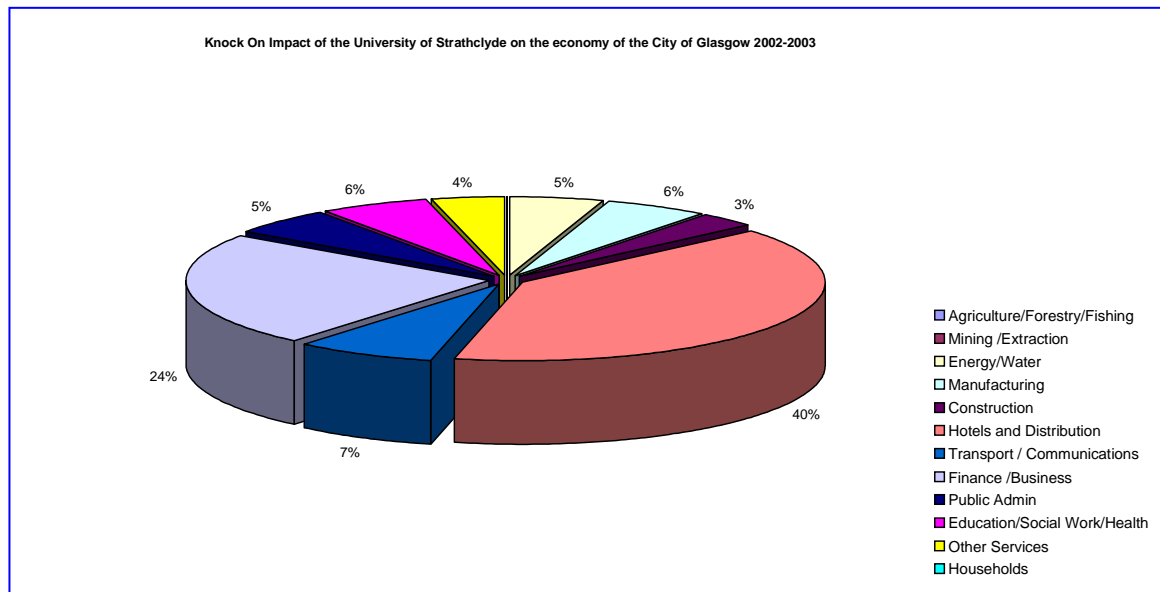
Table 10 below illustrates the estimated secondary output generated by the University in the City of Glasgow for the study year, 2002 –2003.

Table 10: Estimated Secondary output generated by the University in the City of Glasgow 2002 –2003 (£millions)

Sector	£Mns	% Proportion of Output impact
Agriculture/Forestry/Fishing	0.000	0.00%
Mining /Extraction	0.037	0.10%
Energy/Water	1.834	4.86%
Manufacturing	2.147	5.69%
Construction	1.148	3.04%
Hotels and Distribution	15.083	39.96%
Transport / Communications	2.765	7.33%
Finance /Business	8.980	23.79%
Public Admin	2.030	5.38%
Education/Social Work/Health	2.296	6.08%
Other Services	1.423	3.77%
Households	0.000	0.00%
Total Output	37.743	100.00%

This illustrates that while there is a knock-on output impact of the University of Strathclyde across a range of industries in Glasgow City, it is concentrated in Hotels and Distribution (including Retail), Finance and Business services and to a lesser extent Manufacturing, Transport and Communications and Social Work / Health Provision. This can also be seen from Figure 13 below.

Figure 13: The Knock - On Output Impact of the University of Strathclyde’s expenditure on Glasgow City’s Economy 2002 -2003



As the £165.9 Million of the University’s own output can be regarded as occurring directly in Glasgow City this means that total output generated in the City was some £203.6 Million. Thus the University of Strathclyde has an output multiplier of 1.23 In other words for every £1 Million of the University’s own output, a further £0.23 Million of output was generated in other industries in the City of Glasgow.

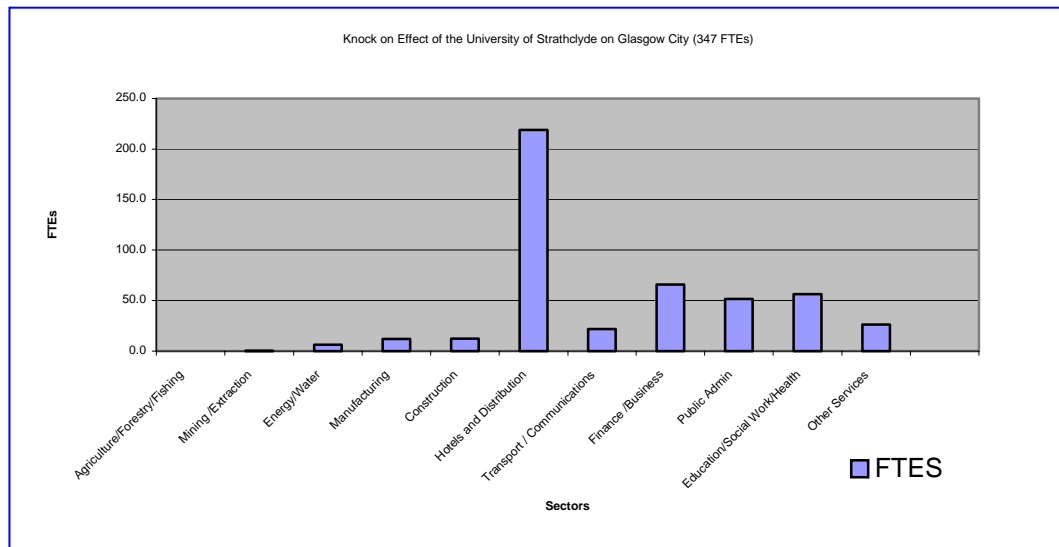
Secondary Employment generated by the University in the City of Glasgow

Table 11: The Employment Knock –On Impact of the University of Strathclyde on the City of Glasgow (FTEs)

Sector	FTEs	Sector
Agriculture/Forestry/Fishing	0.00	0.0%
Mining /Extraction	0.23	0.0%
Energy/Water	6.46	1.4%
Manufacturing	11.93	2.5%
Construction	12.34	2.6%
Hotels and Distribution	219.03	46.4%
Transport / Communications	22.00	4.7%
Finance /Business	65.89	13.9%
Public Admin	51.70	10.9%
Education/Social Work/Health	56.62	12.0%
Other Services	26.17	5.5%
Households	0.00	0.0%
Total Output	472.38	100.0%

Thus the employment generated within Glasgow City itself amounted to 472 FTE jobs. These jobs were created primarily in Hotels and Distribution (46.4%) and in Finance and Business (13.9%). Public Administration (10.9%) and Education /Social Work /Health (12%) were also sectors heavily affected. Given that the University’s direct employment of 2845 FTE jobs is employment within the City of Glasgow, the University of Strathclyde is estimated to have generated a total of 3317 jobs. This gives a Glasgow City employment multiplier of 1.17, indicating that for every 100 jobs within the University, a further 17 jobs are created elsewhere in the city. The pattern of secondary employment is shown in chart form in Figure 14 below.

Figure 14: Knock on employment Effect of the University of Strathclyde on Glasgow City



The team felt that there may be considerable interest in observing how the University's expenditure affects many of the industries identified by Scottish Enterprise³³ and Glasgow Economic Forum³⁴ as particularly important as part of extant development strategies. The team undertook a more detailed breakdown of both the output and employment impact in selected Manufacturing industries as well as examining all of the Finance/Business Sector in more detail. The results are presented below in Tables 12 and 13.

³³http://www.scottishenterprise.com/sedotcom_home/about_se/local_enterprise_companies/glasgow/glasgow-local_initiatives.htm

³⁴Joint economic Strategy Document.
http://www.glasgoweconomicfacts.com/documents/Glasgow%27s_Continuing_Prosperty_JES2003.pdf

Table 12: Detailed breakdown of the Employment and Output Impact of the University of Strathclyde on the Finance/Business Sector in the Glasgow City economy

Services Sub Groups	Employment Knock -on Effects (FTES)	Output Knock - On Effects (£M)
Banking, Finance and Insurance	14.01	1.65
Real Estate and Property Activities	6.33	2.35
Renting Machinery	2.21	0.52
Computer Services	4.82	0.53
Legal, Accountancy and Architect Services	20.26	2.06
Other Business Services	18.26	1.87
All Finance/Business	65.89	8.98

Table 12 above illustrates that the output and employment impact of the university on the component elements of the Finance /Business sector within Glasgow City has a heavy concentration in Legal, Accountancy and Architect services in both job creation (FTES) and Output knock on effects. Real Estate and Property activities exhibits the largest output knock –on effects of any sector within Finance / Business but creates far fewer jobs compared to Business Services and Banking, Finance and Insurance.

Turning to the impact on selected manufacturing sectors, Table 13 below offers a detailed breakdown.

Table 13: Detailed breakdown of the Employment and Output Impact of the University of Strathclyde on Selected Manufacturing Sectors in the Glasgow City

Manufacturing Sub Groups	Employment Knock -on Effects (FTES)	Output Knock -On Effects (£M)
Foodstuffs	1.5	0.209
Beverages	1.5	0.570
Tobacco	0	0.000
Textiles and Apparel	0.1	0.011
Wood and Wood Products	0.6	0.070
Printing and Publishing	0.9	0.211
Chemicals and Pharmaceuticals	0.2	0.029
Non Metals	0.1	0.014
Metals	1.7	0.172
Mechanical Manufactures	1.9	0.244
Electronic Manufactures	0.7	0.412
Vehicle Manufacturing	0.5	0.076
Other Manufacturing	0.6	0.129
Total	10.3	2.147

This illustrates that in terms of knock – on effects of Strathclyde University’s expenditure in manufacturing within the City of Glasgow the effects are very small. Employment impacts are largest in Beverages, Metals, Foodstuffs. Metals and Mechanical Manufactures with smaller effects throughout a range of other Manufacturing sectors. Output effects follow a similar pattern, however the largest effect by far is on Beverages. Beverages and Electronic Manufactures are less labour intensive industries than Foodstuffs or Metals which accounts for their smaller share of employment impact despite their larger share of output.

The Impact of Strathclyde ROW and RUK Students and Visitors on the Economy of Glasgow City

Additionally, it is possible to estimate the Combined Impact of Strathclyde University's RUK and ROW Students and Visitors on the economy of Glasgow City. This was undertaken utilising the same framework as for the estimation of the University of Strathclyde's impact on Glasgow City. The Output effects are shown in Table 14 with the Employment effects outlined in Table 15.

Table 14: The Output Knock – on effects of ROW Students, RUK Students and Visitors (RUK & ROW) on the Glasgow City Economy.

	ROW Students	RUK Students	ROW Visitors	RUK Visitors	Totals	Proportions
Agriculture/Forestry/Fishing	0.000	0.000	0.000	0.000	0.00	0.0%
Mining /Extraction	0.020	0.010	0.000	0.000	0.03	0.4%
Energy/Water	0.176	0.067	0.000	0.000	0.24	3.3%
Manufacturing	0.644	0.257	0.282	0.031	1.21	16.7%
Construction	0.127	0.048	0.054	0.006	0.23	3.2%
Hotels and Distribution	1.288	0.505	0.629	0.068	2.49	34.3%
Transport / Communications	0.488	0.191	0.217	0.023	0.92	12.6%
Finance /Business	0.761	0.305	0.369	0.040	1.48	20.3%
Public Admin	0.078	0.029	0.033	0.004	0.14	2.0%
Education/Social Work/Health	0.098	0.038	0.043	0.005	0.18	2.5%
Other Services	0.176	0.057	0.098	0.011	0.34	4.7%
Total	3.738	1.478	1.660	0.180	7.27	100.0%

**Table 15: The Employment Knock –On Effects of ROW Students, RUK Students
and Visitors (RUK & ROW) on the Economy of Glasgow City**

	ROW Students	RUK Students	ROW Visitors	RUK Visitors	Totals	Proportions
Agriculture/Forestry/Fishing	0.00	0.00	0.00	0.00	0.00	0.00%
Mining /Extraction	0.00	0.00	0.00	0.00	0.00	0.00%
Energy/Water	2.56	0.88	0.72	0.08	4.24	3.49%
Manufacturing	0.84	0.32	0.11	0.01	1.28	1.05%
Construction	1.51	0.55	0.25	0.03	2.34	1.93%
Hotels and Distribution	26.57	8.98	13.35	1.45	50.35	41.47%
Transport / Communications	1.95	0.65	2.89	0.31	5.80	4.78%
Finance /Business	13.94	4.08	5.55	0.60	24.17	19.91%
Public Admin	2.86	1.80	1.15	0.12	5.93	4.88%
Education/Social Work/Health	3.84	1.34	1.85	0.20	7.23	5.96%
Other Services	10.03	4.04	5.41	0.59	20.06	16.53%
Total	64.10	22.64	31.28	3.38	121.40	100.00%

Tables 14 and 15 show that ROW and RUK Students together with Visitors (both RUK and ROW) expenditure generated £7.27 Million of output in the City of Glasgow and created over 121 FTEs in the economy of the city. Knock –on effects were heavily concentrated in both output and employment within Hotels and Retail Distribution, reflecting the largely local expenditures of student and visitor off – campus activities such as club and pub going, shopping and eating-out.

A full summary of the impacts realised is included in Table16 in Section Four of this report.

**SECTION FOUR: Overall Impact Summary and
Conclusions**

Overall Impact Summary for both Scotland and the City of Glasgow

The purpose of this study was to provide an analysis of the economic impact of the University of Strathclyde on the economies of Scotland and the University's host city of Glasgow. The overall impact of the University and its activity is summarised in Table 16 overleaf.

Table 16: Summary of impact generated in the City of Glasgow, the Rest of the Scotland and Scotland as a whole

OUTPUT £ MILLION						
	<i>Direct (£Mns)</i>	Total knock-on impact on Scotland	<i>Of Which</i> Knock-on impact accruing to Glasgow City	<i>Of Which</i> knock-on impact accruing to the rest of Scotland	Total Impact on Scotland (Direct Plus Knock-on)	Total Impact on the City of Glasgow (Direct plus Knock-on)
University of Strathclyde	£165.9	£103.7	£37.7	£66	£269.6	£203.1
ROW Students	0.0	£19.3	£3.7	£15.6	£19.3	£3.7
RUK Students	0.0	£7.3	£1.5	£5.8	£7.3	£1.5
Visitors (ROW and RUK)	0.0	£8.9	£1.8	£7.1	£8.9	£1.8
TOTAL Combined impact of University activity	£165.9	£139.2	£ 44.7	£ 94.5	£ 305.1	£ 210.1
FTE EMPLOYMENT						
	<i>Direct</i>	Total knock-on impact on Scotland	<i>Of Which</i> knock-on impact accruing to the City of Glasgow	<i>Of Which</i> knock-on impact accruing to the rest Of Scotland	Total Impact on Scotland (Direct Plus Knock-on)	Total Impact on the City of Glasgow (Direct plus Knock-on)
University of Strathclyde	2845	1069	472	597	3914	3317
ROW Students	0	218	64	154	218	64
RUK Students	0	82	23	59	82	23
Visitors (ROW and RUK)	0	120	35	85	120	35
TOTAL Combined impact of University activity	2845	1489	594	895	4334	3439

The primary focus of this study was to analyse those aspects of the University of Strathclyde’s contribution to the economy that can currently be quantified and measured. Evidence presented within this study clearly shows the University of Strathclyde to be a significant economic player both in its host city of Glasgow and in

Scotland as a whole. In total it was shown that Strathclyde generated over £300 million of output in Scotland, with around 68% of this in Glasgow City and 32% in the rest of Scotland. The University's activities were responsible for generating over 4300 Scottish jobs, with around 3400 of those in Glasgow City and a further 900 elsewhere in Scotland. In purely quantifiable terms alone, as revealed through this study, the University's impact on the economy is substantial.

In the course of undertaking this study it became clear that the University engages in a very wide range of activities which support economic, social and cultural development. The University plays a very important role in knowledge transfer and innovation and is increasing Scotland's absorptive capacity.

With support from the Nuffield Foundation, the study team are currently engaged in seeking ways to estimate the economic impact of those university activities and outputs which are currently viewed as 'intangible'. Using the University of Strathclyde as a paradigm case study, the team are seeking to capture the impact of *all* of the University's outputs. This will create a fuller picture of the role the University plays and contribute to a better understanding and appreciation of the value of higher education to the nation.

Economic Impact of the University of Strathclyde on the Scottish Economy

For the Financial year 2002/2003

University of Strathclyde Baseline Data

Section 1: Staff Data (Personnel Office)

Section 2: Income Data (Finance Office)

Section 3: Additional Policy-relevant Breakdown of Income Sources (Finance Office)

Section 4: Expenditure data (Finance Office)

Section 5: Student Data (Planning Office)

If you have any questions, please contact Donald McLellan or Ursula Kelly

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Very many thanks for your assistance.

SECTION 1: Staff Data (Please indicate the ‘census’ date as appropriate e.g. 31 July 2003)

I Please give the numbers of staff in each of the following categories:

Category	Full-time	Part-time
1 A. General Senior management		
1.B All other management/administration		
2.A Teaching & Research Professionals		
2.B Research only staff		
2.C Medical Doctors etc (Health Professionals)		
2.D Librarians		
3.A Laboratory Technicians		
3.B Nursing staff (Associate Health Professionals)		
3.C General IT Support staff		
4. Secretarial and clerical		
5.Maintenance Staff/Trades		
6.A Security Wardens		
6.B Residence/Catering staff		
7. Sales Occupations		
8. Other Labourers/gardeners, general cleaning staff etc		
9. All other staff (please specify)		
TOTAL		

Guidance Notes for completion of Staff data.

As HE institutions sometimes differ in their classifications of types of staff, these notes are provided for clarification of the types of staff intended. It may not be possible to separately identify all of your staff in the categories indicated – in which case it would be much appreciated if you would include the appropriate totals and simply indicate where categories cannot be subdivided.

1. General Senior Management. This is intended to include e.g. Principal, Pro Vice Principals, University Secretary/Registrar etc

1.B All other management/administration – education registrars/assistant registrars, specialist managers e.g. Finance managers, Personnel managers, Computer systems managers, Faculty Officers, Admin Officers, Departmental Administrators etc

2.A Teaching & Research professionals . All academic staff whose post involves teaching as well as research or who are teaching only

2.B Research only staff Those academic staff employed primarily to undertake research e.g. contract research staff

2.C Health Professionals (Medical practitioners, Pharmacists etc) Those staff formally employed as health practitioners e.g. in student health centre or equivalent . Clinical Academics should be included in Teaching & Research Professionals. Note that Nursing staff etc in health centres should be included in (3.B)

2.D. Librarians – qualified librarians/archivists

3.A Laboratory Technicians – scientific, engineering, architectural etc

3.B Nursing Staff - Health Associate Professionals. This would include Nursing staff, physiotherapists etc who are employed as practitioners in a student health centre or equivalent.

3.C General IT Support Staff – e.g. IT helpdesk staff, network systems staff, computer programmers/applications staff, departmental computing officers etc.

4. **Clerical and Secretarial:** This should include secretarial and clerical staff such as Receptionists, typists & word processor operators, filing & records clerks, cashiers, legal secretaries, medical secretaries, general secretaries, general clerical assistants.

5. **Maintenance staff/Trades** e.g. Electricians/Joiners, motor mechanics, painters & decorators etc

6.A **Security Wardens**

6.B **Residence/Catering Staff** such as chefs, cooks, waiting staff, bar staff, housekeepers, caretakers. *If it is possible* to separately identify general cleaning staff, it would be helpful to include these in (8).

7. **Sales Occupations:** Such as retail check-out operators and sales representatives.

8. **Labourers/gardeners/general cleaning staff.** This would include general ancillary staff not included elsewhere.

9. **Any others** not included above.

SECTION 2: Income Data Financial year 2002/2003

I Total Income

	(£000) for:						
Source	Scottish Public Sector	Scottish Private Sector	RUK Public sector	RUK Private sector	Rest of EU	Other overseas	TOTAL INCOME
Funding council grants³⁵							
Tuition fees & education grants & contracts							
Research grants & contracts³⁶							
Other services rendered							
Other income - other							
Endowment income & investment income							
TOTAL INCOME							

Where it is not possible to exactly identify the split between Scottish public sector/Scottish private sector or UK public sector and UK private sector or overseas/EU, please give your 'best guess' estimate.

³⁵ Monies from the SHEFC for example would be Scottish Public Sector. However monies from other Funding Councils including joint Funding Council Agencies such as the JISC should be designated as RUK public sector.

³⁶ Agencies such as Scottish Enterprise etc are classed as Scottish Public Sector, as are Scottish Executive contracts etc. UK Research Councils and other UK Government Departments or English RDAs etc should be RUK public sector.

Section 3: Additional Policy-relevant breakdown of income sources. Please complete as far as possible, using your 'best guess' estimate of source split where necessary

From Other Services Rendered:

<i>Of which:</i>	Scottish Public Sector	Scottish Private Sector	UK Public Sector	UK Private Sector	Rest of EU	Overseas	Total
Consultancy Services							
IPR							

From Other Income - Other

<i>Of which</i>			
Residence & Catering operations			
	<i>Of Which, from:</i>		
	Students	Scottish	
		RUK	
		Overseas (incl..EU)	
	Leisure Visitors	Scottish	
		RUK	
		Overseas (incl EU)	
	Business Visitors (incl. Educational visitors)	Scottish	
		RUK	
		Overseas (incl EU)	
	Other Conference/facilities income not included above	Scottish	
		RUK	
		Overseas (incl. EU)	

SECTION 4: Expenditure 2002/3

1. What was the total University Expenditure in 2002/03

.....

2. University expenditure in 2002/03 by HESA categories:

By Activity

Academic Departments	Academic Services	Admin & Central Services	Premises	Residences & Catering Operations	Research Grants & Contracts	Other expenditure	Total

2. Depreciation

3. Interest payable

4. Please give the total annual labour costs for all staff, including employer's pension and NI contributions £.....

Of which: Academic Staff Costs:

Other Staff costs:.....

Students

Section 5 : Student Population

How many students of each type study at Strathclyde? (For 2002/03)

CATEGORY	FULL TIME (FT)	PART TIME (PT)	TOTAL
Scottish Domiciled			
Rest of UK Domiciled			
EU Domiciled			
Other Overseas			
Total			

Very many thanks for your assistance. Please return completed questionnaire to:

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Appendix 2: Detailed Income Source analysis

	Scot Public		Scot Private		RUK Public		RUK Private		EU		Oseas		Total	
	Strathclyde	All Scottish HEIS	Strathclyde	All Scottish HEIs	Strathclyde	All Scottish HEIs	Strathclyde	All Scottish HEIs	Strathclyde	All Scottish HEIs	Strathclyde	All Scottish HEIs	Strathclyde	All Scottish HEIs
Funding Council Grants	43.1	41.5	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	43.3	41.7
Tuition Fees & Education grants	6.9	7.8	5.2	1.4	2.1	2.0	4.5	2.0	0.6	0.7	7.8	4.7	27.1	18.6
Research Grants & Contracts	0.5	2.5	0.2	0.2	6.7	8.0	4.3	6.2	2.0	1.6	0.5	0.8	14.2	19.3
Other Services rendered	0.2	1.3	0.9	1.7	0.1	0.6	0.9	1.9	0.1	0.2	0.1	0.5	2.3	6.2
Other income-other	1.7	1.8	4.4	4.0	0.2	1.8	2.0	3.7	0.7	0.5	2.9	0.7	11.9	12.6
Endowment & Investment Income	0.0	0.0	0.0	1.2	0.0	0.0	1.2	0.3	0.0	0.0	0.0	0.0	1.2	1.5
Total	52.4	54.8	10.8	8.6	9.3	12.7	12.8	14.3	3.3	2.9	11.4	6.7	100.0	100.0

APPENDIX THREE

Underlying approach to estimating the Glasgow City share of the impact of the University of Strathclyde

Using data from the Glasgow Economic Library³⁷ for Output, Employment numbers and Wage Levels it was possible to derive a comparison of Glasgow City's industrial structure with that of Scotland as a whole. From this data it was possible to construct a set of location quotients. Utilised here, Location Quotients (LQs) are measures of regional specification. Glasgow City is relatively unspecialized in industries for which its calculated LQ values are less than unity (i.e less than 1). Glasgow City is relatively specialized in those sectors where LQ values are greater than unity. This is shown in summary form below.

Summary Comparative Measures of Glasgow City and Scottish Economic Structures

	Glasgow City Share of Scottish GDP	Glasgow City Location Quotient
Agriculture/Forestry/Fishing	0.00%	0.000
Mining/Extraction	1.64%	0.114
Energy/Water	3.33%	1.050
Manufacturing	18.39%	0.520
Construction	12.9%	0.736
Distribution	14.02%	0.850
Transport/Communications	20.95%	1.165
Finance/Business	16.62%	0.944
Public Administration	18%	0.943
Education/Social Work/Health	25.2%	0.945
Other Services	24.2%	0.956

³⁷ http://www.glasgoweconomicfacts.com/library_section/default.htm. This source itself draws from other sources such as the LFS and Annual Business Inquiry (ABI) in addition to additional work carried out by Experian and Business Strategies.

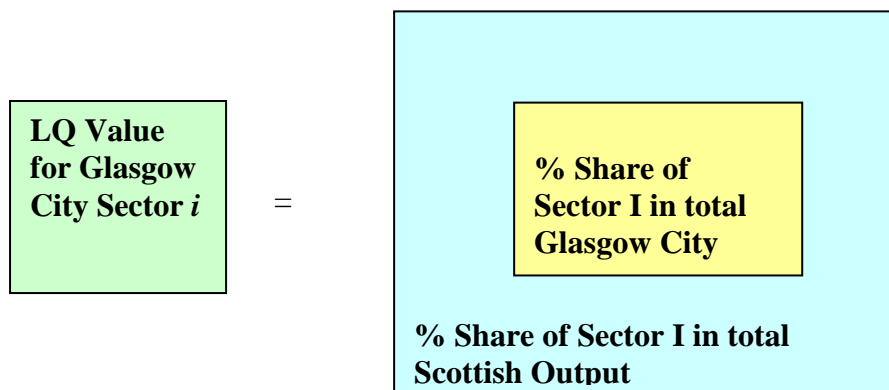
This is the summary form of the complete 128 sector breakdown of Glasgow City against Scottish Output used to calculate Glasgow output shares and Location Quotients for the University of Strathclyde’s impact on the city.

Regional Pattern: Local and National Industries

It would be possible using the above to estimate the City of Glasgow’s share of the University of Strathclyde’s Scottish impact by allocating the share of the impact according to the proportion of City output relative to Scottish Output taken in its entirety.

However, the study team decided that it was desirable to take account of particular characteristics of Glasgow city on both the demand and supply sides through identification of industries which were predominantly ‘local’ in nature.

This approach uses the Location Quotient Approach utilized above. For each sector within the City of Glasgow the location quotient (LQ) is calculated as³⁸:



The team divided the full 128 sectors contained within the SLMI model used (and on which Scottish impact was modelled) into ‘local’ and ‘national’ industries, depending on derived values. As explained above, if an industry has an LQ of over 1 then it must

³⁸ LQ Value for Glasgow City Sector I = % share of Sector I within Total Glasgow City Output / % Share in Total Scottish Output

be relatively specialized in the City of Glasgow; however this could be due to high levels of trade with other regions within Scotland. For example Glasgow City is (in the Scottish context) relatively specialized in Water Transport and Air Transport, but it is likely that many of the products of these Glasgow industries are consumed by individuals from elsewhere in Scotland which would mean that it is not predominantly a local industry. A 'local industry' by definition is one which can meet the demands imposed upon it by the local population and does not trade substantially outside the immediate 'city' – its activity therefore is largely to meet local needs.

The study team established that if a sector had an LQ of greater than unity ($LQ > 1$) but a Glasgow City Output proportion greater than the proportion of the City to Scottish population then (with data allowing different sector employment / output ratios across the two areas) this sector must be trading a proportion of its output and therefore could not be a local industry as defined above. Similarly if the Sector had an LQ of less than 1 it was relatively unspecialized and in order to meet demands for the products of that industry goods would have to be imported from elsewhere in Scotland.

To identify industries which could be regarded as 'local industries', Sectors were selected which had an LQ of 1 or higher (indicating relative specialization) and which *also* supported roughly the equivalent share of Glasgow City's Output in that sector to Glasgow City Population / Scottish Population.

Sectors Defined as 'Local' for the purposes of the study

Gas Supply
Retail Distribution
Hotels, Catering and Pubs
Owning and Dealing in Real Estate
Health and Veterinary Services
Other Service Activities

Appendix 4

General Methodological Issues Concerning Updating of the SLMI System to 2000

The Scottish Labour Market Intelligence Model (SLMI) is formally described as an “*extended Input – Output system*”, combining a conventional interindustry core (determining sectoral outputs) and a labour market satellite which determines total employment within industries, subdivided into employment by occupations and employment at different levels of qualification. As an integrated system of economic accounts, SLMI conforms to the recommendations and requirements for satellite accounting elaborated within the System of National Accounts 1993 (SNA93). As a valid tool for economic modelling, Input Output has been internationally recognised and utilised for over 50 years. As this is a regional model designed for short –term impact analysis then it represents a Type II Leontief inverse. In this type of model household income and consumption are made endogenous via the definition of income / expenditure coefficients.

The Input Output Core

The most recent Scottish Input – Output tables available from the Scottish Executive were for 2000³⁹. These identify the full spread of industries used in the SLMI model, together with final demands. The Input –Output tables within the SLMI model are in “*domestic flows plus import row*” format, a relatively standard format for IO. While some manipulation was required in order to allow full use of the data, the fact that the extant SLMI model had been built around an earlier (1998) version of the Scottish Input – Output Tables made this a relatively standard procedure. Further data was required in order to update employment within the model and also to calculate income

³⁹ www.scotland.gov.uk/about/FCSD/OCEA/00014713/index.aspx - 14k - 26 Apr 2004

/ expenditure coefficients. This data was obtained from the Labour Force Survey, expressing Full Time equivalents as Full Time and Part Time employment with each Part Time Job =0.5 Full Time Jobs⁴⁰.

Standard methodology utilised to test such a model is to first determine if overall, economy wide expenditure (and employment) can be recreated by running a simulation involving the full economy, this is known as a recreate base test. If the model fails to do this correctly then it must be corrected. Even small errors will cause the Model to give spurious results. It is then necessary to run a number of simulated impacts through the model comparing the results to models using an earlier (i.e. 1998) Scottish IO tables.

⁴⁰ Office for National Statistics. Labour Market Division, *Labour Force Survey Five-Quarter Longitudinal Dataset, September 1999 - November 2000* [computer file]. Colchester, Essex: UK Data Archive [distributor], February 2004. SN: 480

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