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## Valuing Knowledge Transfer: a new approach to assessing the broader impact of higher education institutions

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There is considerable policy interest in exploring the overall value of higher education to society and in how higher education can support wider economic growth and development through 'knowledge transfer' from higher education institutions. Until fairly recently consideration of 'knowledge transfer' activity has tended to be mainly focussed on those HEI outputs that are commercial or market-based, relate to interaction with businesses and which are also relatively easy to measure (licensing, patents, consultancy contracts and so on). However it is beginning to be recognised that non-market outputs of higher education institutions (such as community interactions) could also have significant economic and social value linked to their support of knowledge flow to the wider community.

This paper presents a new perspective on knowledge transfer from institutions. It demonstrates the application of welfare economic principles to estimate the value of non-market outputs of higher education institutions and It presents the results of a pilot study of 3 areas of non-market activity of Scottish higher education institutions, namely community engagement, cultural outreach and public policy advisory activity.

**Keywords:** Knowledge Transfer, higher education, economic value, public policy, cultural engagement, community engagement.

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## 1. Introduction

There is considerable policy interest in the economic role of higher education institutions (HEIs.) In particular there is increased interest in exploring the overall value of higher education to society and in how higher education can support wider economic growth and development through 'knowledge transfer' from higher education institutions. (See Lambert 2003, DTI 2006.) Encouraging flows of knowledge from higher education institution into wider society is thought to be important in maximising the benefits to be derived from public investment in higher education (E.g. Sainsbury 2007.) In Scotland, this has led the Scottish Funding Council<sup>i</sup> to distribute a proportion of higher education funding according to a range of 'metrics' which measure some aspects of knowledge transfer and to seek the development of additional metrics that could capture other aspects, in particular non-commercial or non-market activity. A similar approach to allocating funding for 'knowledge transfer' activity has been adopted by the higher education funding councils in other parts of the UK also through specific funds such as the 'Higher Education Innovation Fund'.<sup>ii</sup>

Until fairly recently, the metrics used by the UK Funding Councils for assessment of 'knowledge transfer' activity have tended to be mainly focussed on HEI outputs that are commercial or market-based, relate to interaction with businesses and which are also relatively easy to measure (licensing, patents, consultancy contracts and so on.) Non-market outputs of higher education institutions (such as community interactions) could also have significant economic and social value linked to their support of knowledge flow to the wider community. However, as Phillips KPA have pointed out in their report to the Australian Government (2006), 'measurement' of knowledge transfer mechanisms with a non-commercial focus has been almost 'non-existent'. (See also Arundel and Bordoy 2006, and Garner et al 2006 for other assessments of internationally comparable indicators for knowledge transfer.) However the increasing awareness of the wide range of ways in which universities may benefit their host communities, and the recognition that not all university activity is commercially based, has led to a growing need for the development of methodologically sound measures of non-market higher education institution outputs. This is particularly the case where higher education funders are seeking to encourage such wider activity through resource allocation and funding incentives.

The present paper presents findings from a pilot study of 3 non-market areas of higher education institutional activity that are potentially important in the knowledge transfer context, namely community engagement, cultural outreach and public policy advisory activity. The study aimed to pilot the application of new methodology, based on the fundamental principles of welfare economics, to these 3 areas of non-market higher education activity and to use 'real world' higher education data where possible to 'test' the new methodological framework's potential to identify areas of potential high economic value. The pilot study was carried out in 2007/08 and covered the 19 Scottish HEIs who are funded by the Scottish Funding Council (SFC) and included within statistics collected by the Higher Education Statistics Agency (HESA.)

## 3. Methodology and guiding principles

The study applied the methodology developed in an earlier report for the SFC *Towards the estimation of the economic value of the outputs of Scottish higher education institutions* (Kelly, McNicoll & McLellan December 2005). This earlier report had outlined the development of a comprehensive and methodologically rigorous approach to capturing the larger part of the economic value of Scottish HEI outputs. The 2005 report devised a holistic and overarching framework for estimating the value of higher education institutional outputs.

The purposes of the earlier study had been to assess the feasibility of producing comprehensive and detailed quantitative measures of the outputs of the Scottish HEIs in both volume and value terms. The purpose for this was:

- To allow assessment of the "size" of the contribution of the HEI sector to the Scottish economy in terms comparable with those of other industries.
- To provide information for the evaluation of the *efficiency* (both technical and allocative) of the Scottish HEIs in production; i.e. "value for money" calculations

- To assist in the creation of appropriate signals/incentives to encourage the HEIs to achieve technical and allocative efficiency
- To create a statistical data set for the HEIs equivalent to that likely to be required by legislation for Scottish and UK public sector bodies.

The study was informed by the key guiding principles: a) that the underlying concepts and definitions must conform to fundamental economic theory and (b) that applied measurement techniques and measures should conform to recognised international best-practice for the compilation of economic statistics (e.g. The European System of Accounts (ESA) 95, the UN System of National Accounts (SNA) 1993, HM Treasury Green Book (2003.)

### 3.1 Procedural steps

The approach followed 3 procedural steps: firstly defining and identifying the outputs of HEIs in the areas under study (what the HEIs actually produce), secondly finding ways to quantify the volume of the relevant HEI outputs (how much they produce) and finally finding ways of pricing the outputs.

The application of the first two steps (identification and quantification of outputs) provides volume measures of HEI outputs. These can be used, for example, to derive indices of production and for analyses of growth, productivity and cost/technical efficiency.

The further application of the third step (finding ways to price the outputs) provides value measures for the relevant outputs. This enables development of size and growth measures in terms of GDP, etc and also informs both cost/technical efficiency calculations and also allocative efficiency calculations. This is an essential step towards a full cost-benefit analysis.

**Economic Value = quantity of output produced x price per unit of output**

## 4. Selected Key issues

### 4.1 Outputs and outcomes

In order to analyse the value of knowledge transfer for HEIs, a vitally important distinction must be made between outputs and outcomes. Discussion regarding the contribution of higher education to the economy – and often especially in relation to knowledge transfer – is frequently couched in language that relates to ‘desired outcomes’. For example, Knowledge Transfer from HEIs may be described as important for ‘enhancing economic growth’. A reason for supporting community and cultural engagement may be to ‘promote social cohesion.’ When evaluating its investments Government looks for the investment’s impact on the government’s overall desired outcomes. This is frequently undertaken within a framework which considers Resources, Inputs, Activities, Outputs and Outcomes (HM Treasury Green Book 2003.) Public sector investment in higher education institutions fits into this framework and from a Government perspective the most important thing is the final outcomes achieved (e.g. growth in GDP, increased social inclusion, a higher skilled workforce.)

But while HEIs may be able to *deliver outputs that contribute to* government objective outcomes ( e.g. they can teach and agreed number of students, establish a number of ‘Knowledge Transfer Partnerships’<sup>iii</sup>, arrange open public lectures etc ) they cannot actually *deliver the outcomes*, which are dependent not only on the work of the HEI but on an range of other factors over which the HEI may have little or no influence ( e.g. the willingness of students to learn, the global economic crisis & ‘credit crunch’ etc.)

**Outputs** relate to the things and HEI produces. **Outcomes** tend to relate to more generic societal results that may be casually derived at least in part from the consumption of HEI outputs. To estimate the economic value of the work of the HEIs , this study focusses on the *outputs* of the HEIs.

HEI Input	HEI Activity	HEI Output	Desired Societal Outcome
Lecturer time	Teaching	Number of hours teaching delivered to x number of students	A more highly educated and productive population

#### 4.2 Pricing non-market outputs

The most important issue arising here is that the 'price' to be applied is *not necessarily equivalent to the money an HEI actually receives for doing something*. This is especially important when considering non-commercial work such as community engagement or public policy development, since an HEI may receive no financial payment for this (for instance, entrance to many public lectures is without charge; another example is where Professor X serves on a government expert advisory committee but no fee is charged for his time.) There are a wide range of economic techniques that could be used to impute value to the outputs of higher education institutions, particularly where these are 'non-market' outputs. These techniques include 'shadow-pricing' with approaches frequently used in the environmental and cultural economics literature (e.g. Throsby 2001) such as 'willingness to pay', 'willingness to accept' and other 'contingent valuation' techniques. Being able to impute value in a methodologically sound way enables overall estimates of the economic value of the outputs to be made. When seeking to 'shadow-price' HEI outputs one is ideally looking for examples of what may have been paid in a 'parallel market' i.e. what would the HEI have received if this output was being delivered under 'market' circumstances. This might be, for example, typical ticket prices for a popular concert or the consultancy fee that would normally be charged by Professor X for similar levels of time and expert advice delivered by him to other clients.

#### 5. Types of output included in this study

This study focussed on Scottish HEIs and aimed to 'test' the new methodological framework's potential to identify areas of high value and where additional relevant metrics for knowledge transfer could be devised. For the purposes of this study, in order to be considered a relevant community, cultural or public policy advisory output, an output needed to have the following key characteristics:

- Should be additional to 'core' (generally degree course) teaching, research and commercial consultancy activity
- Has to reach or involve people beyond the boundaries of the institution
- Has to reach or involve non-academic audiences

For example the delivery of lectures which are part of a formal degree course was considered a 'Teaching' output. However an open 'Town and Gown Lecture' is an additional outreach activity and was considered a 'community engagement' output.

#### 6. Data generation

The study used survey information from a sample of 8 different Scottish higher education institutions (which made up c.42% of the total turnover of Scottish institutions) as well as drawing on a range of published data (the Higher Education Statistics Agency (HESA), the Higher Education Business and Community Interaction Survey (HE-BCIS) and the data produced by the Society of College, National and University Libraries (SCONUL) and the Audit of Sports Provision 2007). The sample institutions were:

1. Ancient, City-based, large (University of Edinburgh)
2. Old, City-based, large (University of Strathclyde)
3. Old, Campus-based, medium-size (University of Stirling)
4. New, City-based, small (University of Abertay)
5. New, City-based, medium-size (Robert Gordon University)
6. Study-relevant specialist, small (Edinburgh College of Art)
7. Study-relevant specialist, small (Glasgow School of Art)
8. Study-relevant specialist, small (Royal Scottish Academy of Music and Drama)

#### 7. Data Constraints

There were significant challenges in the data generation process. The main issue was that while higher education institutions appeared to consider their outreach activities and support for 'public service' advisory activity to be a substantial element of their work, they had previously had no reason to centrally collate data on many of the outputs of these activities. Much of the relevant data was thought to exist but the devolved nature of many of the activities of interest meant that, in the absence of any 'automatic harvesting' systems for this data, a very large number of individuals were required to generate the information manually.

Therefore the implementation of the framework was limited to those areas where at least partial data could be provided. This enabled the testing the framework for some sets of identified outputs.

- Events open to the public
- Performances open to the Public
- External sports facilities usage
- External Library resource usage
- Public Policy Involvement

While the data provided by institutions for the current study was partial, it gave some indication of the type, range and extent of activity involved. It was also sufficient to assist in supplementing data in HE-BCIS and other sources to produce exemplar partial estimates of total Scottish HEI volume outputs in some of the areas considered.

## 8. Value of Time and the 'Time-Cost' method

Reasonably good data was available on event and exhibition attendances. From this it was possible to make estimates of the 'time spent' by visitors and event audiences in attending or visiting a performance or exhibition. In order to impute value to these HEI outputs therefore – many of which were not priced or which carried only a nominal charge - it was decided to apply the 'time-cost' method. The basic idea of the time-cost method is that a person's time is a scarce resource and as such has economic value. When attending a free HEI performance, exhibition or lecture the attendee is spending time rather than money, but the amount of time they are willing to spend can be taken as an indicator of the value that they place on the performance or exhibition. The time cost method is well established and recognised in the evaluation of transport schemes (where it is known as the 'travel-cost' method.) The economic value of, for example, public lectures provided by HEIs could therefore be estimated in this way:

$$\text{Economic value} = \text{No. of Attendees} \times \text{Average Length of Attendance} \times \text{Unit price of Time spent.}$$

The Department for Transport (DfT) publishes estimates of the per-hour value of both 'working' and 'non-working time' and hence it is possible to use official government data in the valuation of time spent. For this study the figures adopted for the preliminary estimates were taken from the February 2007 DfT TEN Note *Values of Time and Operating Costs*. It was also assumed, in the absence of specific information regarding audience characteristics, that the time spent was leisure time rather than business time.

It was decided to apply the 'Time Cost' method to:

- Public Lectures & General Events open to the public
- Performing Arts Events
- Galleries/Museums/Exhibitions
- Wider Community use of Library Services

A different approach was adopted for the two remaining output types included in the exemplar estimates. The two remaining output types were:

- Sports Centre community memberships
- Hours of public policy advisory work delivered

There was a relatively clear 'parallel' market for these in the form of the prices charged by commercial gyms and fitness centres. Hence in imputing value to Sports Centre Memberships an equivalent commercial gym membership fee was used as a shadow-price. Pricing HEI staff contributions to public policy and advisory work is reasonably straightforward. This is because the same HEI staff contributing as advisors or committee members to the work of public or third sector bodies (UK-wide, Scottish Parliament, local government, regional development agencies, policy and health networks and advisory groups, charities etc) also frequently undertake paid commercial consultancy which draws on their same skills and expertise. It is perfectly reasonable therefore to put an economic value on their time that is equivalent to the amount that would have been paid for their time commercially. The main issue in relation to public policy advisory work is obtaining data from HEIs on the estimated number of hours HEI staff spend on this. Comprehensive central data was not readily available at the time of this study – however analysis of survey data from a

survey of 210 staff at one institution had revealed a wide range of relevant 'public policy/advisory' activity and this was used to derive a conservative estimate of hours of public policy work delivered. It should be pointed out that, given the limited database used, the estimate for public policy advisory outputs is likely to be a considerable **underestimate** of the volume of this type of work undertaken by Scottish HEIs .

By using a combination of data sources (HE-BCIS, HESA, SCONUL and the 2007 Scottish Universities Sports Audit) together with information provided by the participating HEIs, it was possible for exemplar estimates to be made at an aggregate level , and for a 'composite year', for all Scottish HEIs, for some of the outputs under consideration.

These exemplar estimates are shown in Table 1 below

**Table 2: Exemplar Estimates of Economic Value**

Preliminary Value Estimates : Annual Values ( Composite year)						
	Est. Numbers	Est. hours spent per event	Total Time spent	Hourly Time Value (2002 Prices)	Total Value £	Value £
Public Lecture Attendance	28624	1.5	42936	4.46	191495	191495
Performing Arts	217248	2.6	564845	4.46	2519208	2519208
Gallery/Museum/ Exhibition Visitors	1727964	1.5	2591946	4.46	11560079	11560079
<i>Source: Derived from HEBCIS, HESA and survey info. and Department for Transport TEN</i>						
		Est Number of visits per FTE user	Hours spent	Total time spent	Hourly Time Value (2002 Prices)	Total Value (£)
External Library Visitors (FTE)	16640	64	1.5	1597440	4.46	7124582
<i>Source: Derived from SCONUL 2005/06 and Department for Transport TEN</i>						
External Sports memberships 2006		equiv. mkt p.a gym membership	Est.Value			
Public( Community Memberships) of Sports Facilities	4807	612	2941884			2941884
<i>Source Scottish Universities Sport Audit 2007 and web price searches</i>						
	Hours per ac/staff	Scottish HEI Academic staff numbers(04-05)	Total est hours	Hourly rate	Total Est value	
Public Policy Advisory work	5	15115	75575	86	6499450	6499450
<i>Sources: Estimates based on single institutional survey info</i>						
<i>Hourly rate based on av. £600/day consultancy rate for senior</i>						
<i>consultant ( av. of 900/600/300)</i>						
					<b>TOTAL</b>	<b>30836698</b>

#### 4. Conclusions

Kelly et al (2005) had shown that it is possible to identify variables and make volume measures of higher education outputs in natural units and that by using a range of economic techniques it would be theoretically possible to make estimates of the value of higher education institution outputs in a methodologically sound and rigorous way. The findings



presented in this paper show that the methodology can in fact be applied in practice. By selecting some of the non-commercial knowledge transfer activity of Higher Education Institutions, it shows that it is possible to make estimates of value for some of those areas previously excluded from most economic appraisals of higher education and knowledge transfer. This is particularly important if the policy agenda is to take a holistic view of the benefits of knowledge transfer from higher education and not to be limited only to commercial interactions.

The pilot study also found that the greatest hurdle to overcome is in the collection of relevant output data, which is a matter for higher education institutions to consider if they wish to have all aspects of their knowledge transfer work recognised. However the issue of relevant data collection did not seem to be an insurmountable problem for future evaluations. In the course of the investigation, a number of the university respondents indicated that if there were sufficient incentives given by the higher education funding bodies for institutions to collate the data (i.e. sufficient to overcome the resource cost of collating it) institutions could put such data collection systems in place.

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<sup>i i</sup> The Scottish Funding Council is responsible for the distribution of a large proportion of public funding for higher and further education in Scotland.

<sup>ii</sup> The Higher Education Innovation Fund (HEIF) is operated by the Higher Education Funding Council for England.

<sup>iii</sup> Knowledge Transfer Partnerships involve close working between a company and a University on a specific project, with a recently qualified researcher placed within the company to work on the project. See: <http://www.ktonline.org.uk/business/business.aspx> for more information.

## References

Arundel & Bordoy (2006) Developing internationally comparable indicators for the commercialisation of publicly funded research United Nations University Maastricht

Garner, Fong & Huang TRIUMF Consortium ( 2006) Measuring the impact of Knowledge Transfer from Public Research Organisations: A comparison of metrics used around the world.

Lambert Review of Business-University Collaboration 2003

Department for Trade and Industry Knowledge Transfer from the Research Base 2006

DfT (2004). Values of Time and Operating Costs. TAG Unit 3.5.6. Department for Transport.

Department of Education, Science & Training (Australia) 2006 Knowledge Transfer and Australian Universities and Publicly Funded Research Agencies PhillipsKPA 2006

Kelly U, McNicoll I and McLellan D(2005) Towards the estimation of the economic value of the outputs of Scottish Higher Education Institutions :Report to the Scottish Finding Council

Kelly U, McNicoll I, Brooks R and McLellan D ( 2008) Towards the estimation of the economic value of the outputs of Scottish Higher Education Institutions The *Next Steps* Study Report to the Scottish Finding Council

Throsby, D (2001) Economics and Culture Cambridge University Press

Sainsbury 2007: The Race to the Top: A Review of Government's Science and Innovation Policies