V.2 Annex- Exploration of the Costs of Research Methodology

Introduction - what we know so far

R&D expenditure is increasing across the sector (at a rate faster than inflation) and there has been a consistent year-on-year increase in the Full Economic Costs of research in universities, as seen in TRAC data.

The following framework[1] of R&D costs is used by the OECD to define the intramural price of R&D.[2]

- Current costs
    - Labour costs for internal R&D personnel
    - Other current costs
- Capital costs
    - Land and buildings
    - Machinery and equipment
    - Capitalised computer software
    - Other intellectual property products.

OECD data on Gross Domestic Expenditure on R&D by type of expenditure show labour costs for internal R&D personnel have increased by 41% between 2012-2018.[3]

Expenditure on research activity can be described as being influenced by two factors: an increase in the 'volume' of research being undertaken (i.e. the size or capacity of the research base), and the 'costs' of research activity increasing (i.e. the price of the necessary inputs for research, such as staff, equipment, indirect costs etc).

Research activities change in focus and method over time, making comparisons difficult. Both volume and price will further be influenced by efficiency measures taken by organisations (e.g. through mandate or incentives) to drive down the overall cost (e.g. asset-sharing and collective negotiations for procurement).

In order to understand changes in the costs of research activity, one approach might be to control for changes in volume of research activity in research expenditure data from TRAC– in effect this would be an attempt to track a hypothetical 'unit cost' of research.

An initial analysis of the available data suggests that not all disciplines will be impacted the same way. UKRI grant data indicates significant variation between disciplines, subdisciplines and types of costs (Directly Allocated, Directly Incurred and Indirect costs) over time. HESA data also shows that the expenditure and the grant and contract income per academic FTE are higher for STEM subjects, and those they identify as 'high cost' disciplines. There is also likely to be differential impacts across TRAC peer groups[4].

[1] Gross domestic expenditure on R&D by sector of performance and type of expenditure (oecd.org)
[2] Frascati Manual (2015) Guidelines for Collecting and Reporting Data on Research and Experimental Development
[3] Gross domestic expenditure on R&D by sector of performance and type of expenditure (oecd.org)
[4] Annex-4.1b-TRAC-Peer-groups-2017-18.pdf

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Limitations of the data

The datasets and methodologies available to us have various shortcomings:

- **TRAC data** shows changes in the full economic costs of research activity but does not distinguish changes due to 'volume' or 'cost' of research activity. TRAC data also does not contain the level of detail required to understand spend in line with the OECD categories above – nor can be disaggregated and analyzed to show differences between academic disciplines.

- **HESA data** reports annual income and some useful expenditure data, but not the full economic costs of research activity.

- **UKRI grant funding data** (Siebel/J-ES) records grant application data rather than the full economic costs or price eventually paid, and is therefore subject to external influences that we cannot control for e.g. applicant behaviour/policy impacts. Other data (e.g. on detailed equipment costs) are in pdf form and not readily available for extraction. Analysis of UKRI application data has not identified any clear trends in the relative proportion of different kinds of costs (i.e. staff, equipment, consumables, travel etc.), the amount of staff time (hours and duration) costed to grants, or the average cost of successful and unsuccessful applications.

- There are also **behavioural factors** influencing the available data. Data may reflect the behaviour of funders who are making decisions on success rates, match funding requirements and demand management approaches in individual programmes. The data may also reflect some 'gaming' of where costs may be suppressed or moved.

Increases in the cost of research- context and background

Cross- subsidy

The Full Economic Costs of research activity are higher than what is covered through research grants, requiring cross-subsidy from other areas. Heavy reliance on cross-subsidy leaves research activities susceptible. If the cost of everything goes up institutions will be less able to generate surpluses, which poses a risk to the continued delivery of research.

HEPs already experiencing financial pressure are also vulnerable to changes in the policy landscape. Domestic student fee caps, the ability to attract and retain international students and broader economic drivers all pose increasingly big risks for HEPs.

Cost Increases

Table one shows total expenditure (Full Economic Costs) on research reported in TRAC data by universities between 2014/15 and 2019/20. There has been a consistent year-on-year increase in TRAC full economic cost of research in universities, higher than the rate of inflation (except for 19/20, likely reflecting the first few months of first coronavirus pandemic national lockdown where activity was constrained).

Table 1: Changes in TRAC full economic cost of research 2014/15 – 2020/21 (UK higher education institutions)

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	Academic year						
	2014/15	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**2019/20**	**2020/21**
Total full economic cost of research (TRAC) (£m)	11162	12621	13656	14300	15166	15138	15147
Year on year change (£1m)		1458	1035	644	866	-28	9
% change		13.06%	8.20%	4.71%	6.05%	-0.18%	0.06%
Inflation (ONS GDP deflator year-on-year growth)[5]		0.62%	2.24%	1.72%	1.95%	2.27%	5.65%

Inflation

There is no bespoke "R&D" inflation. Standard measures such as CPI or PPI (based upon "baskets of goods") or the GDP deflator are economy-wide assessments and likely to be imperfect measures to assess impacts on R&D costs. However, based on these forecasts it is reasonable to assume that the research sector will be exposed to a significant increase in pressure, and at a rate of increase not seen for many decades. In addition, several of the PPI product groups with the highest growth rates are relevant to R&D e.g. chemicals, industrial gases, electrical equipment, as well as utility prices.

Increases wholesale gas and electricity prices are expected to have a significant impact on the cost of research. Particularly for approaches which involve energy intensive methodologies/technologies such as high-performance computing, accelerators, research vessels/vehicles, and controlled environments (e.g. glass houses, containment facilities etc.).

Changes to FTE staff and pay

Over the period 2015/16 to 2018/19 we see consistent increases in 'research expenditure per researcher' at a rate significantly higher than inflation. The 2019/20 decrease is presumed to indicate reduced spend and activity during the first few months of the pandemic. Table two below suggests that, over a 6-year period (2014/15 – 2020/21), the real value of expenditure-per-researcher has increased by 6.2%.

Table 2: Full economic cost (FEC) of research* per research staff FTE (UK higher education institutions†)

	Academic year (Aug-Jul)						
	2014/15	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**2019/20**	**2020/21**
FTE researchers**	63,889	67,548	69,221	69,378	71,869	71,764	70,632

[5] NB: published GDP deflators comparing each financial year to the previous year. Accessed: https://www.gov.uk/government/statistics/gdp-deflators-at-market-prices-and-money-gdp-march-2022-quarterly-national-accounts

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Research FEC per FTE researchers (2020/21 prices, £k)	201.39	214.04	218.94	224.68	225.61	220.36	213.97
Percentage change year-on-year		6.28%	2.29%	2.62%	0.41%	-2.33%	-2.90%

* fEC values have been converted to 2020/21 prices to control for inflation, using published GDP deflators: https://www.gov.uk/government/statistics/gdp-deflators-at-market-prices-and-money-gdp-march-2022-quarterly-national-accounts, and aggregated at the sector level.

** Research staff include academic staff, research assistants and fellows. The academic staff FTE is weighted according to the percentage time academic staff spend on research, as reported by each university via the TRAC return. Research assistants and fellows are assumed to spend their full contracted hours on research activities. Research FTE (weighted academic staff FTE + research assistants and fellows FTE) has been aggregated at the sector level.

‡Data from universities eligible for dispensation is excluded as these universities do not need to submit FTE data.

The sector is anticipating changes to salary and pension costs, which has been raised as a concern by HEPs and may impact the volume of research undertaken (i.e., Any increase in costs to employers will increase the cost of research and reduce the volume of research, assuming income does not also rise).