Virtual Micro Data Laboratory Data Brief 4: Autumn 2007

Employment in Research & Development; Insights from BERD and other Sources

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This Data Brief provides a summary of the Business Enterprise Research & Development (BERD) data available through the Virtual Micro-data Laboratory. The BERD is an annual survey that measures Research & Development (R&D) expenditure and the total R&D Employment in the UK. The survey also includes information on the types of R&D and it's the sources of funding. BERD is used to produce Research & Development Statistics along with a number of other purposes; including contributing to the production of National Accounts.

This data brief is structured as follows. Section 1 provides an overview of the BERD survey design and the nature of questions asked. Section 2 shows sample sizes available for analysis from the BERD data, and demonstrates how these can be matched to other sources of ONS business data. Section 3 presents a summary of research that has been conducted within the VML based upon the BERD data. Finally, Section 4 presents an analysis of employment in R&D based upon the BERD survey. Further insight in to what constitutes employment within R&D is provided by further analysis based upon the Labour Force Survey (LFS) and the Annual Survey of Hours and Earnings (ASHE).

1. Overview of the BERD Survey

The BERD survey has been conducted since 1994. Within the BERD, R&D is defined as 'creative work undertaken on a systematic basis in order to increase the stock of knowledge, including the knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications'. This definition is provided by the OECD Frascati Manual and is included in the guidance notes that accompany the BERD questionnaire. Guidance notes further state that 'the guiding line to distinguish R&D activity from non-research activity is the presence or absence of an appreciable element of novelty or innovation. If activity departs from routine and breaks new ground it should be included: if it follows an established pattern it should be excluded'.

The unit of analysis within the BERD survey is the reporting unit. Similar to other ONS business surveys, respondents receive either a short from or a long form of the questionnaire. The short form is designed, primarily, for small businesses to reduce the administrative burden of the surveys and also reflects that generally, small firms contribute less to overall totals of R&D. The longer form is designed for larger businesses that are more likely to be involved in R&D and who will contribute more to total expenditure on R&D. The long and short forms are part of the stratified sampling

framework, which is common to most ONS surveys. Both forms gather information on the following areas:

- **Basic Research**: This is work undertaken primarily for the advancement of scientific knowledge without a specific practical application in view.
- **Applied Research**: This is research undertaken with a general or particular application in view.
- **Experimental Research**: This covers the use of the results of the basic and applied research directed to the introduction of new materials, processes, products, devices and systems, or the improvement of existing ones.

Both survey forms ask for quantitative data on in house expenditure on R&D, and how much is bought in (i.e. work conducted outside of the business, funded by the company), along with average employment and headcount on R&D. The longer form goes into more detail and asks questions on current and capital expenditure, R&D expenditure outside of the country and sources of funds for expenditure on R&D. The Long form also asks for information supplied to be broken down by product group and purpose.

2. Overview BERD Data Available within the VML

Table 1 gives an overview of the number of reporting units appearing within the annual BERD data. The number of reporting units is broken down into broad industry sectors and the table shows the number of reporting units appearing in each of the annual data sets from 1994 onwards. It is important to note that the BERD micro-data available in the VML contains both actual responses from reporting units and imputed responses. This issue will be considered in further detail below.

It can be seen from Table 1 that most reporting units in the BERD data are in the manufacturing sector, accounting for approximately 42% to 50% of observations within the micro-data[1]. A relatively large number of reporting units are also in the specific R&D sector of industry. Within the Standard Industrial Classification, SIC73 'Research & Development' is devoted to the activities of business that specialise in R&D and do research on behalf of other industries or government departments. It is noted that the number of observations within the BERD data sets are relatively small during the early years of the survey. Since then the number has increased significantly and by 2005, information on approximately 14,000 reporting units is contained within the BERD data sets.

Those organisations that contribute significantly to overall R&D activity may be sampled across successive years of the BERD survey. Table 2 shows how many reporting units within the BERD data set during a given year appear within subsequent years of the survey. For example, of the 5 thousand reporting units that appeared within the 1995 survey, approximately 1,500 appeared within each of the subsequent BERD data sets. Across all years, it can be seen that a large number of reporting units appear within the BERD micro-data within all following years, reflecting their importance in measuring overall activity in R&D.

[1] A higher incidence of reporting units is observed during 1994 and 1995, although data for these years is characterised by smaller sample sizes.

Table 1: Industrial Composition of BERD Sample (% of total reporting units)

Industry Sector	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Primary & Utility Sectors	2.5	1.2	0.8	0.7	0.7	0.9	1.0	0.7	0.8	0.7	0.8	0.6
Manufacturing	72.1	64.7	42.5	42.6	52.5	50.7	49.9	47.7	47.5	48.2	42.8	42.7
Construction	1.0	0.9	0.7	0.7	0.7	0.7	1.0	1.1	1.5	1.4	1.5	1.7
Wholesale & Retail Trade & Repair												
Wholesale Trade	0.9	1.3	1.2	1.1	1.0	0.8	1.4	1.4	1.9	1.7	2.2	2.7
Retail Trade & Repair	2.0	3.0	2.8	3.5	3.2	2.9	4.1	4.2	4.8	4.8	4.9	5.2
Service Sector	0.6	0.5	0.6	0.5	0.5	0.5	1.0	1.4	1.9	1.1	2.4	2.9
Real Estate, Renting and Business Activities												
Computer industry	6.6	9.0	7.5	7.7	6.8	6.4	7.2	7.5	7.7	8.3	9.4	9.7
Research & development	5.3	6.3	32.4	30.6	23.0	25.5	20.9	21.7	18.7	18.8	19.6	14.8
Real estate, renting, other business activities	8.1	11.4	9.4	10.4	9.7	9.8	10.6	11.3	11.2	11.1	12.4	13.6
Public Sector	1.0	1.8	2.1	2.1	1.9	2.1	3.1	3.1	4.0	4.0	4.1	6.2
Total number of reporting units	3813	4846	7763	8170	9197	8544	9,515	9506	10896	10334	12783	13874

Table 2: Number of Times Reporting Units Appear within the BERD Data

Year	1	2	3	4	5	6	7	8	9	10	11	Total
1995	354	373	338	468	366	356	264	325	248	272	1,482	4846
1996	461	678	901	676	749	446	760	535	446	2111		7763
1997	766	1,028	760	847	500	826	568	513	2362			8170
1998	1287	930	1076	621	955	706	635	2987				9197
1999	1017	1039	631	1102	718	691	3346					8544
2000	1353	799	1,528	806	880	4149						9515
2001	931	1843	827	987	4918							9506
2002	2431	1107	1416	6944								11898
2003	1127	1364	7843									10334
2004	1718	11067										12785
2005	13894											13894

It is important to note that BERD is a population data set, with imputed values for those firms who did not actually respond to the survey. The above tables provide data for both real and imputed responses. Table 3 looks at the number of real respondents to have appeared in the survey between 1995 and 2005. Respondents to the BERD survey can be asked to provide information on expenditure on R&D for multiple product groups. Within a single questionnaire, respondents are able to provide information on R&D for three civil product groups and 2 defence product groups. Respondents are not restricted to 5 product groups and can request additional questionnaires to provide information on more areas of R&D expenditure if they so wish. Within the BERD micro-data, reporting units providing information on more than 1 product group will appear in within multiple rows of the data. Table 3 therefore also provides data on how many different areas of R&D each respondent was involved in each year, i.e. how many respondents indicate that they are undertaking R&D in more than one field of activity.

Table 3: Real and Imputed Responses to the BERD Survey

Number of Returns Provided by Respondents	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1	1003	1003	972	1219	2147	2147	2299	2284	2399	2480	2527
2	217	225	164	201	383	420	312	259	238	252	370
3	28	40	17	25	27	33	31	29	28	23	24
4+	68	82	71	72	67	69	66	52	46	46	50
Total Number of Respondents	1316	1350	1224	1517	2624	2669	2708	2624	2711	2801	2971
Imputed Responses	3530	6413	6946	7680	5920	6846	6798	9274	7623	9984	10923
Total	4846	7763	8170	9197	8544	9515	9506	11898	10334	12785	13894

It can be seen in Table 3 that when we abstract from imputed responses, the 'real' numbers of respondents across years is considerably smaller than the numbers of reporting units appearing within the BERD datasets. The number of actual respondents in 2005 was accounted for approximately a quarter of the reporting units present in the BERD data set. Among those who responded to the survey, approximately 75% to 85% only provide information on R&D for a single product area; with 10% to 20% providing information on 2 areas of R&D. Table 4 reproduces the results of Table 3, although only looking instead at the actual number of respondents appearing in successive years of the BERD data. This table gives a better idea of the number of respondents actually appearing in successive years. It can be seen that the percentage of reporting that actually respond to the BERD survey in consecutive years is smaller than the percentage that appear in the BERD population.

Table 4: Number of Times Non-Imputed Reporting Units Appear within the BERD Data

Year	1	2	3	4	5	6	7	8	9	10	11	Total
1995	267	168	133	102	113	95	68	55	48	54	213	1316
1996	273	192	129	141	114	88	70	55	58	230		1350
1997	242	159	151	133	98	77	57	62	245			1224
1998	326	252	217	152	112	87	79	292				1517
1999	830	556	335	266	182	112	343					2624
2000	968	525	370	230	141	435						2669
2001	962	528	373	252	593							2708
2002	923	542	390	769								2624
2003	1,105	701	905									2711
2004	1,398	1403										2801
2005	2971											2971

3. Previous research Using BERD

This section provides a brief overview of some of the recent research that has been conducted within the VML based upon the BERD data.

Estimating the impact of R&D on productivity using the BERD – ARD data. (Rogers, 2006)

This paper discusses the relatively low ratio of business GDP to R&D compared to other leading economies and the small decline in this ratio in the UK since the 1990s, again in comparison to other leading economies that have seen small increases in recent years. It uses BERD data along with ARD data collected between 1996 and 2003 to examine the UK ratio. The low ratio is attributed to differences in: industrial structure between UK and other countries; low R&D activity of some firms; and the absence of large UK firms in electronics, motor vehicles and IT.

Productivity, Spillovers and Human Capital: An Analysis for British Establishments Using the ARD Dataset. (Anon Higon and Sena 2006)
This report, commissioned by the DTI, looks into the issue of sustained and persistent productivity differentials across regions. The main reason believed to be behind this is the uneven distribution of human capital (in terms of educational attainment) across the regions. The authors estimate a production function on a panel of firms drawn from the Annual Business Inquiry (ABI) over the period 1997-2002 where both measures of knowledge spillovers (computed from the BERD) and regional density of human capital (computed using information from the Labour Force Survey) - and their interactions - appear among the factors that can affect firms' productivity.

How Much Does the UK Invest in Intangible Assets? (Haskel and Marrano 2006)
This paper presents an analysis of British investment in intangible assets (information, advice, know-how) in the context of their increasing importance in the UK economy. This research presents comparisons in this investment between the UK and US, and between investment in tangible and intangible assets. The authors draw upon data from the US National Income and Product Accounts, and data from the ONS's ABI and BERD data sets. This work finds that, in comparison with UK tangible asset investment of 11.7% of GDP in 1998-2000, in 2004 the UK invests 10% of GDP in intangibles which is approximately as much as investment on tangibles.

University Research and the Location of Business R&D (Abramovsky, Harrison and Simpson 2006)
This article investigates the relationship between the location of private sector R&D labs and university research departments in Great Britain. It uses ONS BERD data from 2000 to 2003. The establishment-level BERD data provide information on the population of establishments performing intramural R&D in Great Britain. They find that for high quality research departments rated 5 or 5* by the RAE we find consistent evidence of co-location only in the pharmaceuticals and chemicals industries, but we also find positive effects for research departments rated 4 or below in other industries such as machinery and communications equipment. These findings shed new light on the links between public research and business R&D and the role of geographic proximity in public-private sector interactions.

Assessing the practical and methodological issues involved in capitalising R&D in National Accounts (Clayton, Edworthy, Galindo-Rueda and Wallis 2007)
This report conducts a literature review on R&D and its behaviour as an asset at firm, industry and whole economy level. The paper examines issues associated with linking R&D with innovation surveys; it explores methods to estimate life length of R&D assets and compiles R&D expenditure series for the UK using Business Enterprise Research and Development (BERD) surveys.

R&D and Exporting: A Comparison of British and Irish firms (Girma, Görg and Hanley 2007)
This paper investigates the two way relationship between R&D and export activity. It concerns itself with the question of whether R&D stimulates exports and whether export activity leads to increasing innovative activity in terms of R&D (learning by exporting). For Britain, it links ONS BERD data with the standard published data from Companies House obtainable through FAME. Its conclusions are that that previous exporting experience enhances the innovative capability of Irish firms and the differential effect of exporting on R&D capability in Ireland and Britain is a consequence of different, cross-country exporting patterns.

4. Understanding Employment within Research and Development: Insights from BERD and other Data Sources

The BERD survey asks respondents to provide information about those people who are employed in R&D related activities. The survey asks for both an average full time equivalent over the reference period covered by the survey and a headcount figure for employment on a particular date. Respondents are asked to self-classify employment within R&D to one of 3 broad occupational groups. These are defined according to the BERD survey as follows:

- **Scientists and Engineers**: Include professional scientists or engineers engaged in the conception, or the creation of new knowledge, products, methods and systems.
- **Technicians:** Technicians are qualified personnel who participate in R&D projects by performing scientific and technical tasks, normally under the supervision of professional scientists and engineers. They will usually have scientific or engineering qualifications.
- **Other:** Supporting staff include skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects.

Table 5 shows the percentages of each employment type that make up total employment on R&D as derived from the BERD survey, broken down by industry sector. In terms of the occupational composition of employment, it can be seen that across all sectors of industry, 65% of those working on R+D projects are employed in Science and Engineering Occupations, 17% are employed in technical occupations and 18% are employed in other supporting occupations. The relative incidence of science and engineering occupations is relatively high within the primary, construction and manufacturing industries. The proportion of supporting staff engaged in R+D occupations is relatively high within those organisations whose primary activity is conducting research and development.

Table 5: Occupational Composition of R&D Related Employment Reported in BERD

Industry sector	% of employment by field on R & D			Total employment on R & D
	Scientists and Engineers	Technicians	Other	
Primary and Utility Sectors	73%	15%	12%	571
Manufacturing	69%	16%	15%	69626
Construction	84%	4%	12%	205
Wholesale and Retail Trade and Repair				
- Wholesale Trade	55%	17%	29%	480
- Retail Trade and Repair	67%	23%	11%	5027
Service Sector	73%	22%	5%	6154
Real Estate, Renting and Business Activities				
- Computer industry	58%	22%	20%	16538
- Research and development	58%	15%	27%	36354
- Real estate, renting, other business activities	63%	26%	11%	11165
Public Sector	59%	11%	29%	1099
Average Employment Across All Sectors	65%	17%	18%	

Though BERD does provide information on R&D employment the data provided is limited and provides us with relatively little detail about the actual jobs undertaken by

those people. The BERD data relies on respondents self-classifying employees within their organisation to three broad groups. Particularly in the case of the 'other' category, the occupational category within BERD appears to be relatively heterogeneous in terms of the nature of jobs that are allocated to that category (i.e. skilled and unskilled). The BERD survey also provides relatively little guidance to respondents in terms of which occupations should be classified to these groups.

The Standard Occupational Classification (SOC) provides the basis of occupational classification in a variety of national surveys that collect statistical information, including the LFS and ASHE. Within SOC, jobs are classified into groups according to their skill level and skill content, where the concept of 'skill' is operationalised in terms of the nature and duration of the qualifications, training and work experience required to become competent to perform the associated tasks in a particular job. Moreover, the occupational groups embodied within SOC are designed to be useful in bringing together occupations that are similar in terms of qualifications, training, skills and experience commonly associated with the competent performance of work tasks. SOC has a hierarchical structure. At the broadest level of the classification, occupations are classified to one of nine major groups. Beneath this, occupations are classified to 25 sub-major groups (2 digit level), 81 minor groups (3 digit level) and 353 unit groups (4 digit level). The utilisation of SOC therefore provides a more detailed and meaningful classification of those occupations that are engaged in activities directly related to research and development.

Labour Force Survey (LFS)

In order to provide a more detailed picture of the occupational composition of employment within the R&D sector, we utilised information from the 2004 Labour Force Survey. The Labour Force Survey (LFS) is a quarterly sample survey of households living at private addresses in Great Britain. Its purpose is to provide information on the UK labour market that can then be used to develop, manage, evaluate and report on labour market policies. Within the LFS, information on employment is coded to the SOC2000 at the four digit level, facilitating a more detailed analysis of occupations within the R&D sector.

The VML holds a more detailed version of the LFS than that which is more readily available from the Data Archive. This version of the LFS contains information about the sector of employment within which respondents work, at the 5 digit level of SIC (this information is suppressed in more easily accessible versions of the LFS to maintain the confidentiality of respondents). By using this version of the LFS, it is possible to examine the occupational composition of employment among those people who work within the R&D sector. Unlike the BERD data, it is not possible to identify those people engaged in R&D activities within organisations whose primary activity is R&D. However, we can use the data source to examine the occupational composition of employment among those people employed directly within the R&D sector, as being identified by SIC 73 within the Standard Industrial Classification.

Despite the relatively large size of the Labour Force Survey, a single quarter of data did not provide a sufficient number of observations to provide a detailed picture of employment within the R&D sector. It was therefore necessary to merge data from four successive quarters of the LFS for 2004. The LFS sample embodies a panel design, with the same individuals appearing within 5 successive quarters of the LFS. Failing to take into account the panel nature of the LFS when merging data between quarters would exaggerate the number of unique observations within the pooled data set. To take this into account, information from individuals appearing within the first quarter of LFS data were combined within information on individuals who appeared

within Wave 1 in each of the subsequent quarters. This technique avoids 'double counting' respondents who appear in successive quarters of the LFS. .

Table 6 presents the top twenty occupational groups among those respondents to the LFS employed within the R&D sector, weighted to population estimates. It can be seen that while scientists, engineers and technicians comprise a large percentage of employment in R&D, the second most populated occupation within the R&D sector is SOC 1137: Research and Development Managers. It is noted that this unit group of SOC was introduced following the revision of the classification when moving from SOC90 to SOC2000.

The relative importance of this occupational group highlights a significant weakness in the collection of employment data by the BERD survey. The guidance notes that accompany the BERD imply that the 'other' category is a category for support staff, such as those engaged in clerical and administrative occupations. The classification schema within BERD does not provide guidance as to where Research and Development Managers should be recorded. The 'Other' category of employment is vague and implies administrative staff and it is often assumed so in research (for example; Assessing the practical and methodological issues involved in capitalising R&D in National Accounts (Clayton, Edworthy, Galindo-Rueda and Wallis 2007). However, there is no separate section for managerial occupations, which as table 6 shows, is a very important part of R&D employment. Table 6 also emphasises the heterogeneity of occupations among those employed in R&D activities. Whilst this selection of occupations emphasises the importance of clerical and administrative staff allocated to Major Group 4 of SOC, skill trades occupations and process operative occupations also appear within this list.

Table 6: Most Commonly Occurring Occupations among those Employed within SIC 73: Research and development

Rank	occupation (main job)		Weighted	
	SOC Code	Job title	Freq	Percent
1	2112	Bio Scientists and Biochemists	16,404	17.1
2	1137	Research and Development Managers	6,709	7.0
3	2321	Scientific Researchers	4,849	5.0
4	2329	Researchers N.E.C.	4,689	4.9
5	3111	Laboratory Technicians	4,455	4.6
6	2111	Chemists	4,299	4.5
7	2113	Physicists, Geologists & Meteorologists	3,002	3.1
8	2132	Software Professionals	2,852	3.0
9	2126	Design and Development Engineers	2,763	2.9
10	3119	Science & Engineering Technicians N.E.C	2,124	2.2
11	2124	Electronics Engineers	2,001	2.1
12	1136	Information & Communication Technology Managers	1,537	1.6
13	5223	Metal Working Production & Maintenance Fitters	1,466	1.5
14	2129	Engineering Professionals N.E.C	1,464	1.5
15	4137	Market Research Interviewers	1,385	1.4
16	2131	I.T Strategy and Planning Professionals	1,345	1.4
17	4150	General Office Assistants or Clerks	1,335	1.4
18	1121	production Works & Maintenance Managers	1,319	1.4
19	4112	Civil Service Administrative officers and assistants	1,272	1.3
20	8133	Routine Inspectors and Testers	1,253	1.3
Total			**66,523**	**69.13**

Annual Survey of Hours and Earnings (ASHE)

The Annual Survey of Hours and Earnings (ASHE) provides information about the levels, distribution and make-up of earnings and hours worked for employees in all industries and occupations. The ASHE is a new survey developed to replace the New Earnings Survey (NES) from 2004, including improvements to the coverage of employees, imputation for item non-response and the weighting of earnings estimates. ASHE is the largest regular survey of pay in Great Britain. It currently provides data for around 160000 employees.

Whereas in the LFS data is collected via interviews with individuals, in ASHE information is provided directly by employers from their administrative records. The ASHE therefore has several advantages over other sources of earnings data. First it is the only survey where earnings is the primary objective, second it has a much larger sample size than other surveys, which means that a more detailed analysis can be undertaken for particular groups. Third, since the data are collected from administrative records, rather than being supplied by individuals the accuracy of data is likely to be greater

ASHE provides information about the levels, distribution and make-up of earnings and hours worked for employees in all industries and occupations. By taking the SOC codes (as used previously) that were gathered for the research and development industry sector it is possible (using ASHE) to show earnings in R&D by occupation. Table 7 shows the earnings data from ASHE for selected occupations in R&D. It provides a good idea of earnings for each BERD employment category and by SOC code across a three year period (although only the combined totals for SOC 522 and 813 are given here as a more detailed breakdown is not possible due to VML disclosure control rules).

The second half of Table 7 gives earnings index numbers. These compare the earnings of occupations within the R&D sector of compared with the same occupation across all sectors of industry. It can be seen that the earnings in the R&D sector are generally higher than the average for other industry sectors, the only exception being technicians.

Table 7: Earnings of selected occupations in R&D and Earnings Index numbers

Employment Field	SOC Code	2004 Hourly earnings	2004 N	2005 Hourly earnings	2005 N	2006 Hourly earnings	2006 N	2004-2006 Hourly earnings	2004-2006 N
Scientists and engineers	**211**	£18.48	117	£20.05	97	£19.03	89	£19.15	303
	212	£16.48	26	£16.82	22	£17.43	18	£16.86	66
	213	£17.78	36	£19.91	29	£21.44	23	£19.48	88
	232	£14.26	116	£15.02	92	£15.90	83	£14.98	291
	Average	£16.57	295	£17.83	240	£17.95	213	£17.38	748
Technicians	**311**	£9.51	48	£9.34	41	£9.70	36	£9.51	125
	Average	£9.51	48	£9.34	41	£9.70	36	£9.51	125
Other	**112**	£21.16	36	£25.48	25	£24.07	28	£23.30	89
	113	£23.87	39	£26.98	39	£25.22	36	£25.35	114
	41	£10.33	41	£10.23	37	£10.11	36	£10.22	114
	522+813							£9.70	23
	Average	£18.34	129	£21.05	107	£20.14	104	£19.74	340
		Index numbers for earnings in R&D: selected occupational groups							
Scientists and engineers	**211**	115.9		114.2		108.9		112.7	
	212	102.6		102.2		103.3		102.4	
	213	102.4		108.9		111.1		106.3	
	232	102.7		103.9		106.7		104	
	Average	101		103.3		100.1		101	
Technicians	**311**	99.7		91.1		92.8		94.4	
	Average	99.7		91.1		92.8		94.4	
Other	**112**	121		132.1		119.7		122.6	
	113	106.8		115.2		105.5		109.1	
	Average	113.89		123.65		112.63		115.85	

Bibliography

Abramovsky L., R. *Harrison and H. Simpson (2006). University Research and the Location of Business R&D.* Forthcoming in the Economic Journal.

Anon Higon D. and V. Sena (2006). *Productivity, spillovers and human capital: an analysis for British establishments using the ARD dataset.* Report for the DTI.

Clayton T., E. Edworthy, F. Galindo-Rueda and G. Wallis (2007). *Assessing the practical and methodological issues involved in capitalising R&D in National Accounts.* A report for ONS.

Girma S., H. Görg and A. Hanley (2007) *R&D and exporting: A comparison of British and Irish firms.* GEP research paper 2007/18.

Marrano M. G. and J Haskel (2006). *How Much Does the UK Invest in Intangible Assets?* A report for HMT.

Rogers M. (2006). *Estimating the impact of R&D on productivity using the BERD-ARD data*. Report for the DTI.