Design services, design rights and design life lengths in the UK

This is an independent report commissioned by the Intellectual Property Office (IPO)

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Intellectual Property Office is an operating name of the Patent Office

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Design Economics Introduction

The design industry continues to make a significant contribution to the UK's growth and innovation. A conservative estimate of £23 billion[1] on spending in design, equating to 1.6% of GDP, demonstrates the value that it brings to the economy. However, we believe that this is not the true picture and if all design activity was included it would be much higher. Various entities define what is included in the "design industry" in different ways, for the purpose of this report the design industry is defined in Table 1 of Chapter 1. To maintain and build on this success, policy makers need to better understand how the Intellectual Property (IP) framework supports this dynamic sector. Policy makers need to know:

- How has the UK built up such a successful design sector with such a low level of registered rights?
- Is the design sector successful because it does not register rights?
- Is the intellectual property work framework too complex?
- Why is the number of domestic design rights issued each year about a quarter of the number of patents or trademarks?

The propensity for UK businesses to register designs rights both domestically and through Office for Harmonization of Internal Markets (OHIM) seems to be significantly lower than its EU counterparts. Yet the Government has no evidence to explain this. One of the barriers to understanding this is that gauging the aggregate number of unregistered design rights is difficult, as by their nature they are not on any official registry. It is very possible that many businesses are consciously protecting their designs using an unregistered intellectual property right.

The current Intellectual Property Right (IPR) framework for design is perceived to be something of a patchwork, with many different options for protecting designs in the UK. An overview of the routes available and how they differ is provided in the table of rights below. Each user will value every option differently, depending upon their makeup. Each right covers different dimensions including time, geographical area and the features of a design it will protect, as well as being priced differently. Most bodies who issue registred design rights do not examine for prior art or novelty, this includies the UK Intellectual Property Office (IPO) and OHIM.

The Hargreaves Review of Intellectual Property and Growth and the subsequent Government Response identifies a gap in the knowledge base and calls for more research in this area to ensure that government policies to support UK design are based on evidence. As a first step towards answering these questions the IPO and the Design Council have commissioned Imperial College and BOP Consulting to research specific areas and create this report.

1 Nesta

This research has been commissioned in four chapters, which can be read individually or together:

- **Chapter One provides a map of where design activity takes place in the UK, how it is purchased (bought externally or created internally) and how registered rights are used.**
- **Chapter Two analyses the impact registered design rights have on business performance, given a UK or EU design registration.**
- **Chapter Three is a survey looking at the reasons for the behaviour of firms when interacting within the IP framework for design.**
- **Chapter Four is an international comparison of design systems in the UK, France and Germany.**

The IPO and Design Council would like to thank all of the researchers involved in the project for their hard work in creating this report. We would also like to thank the Trade Mark and Design Rights Expert Advisory Group, and its chair Phillip Johnson, for their input to the research.

Intellectual Property Office, 2011

Table of rights available to design entities in the UK

Name of right	Right Provider	Cover	Term	What's covered?	Cost[1]
Registered Design	UK Intellectual Property Office	UK	25 years (subject to renewal fees)	The overall appearance of a novel design which has individual character (excluding features dictated by function and designs contrary to public policy). No requirement of copying.	1 design: £60 4 designs £180 100 designs: £4,060
Design Right	UK law (unregistered) Some private initiatives such as ACID provide private registries.	UK	15 years from made or, if earlier, 10 years from making available. Last five years subject to licence of right.	An original (and not commonplace) design any aspect of the shape or configuration (whether internal or external) of the whole or part of an article. Excludes must fit, must match and surface decoration). Protection only extends to copying.	Free as copyright, private registries may charge.
Registered Community Design	OHIM	EU	25 years (subject to renewal fees)	The overall appearance of a novel design which has individual character (excluding features dictated by function and designs contrary to public policy). No requirement of copying.	1 design: €350 4 designs €875 100 designs €9125
Unregistered Community Design	EU regulation (unregistered)	EU	3 years	The overall appearance of a novel design which has individual character (excluding features dictated by function and designs contrary to public policy). Protection only extends to copying.	Free as copyright, private registries may charge.
The Hague Industrial design	The World Intellectual Property Organisation	Can designate up to 58 signatories including the EU	Between 15-25 years depending on jurisdiction	The protection depends on the national laws in the respective members of the Hague system.	1 design and all states covered: Sfr[2] 3753 1 design just in the EU: Sfr 503 4 designs and all states covered: Sfr 6912 4 designs just in the EU: Sfr 878 100 designs and all states covered: Sfr 106272 100 designs in just the EU: Sfr 12878

Name of right	Right Provider	Cover	Term	What's covered?	Cost[1]
Copyright (in relation to artistic works – copyright extends much further)	National laws in each country	In every country in the WTO or member of the Berne Convention (artistic works)	At least the life of the author plus 50 years (25 years for industrial articles).	Original artistic works (or works of artistic craftsmanship).	Free
Trade Mark	UK Intellectual Property Office	UK	No limit	Any sign capable of being represented graphically which is capable of distinguishing goods or services of one undertaking from those of other undertakings. A trade mark may, in particular, consist of words (including personal names), designs, letters, numerals or the shape of goods or their packaging (numerous exclusions, in particular functional trade marks are not permitted).	1 registration £170 4 registrations £680 100 registrations £17,000 (plus renewal fees, and extra charges for additional classes)
Community Trade Mark	OHIM	EU	No limit	Any sign capable of being represented graphically which is capable of distinguishing goods or services of one undertaking from those of other undertakings. A trade mark may, in particular, consist of words (including personal names), designs, letters, numerals or the shape of goods or their packaging (numerous exclusions, in particular functional trade marks are not permitted).	€900 for one registration (covers three classes) 4 registrations €3600 100 registrations €90,000 (plus renewal fees, and extra charges for additional classes)

1 The costs can vary in various regions due to the nature of the application for a number of reasons, e.g. number of words in the description, area it covers (for the Hague). Four designs is the average number of rights held by firms. This comparison does not take account of renewal fees. This table is a rough guide to give a broad comparison of the costs involved in protecting a design, they are subject to change.

2 Swiss Francs – these figures were compiled using the WIPO fee calculator.

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Introduction and executive summary

This report attempts to map design employment, activity, spending and use, and the use of design rights across the UK economy. Our purpose is to contribute to the ongoing effort to better understand design, the creative sector and innovation.

We start from two premises. First, that innovation arises from increasing knowledge in the economy and second, that design spending is but one part of the investment in that knowledge stock (along with spending on software, research and development (R&D), organisation, skills and reputation). Increased recognition of the importance of a broad range of knowledge creating activities has led to various streams of work such as the Department for Culture, Media and Sport-sponsored "creative industries" programme (DCMS, 2010) the National Endowment of Science Technology and the Arts (NESTA) work on "hidden innovation" (NESTA, 2007) and the Imperial/NESTA Innovation Index (Haskel et al, 2011) (for a broader survey of design, innovation and creativity, see Swann and Birke, 2005).

On design, in particular, there are already a number of studies, such as the Design Council (2010) and Livesey and Moultrie (2009)[1]. The data in their paper are different from this work, which mostly relies on surveys of designers. First, we adopt a rather broader definition of the type of workers who produce design: we include Architects, Engineers and Graphic, Product, Clothing and related designers (which we call AEGPD occupations). Thus, our work is consistent with the knowledge investment measures used in the Imperial/NESTA Innovation Index and, at the same time, avoids counting as 'design economic' activity covered in other areas of the creative/knowledge creating industries (such as software and artists). Our analysis does, however, extend the range of occupations cited in other studies: we include architecture and (most forms of) engineering (although we exclude software and process engineering to avoid double counting design type work already explained elsewhere in the NESTA framework). Second, our data are consistent with the National Accounts, so they can be readily compared with other economic measures. Third, we use the National Accounts supply-use framework, which captures where economic value is created in the economy, and where it is used.

National Accounts currently treats some items of knowledge spending as investment, the most notable example being software spending. In addition, it also includes investment used to create 'artistic originals', such as books, music and films. Most of the investment in 'artistic originals' is measured, in the absence of better data, as a proportion of the output of industries that plausibly trade in such originals; publishing is a good example.

1 See also PACEC (2008) for a report on the Design Engineering Sector in particular.

One approach to 'design' would be to examine the output of the design industry. The problem is that this would miss design spending undertaken outside the design industry by in-house designers - designers working at Virgin, for example. For this reason, we include in-house spending, using the method adopted by National Accounts for measuring software: we identify workers in design occupations working outside the design industry, in addition to activities within it.

In this paper we do three main things. First, we estimate the value of the AEGPD services purchased in the marketplace and those which companies produce in-house for internal use. For the purchase of design, we rely on the official supply-use tables, with particular adjustments for business services (outlined below). For the in-house or own-account spending, we select some of the official occupational classifications that we judge to cover design activity. These are:

- Engineers (Civil engineers; Mechanical engineers; Electrical engineers; Electronics engineers; Chemical engineers; Design and development engineers; Planning and quality control engineers);
- Architects; and
- Graphic, product, clothing and related designers.

Whilst we choose these professions to calculate own-account spending we do not allocate the full proportion of their time to producing new designs, instead estimating a proportion based on interviews with designers (see below).

Second, we look at the use of design rights. Design spending is potentially protected by the use of design rights, but the registration and overlap with EU jurisdiction is complicated (see the introductory paper – IPO Design Economics Introduction (2011) - for an overview). Our work here (briefly) explores the Community Innovation Survey (CIS), a firm-level survey, which asks companies whether or not they register their designs.[2]

Third, we are also interested in how long such spending on design might benefit firms. For spending to count as an investment, in National Accounts terms, it has to potentially give rise to an enduring benefit for the firm (one that lasts more than a year). So, for example, the design of a new shop layout is typically rolled out in a flagship store before it is used in others, with the cycle being repeated three or four years later. The design of a seasonal fashion item, for example, might not sell for more than one year whereas; the design of a piece of furniture might sell for a long time. In addition, if such spending has longer benefits, the company who owns the design may be more willing to consider it using an intellectual property right to protect it. We have very little information on the productive length of design investment and so we explore this through the Intangible Assets Survey (IIA). We also examine the relationship between the expected length of benefit of such spending and whether or not the design is registered.

2 Current work at the IPO is seeking to improve this estimate by matching the universe of design registrations from the administrative data at the IPO and EU to UK firm-level data.

What do we find?

Employment

- UK AEGPD employment (not including self-employment) has remained steady over the last ten years (including during the recession), at around 350,000;

- The AEGPD sector itself employs around 55,000 people (in 2004). But, many designers are employed outside the “design” sector: around four are outside for every employee inside. Manufacturing, for example, employs around 120,000 AEGPD workers. There is also a lot of self-employment within the design sector; it is as high as 48 per cent for product, clothing and related designs.

Spending

- In 2008, UK private sector firms purchased about £26bn worth of AEGPD services, but the value of services produced on their own-account was worth about another £7.5bn;

- The industries that spend most on design are business services, manufacturing and construction, collectively accounting for almost three-quarters of total in-house and purchased AEGPD spend (39, 20 and 12 per cent of all AEGPD spending). Within manufacturing, the largest spenders are manufacturing of transport, computers and publishing;

- Outside business services, each of these sectors has different patterns of own-account and purchased methods. Manufacturing is evenly split, whereas construction is 90 per cent bought-in. Within business services, it is harder to measure the proportion of externally subcontracted design though evidence from other papers (Design Council, 2010) suggests it is quite substantial; and

- Spending has doubled since 1992 from around £13bn to £26bn. Most of that rise is accounted for by increased purchases of design services from the design sector, suggesting greater sub-contracting of design services. Since employment numbers have hardly risen, this rise has likely been underpinned by an increase in self-employed designers.

Design registration

- The Community Innovation Survey micro-data suggest limited use of registration: only 15 per cent of firms report registering an industrial design. This is in line with other studies.

Length of design benefit.

- On average, firms report that design gives benefits for just under 4 years (4.6 years in production, but 3.7 years in services). This number is significantly over one year, suggesting that design gives investment-type benefits. Firms who undertake own-account design report a significantly longer benefit time then firms who purchase design services. This is in line with the idea that undertaking own-account design might enable firms to reap the benefits of investment for a longer time then buying it in: it might be more innovative, or firms might find it easier to keep IP from internally generated designs.

Section 2 sets out industry-level data on purchased and own-account design spending using the software method for own-account spend and the Supply Use Tables, with adjustments, for purchased expenditure. Section 3 sets out data on firms reporting using design rights and life lengths. Finally, section 4 concludes.

1. Design employment[3]

There have been a number of different studies on design, all of which use different definitions of the occupations in design. In our work, we assume design is produced by:

- Engineers (Civil engineers, Mechanical engineers, Electrical engineers. Electronics engineers, Chemical engineers, Design and development engineers. Planning and quality control engineers);
- Architects; and
- Graphic, product, clothing and related designers.

Note that 'engineers' exclude software engineers, since they are deemed to be in software and counted elsewhere in innovation investment. The details of the classification are set out in Table 1. For comparison, it also lists a number of occupations as identified by a number of other studies, typically focusing on aspects of the 'creative' economy, namely those by NESTA (2008), Arts Council (2005), DCMS (2010) and Design Council (2010). As is clear by comparing the first three columns and the last column in the table, these other studies use a broader set of occupations outside design.

3 This section draws on Galindo-Rueda, Haskel and Pesole (2011).

Table 1: Design occupations used by different studies

SOC 2000	Occupation Description	NESTA	ARTS COUNCIL	DCMS	DESIGN COUNCIL	This paper
1134	Advertising and public relations managers	√	x	√	x	x
1136	ICT managers	x	x	√	x	x
1225	Leisure and sport manager	x	√	x	x	
2121	Civil engineers	x	x	x	x	√
2122	Mechanical engineers	x	x	x	x	√
2123	Electrical engineers	x	x	x	x	√
2124	Electronics engineers	x	x	x	x	√
2125	Chemical engineers	x	x	x	x	√
2126	Design and development engineers	x	x	√	x	√
2128	Planning and quality control engineers	x	x	x	x	√
2131	IT strategy and planning professional	√	x	√	x	x
2132	Softw are professional	√	x	x	x	x
2431	Architects	√	√	√	x	√
2432	Tow n planners	√	x	√	x	x
2451	Librarians	√	√	x	x	x
2452	Archivist and curator	√	√	x	x	x
3121	Architectural technologists and tow n planning technicians	√	x	√	x	x
3122	Draughtspersons	√	x	x	x	x
3411	Artists	√	√	√	x	x
3412	Authors, w riters	√	√	√	x	x
3413	Actors, entertainers	√	√	√	x	x
3414	Dancers and choreographers	√	√	√	x	x
3415	Musicians	√	√	√	x	x
3416	Arts officer, producers and directors	√	√	√	x	x
3421	Graphic designers	√	√	√	√	√
3422	Product, clothing and related designers	√	√	√	√	√
3431	Journalists, new spaper and periodical editors	√	√	√	x	x
3432	Broadcasting associate professional	√	x	√	x	x
3433	Public relations officers	x	x	√	x	x
3434	Photographers and audio-visual equipment operators	√	√	√	x	x
3543	Marketing associate professional	√	x	√	x	x
4135	Library assistants\clerks	√	x	x	x	x
5244	TV,Video and Audio engineers	x	x	√	x	x
5411	Weavers and Knitters	x	x	√	x	x
5421	Originators, compositor and print prepares	√	x	√	x	x
5422	Printers	x	x	√	x	x
5423	Bookbinders and print finishers	x	x	√	x	x
5424	Screen printers	x	x	√	x	x
5491	Glass and ceramics makers, decorator and finishers	√	√	√	x	x
5492	Furniture makers, other craft w oodw orkers	√	x	√	x	x
5493	Pattern makers	x	x	√	x	x
5494	Musical instrument makers and tuner	x	√	√	x	x
5495	Goldsmiths, silversmiths, precious stone w orkers	√	√	√	x	x
5496	Floral arrangers, Florist	x	x	√	x	x
5499	Hand Craft occupations not elsew here classified	x	x	√	x	x
8112	Glass and ceramics process operative	x	x	√	x	x
9121	Labourers in building and w oodw orking trades*	x	x	√	x	x

Notes: The table shows occupations with design or design related in title according to Standard Occupational Classification, 2000. Columns show occupations counted in studies by NESTA(2007), Arts Council (2003), DCMS (2007), Design Council (2010) and this study. In DCMS study only a proportion of the SOC 9121is

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Source: studies cited above and Standard Occupational Classification Occupation.

As we explained earlier, there are a number of reasons for our choice of occupations. First, we wish to capture as much design activity in the economy as genuinely contributes to new products and services. Second, we don't wish to double count with other knowledge activities which are included elsewhere. This is why we exclude software and artistic activity. For these reasons we list far fewer activities than DCMS.

Measuring employees in these occupations is complicated. The Annual Survey of Hours and Earnings (ASHE) samples firms based on a sample of one per cent of National Insurance number holders employed at that firm and part of the Pay As You Earn (PAYE) tax system. It thereby produces the estimates of hours and earnings that we use below. It also produces employment data, by adding up the sample based on sampling weights. Because ASHE is an administrative survey of firms, it is held to be reliable on wages and employment data at industry and occupation level for the employed (it does not count the self-employed).

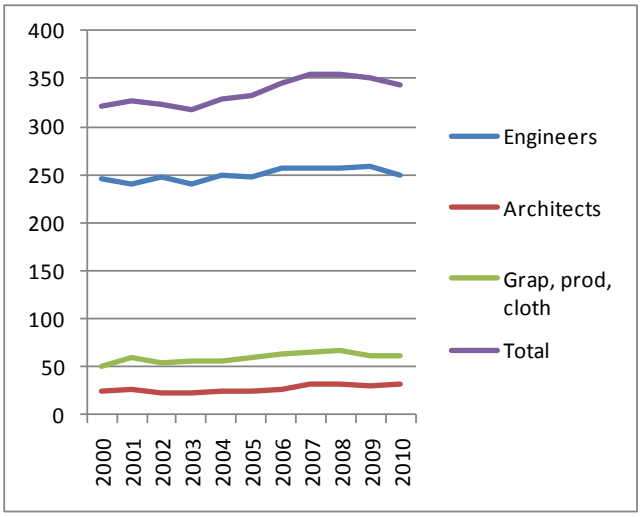
The alternative data set is the Labour Force Survey (LFS), a survey of households that includes the self-employed and relies on wages, occupation and industry affiliation. This is reported by individual members of the workforce rather than firms.

Our data use a blend of the two data sets. We decided to use the ASHE numbers for consistent data on employment and wages. The employment numbers are produced for the whole economy by using ONS-provided weights. We then adjusted for self-employed workers using Census and LFS adjustments, set out below. We did this for two reasons. First, the ASHE does not count the self-employed and those outside the PAYE system; LFS weighting corrects for this. Second, the ASHE weighting we used[4] , according to ONS, is indicative only for the strata. This means that whilst the numbers for the whole economy correspond to the correct whole economy totals, the numbers by industry may not. However, the LFS has its own problems and is known to have inaccuracies in reporting industry data since it relies on self-classification by individuals of their occupation and industry, rather than the more objective wages data used by ASHE.

Figure 1 sets out total employment, by occupation, for 2000-2010. These officially-published weighted numbers from ASHE do not include any adjustment for self-employment (although the self-employed will show up as part of business purchases of design services when we come to review the spending data below). Design spending is dominated by engineers and is quite steady over the period, at around 350,000 full- and part-time employees.

4 We used the weight described as "population to LFS total" which according to the documentation is a weight dealing with the one per cent sampling and non-response and also the strata: by gender, three age groups, one digit occupation, to work region (but not self-employment). The implied total employees in employment produced sing this weight sums to near the published total employees (excluding the self-employed).

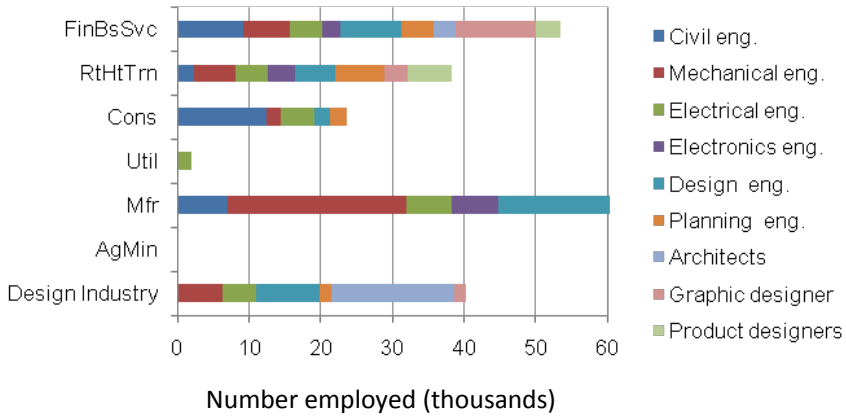
Figure 1 Total design employment, by occupation, 2000-2010.



Source: published aggregates from ASHE; Table 14, http://www.statistics.gov.uk/statbase/product.asp?vlnk=13101

How does employment vary over industries? Many designers work in the design industry, but it is reasonable to assume that many more work outside it. The latter data require a breakdown of employment by industry not available in public data. To calculate them, we use the detailed ASHE data underlying those in figure 1. We still have to get disclosure clearance for 2008 data, which is why we use the older 2004 data, set out in table 2 and displayed graphically in Figure 2.

Figure 2: Designers in ASHE, 2004[5]



5 This table excludes self employment. Some samples were not released by ONS as the size was too small and so they have been counted as zero. Industry key: 'Financial Intermediation and Business Services', 'Wholesale and Retail, Hotels and Restaurants, Transport and Communications', 'Construction', 'Electricity, Gas and Water', 'Manufacturing', 'Agriculture, Fishing and Mining' and 'Design Industry'.

Table 2: Design employment (as measured by occupations) in design and other industries in 2004

	SIC 74.2	Industry classification						Total Including design industries	Total excluding design industries
SOC		AgMin	Mfr	Util	Cons	RtHtTrn	FinBsSvc		
Civil eng.	14,742	n.r.	6,974	0	12,350	2,398	9,102	45,566	30,824
Mechanical eng.	6,225	n.r.	24,954	n.r.	2,149	5,655	6,547	45,530	39,305
Electrical eng.	4,829	n.r.	6,311	1,994	4,616	4,596	4,483	26,829	22,000
Electronics eng.	0	n.r.	6,521	0	n.r.	3,706	2,587	12,814	12,814
Design eng.	8,705	n.r.	33,640	n.r.	2,199	5,703	8,417	58,664	49,959
Planning eng.	1,702	n.r.	21,535	n.r.	2,293	6,735	4,664	36,929	35,227
Architects	17,208	n.r.	n.a.	0	n.r.	n.r.	3,009	20,217	3,009
Graphic designer	1,617	n.r.	12,754	0	n.r.	3,385	11,193	28,949	27,332
Product designers	n.r.	n.r.	7,417	0	n.r.	6,179	3,371	16,967	16,967
Total	55,028	n.r.	120,106	1,994	23,607	38,357	53,373	292,465	237,437
Wage bill (£m)	1,813	n.r.	3,581	73	694	1,239	1,703	9,103	7,290

Notes: Each cell, aside from the last row, shows employment (excluding self employed), the last row shows wage bill (in £ million). The rows are occupations and the columns industries (note that SOC 2125 'Chemical Engineers' is not reported directly due to disclosure). Column 1 is the design industry 74.2 a sub-sector of Finance and Business Services (column 7). Columns 2-7 are the six broad industries that we use in this paper, defined as 'Agriculture, Fishing and Mining'; 'Manufacturing'; 'Electricity, Gas and Water'; 'Construction'; 'Wholesale and Retail, Hotels and Restaurants, Transport and Communications' and 'Financial Intermediation and Business Services'. Column 7, 'Financial and Business Services', excludes 74.2 and 74.87/2 (note that 74.87/2 is not reported directly due to disclosure). The final two columns are then the row sums of these columns, with column 8 including the design industry 74.2 and column 9 excluding it. N.r. stands for not reported due to disclosure.

Source: Authors' calculation on ASHE dataset.

Column 1 shows, in 2004, 55,028 employees (omitting the self-employed) in the AEGPD industry. The next six columns each represent broad industries chosen for ease of classification in this table and later data: (1) Agriculture, Fishing and Mining; (2) Manufacturing; (3) Electricity, Gas and Water; (4) Construction; (5) Wholesale and Retail, Hotels and Restaurants, Transport and Communications; (6) Financial Intermediation and Business Services. The rows show our chosen design occupations (as set out in

table 1). Each cell includes the number of employees in that sector.[6] These data do not quite tally with Figure 1, since that is for the whole economy.

The table estimates a total of 292,465 employees in a design occupation across all industries. Of these, around 237,437 are in sectors that are not 'design' SICs, suggesting that, for every employed designer within the design sector, there are four outside. Manufacturing is a major employer of designers, employing close to half of all design employees. In our data, engineers are the biggest group, accounting for around 200,000 of the 237,437 non-design employees (the rest are largely graphic and product designers). The final row shows the wage bill numbers. Comparing the last two columns, we see that for every pound paid to designers in the design sector, around £4 is paid to designers outside the sector (which reflects the employee breakdown).

Finally, what do we know about self-employment? We have data from NESTA (2008), based on the 2001 Census. They report self-employment rates as follows: Design engineers 11 per cent, Architects 36 per cent; Graphic Designers 31 per cent; Product, clothing and related 48 per cent.

2. Methodology for estimating spending on own account and purchased design

Using this picture of employment in AEGPD within and outside the design industry, we need to estimate spending and investment on design. Design investment would be lower than spending if, for example, some AEGPD spending was on short-lived projects. On spending, first, we need to estimate:

- The value of the AEGPD services bought in the marketplace; and
- The value of the AEGPD services which companies produce in-house for internal use.

3a. Overview of method

The methodology we use to estimate spending is set out in Galindo-Rueda, Haskel and Pesole (2011), which follows the ONS software method. For purchases, we use the Supply-Use Tables (SUTs), official tables that represent National Accounts in terms of supply and use of products and services. They show purchases for intermediate consumption of 123 products by UK industries. Product 112 is defined as 'Architectural

6 The industry classification is the most detailed we can present avoiding disclosure problems (and even at this level of aggregation, we still have disclosure problems). The private sector is defined as "private company", "sole proprietor" and "partnership". These are data only on current workers in these industries. In addition, our industry classification excludes sections L(Public Administration), M(Education), N(Health), O(Personal Service), P(Private Household) and Q(Extra-territorial). Note that design itself is part of Business Services which is a large collection of industries ranging from accountancy to waste recycling.

and engineering activities and related technical consultancy; technical testing and analysis.' Since this is the closest to AEGPD that we can get, we use these data to build up a picture of the purchases of design services by industries. We scale the data down to account for the fact that this industry supplies more than just AEGPD services. Doing so will tell us, for example, how much is spent on design services by the car industry. It will also tell us how much purchasing occurs within the design sector itself (within business services is industry 113 'Architectural activities and technical consulting') via subcontracting.

To purchases we add own-account spending. We measure own-account spending following the "software method", an internationally agreed way of estimating spending on 'in house' activity. This requires us to:

- Identify workers in software occupations and calculate their wage bill.
- Readjust the wage bill down to allow for the proportion of time that such workers spend creating software rather than managing and administration.
- Adjust up to add overhead costs to the wage bill costs.
- Subtract any own-account expenditure sold on to other companies.

This is the basic method. One way of cross-checking the data would be to look at the value of sales by the design industry itself. This would still only give us a partial picture since such sales will not include own-account spending or exports, even though reported non-design spending by firms on design would include imports.[7]

3b. Data on purchased design services

We estimate the purchased component of design as follows. Currently, the SUTs record company purchases of design as intermediate consumption (IC). In addition, a very small proportion appears as Gross Fixed Capital Formation (GFCF). Thus, we take purchases of design services as the sum of IC + GFCF for each industry within product 112. Since this SIC is broader than design, we scale these data down by a factor based on other information such as the Annual Business Inquiry (see below). We can then calculate from the SUTs the purchases of design services, in 2008, as being around £15bn.

7 Thus own account production+ design industry production = UK design industry output – design exports + design imports = UK design use or purchases and investment by UK firms. It is hard to get an exact sense of trade in design since the data, based on the International Trade in Services Survey, are published for "technical services", which consists of the following products architecture, engineering, surveying and other technical services. According to the latest 2009 data, ITIS (2009), total technical services exports and imports are £7bn and £2bn, of which engineering are £5.1bn and £1.4bn (page 26). These are large data in proportions to the intermediate consumption data set out here. But to stress again, we would be primarily interested in these data if we were attempting to infer spending outside the design sector from the output of the UK design sector, but we do not do this here. Indeed, a more relevant question here is the derivation of the allocations used in the SUTs that give industry design spend.

Within business services, we have five main sectors: real estate, renting of machinery, computer, R&D and 'other' (where 'other' includes design itself). For the first four, we can simply use the SUTs to calculate their purchases of AEGPD services (which we do by scaling down intermediate input purchases of 112). For 'other', we can also use the purchases; this is the figure we report below for spending on purchases of design services.[8]

The scaling down of industries represented in product 112 "Architectural and engineering activities and related technical consultancy; technical testing and analysis", removes 'technical testing and analysis' by using the turnover share of SIC74.3 'Technical testing and analysis' (based on turn on Annual Business Inquiry data). In addition, we remove some subsectors of SIC 74.2 'Architectural and engineering activities and related technical consultancies', such as quantity surveying, where AEGPD activities do not incur. Appendix 1 sets out the SICs in the design sector, for reference.

3c. Own account design spending

Our occupational data provide us with the wage bill of designers working outside the design industry. This bill has to be scaled up to account for non-wage costs to get the full costs of producing design. We do this by going to the costs in the design sector itself. Then, we further scale down industry 112 to mimic total costs for non-design industry

8 Going from this purchased figure to investment by using the intermediate consumption of design by "other business activities" needs some care. This is because "other business activities" includes design itself. Suppose design firm A gets a contract for £100 of design services and contracts out £50 to design firm B. Then measured purchased intermediate consumption of design services is £50. Measured sales are £150. Measured sales may or may not overstate investment depending on whether the £50 value from firm B is an investment which is then added to by £100 of sales by firm A, or whether the £50 is simply sold on by firm A (in which case it should be treated as intermediate consumption by firm A so that value added in design is £100, not £150). Measured intermediate consumption in design correctly measures the purchases of those firms, including design firms, in Business Services (indeed if there was no contracting out, then design intermediate consumption for this sector would be zero, correctly showing no purchases of design by the sector, but quite consistent with non-zero sales of design by design firms to outside the sector). And if this intermediate consumption is investment in design, either following from the purchases of design by non-design firms in business services, or that due to the creation of enduring design assets by subcontracting design firms, then we have correctly measured total investment in design. Had we the correct figure for the output of design companies we can compare that with purchases outside design (leaving aside foreign trade) and would not want to add this output to those purchases: that would be double counting. But, in this case, we are measuring the purchases of design services by design companies and hence not double counting with the purchases of design services outside design.

There is a problem, however, if the purchases outside the design industry overlap with purchases within. Suppose firm C, a car firm, purchases £100 worth of services from firm A, which then contracts out £50 to firm B. Thus whilst total purchases of design services are indeed £150, the £50 may be an intermediate input into the £100 purchased by firm C (unless firm C builds new design assets from its purchase), so that design investment would be at most £100 and not £150. Thus, one conservative approach to estimating design investment would be count own-account outside the design industry, plus purchases of design outside the design industry minus all the purchases of design within the design industry on the assumption that such purchases are then sold on outside the design industry.

designers. We do this by reflecting the high levels of contracting out of design services in the AEGPD sector (around seven per cent of total sales, which is 17 per cent of intermediate purchases), costs which we assume non-AEGPD firms would not incur. We also scale down AEGPD output to reflect savings on managerial, marketing, mark-ups and overheads that might be made through in-house production. All this gives the mark-up over wage costs for the full costs of own-account design, a ratio which turns out to be 4.04.

In making this calculation, we have to estimate the proportion of time spent by the own-account AEGPD occupations on design (as opposed to paperwork and administration) and the ratio between long-lived and short-lived design. This is all very much a matter of guesswork drawing on interviews with design companies and company time sheet data. We estimate the proportion of time spent on long-lived design to be ten per cent for engineers (aside from design and development engineers), 60 per cent for design and development engineers, 70 per cent for architects and 50 per cent for clothing, product and fashion designers.[9]

A last adjustment is needed to obtain the AEGPD own-account data. We must subtract any output later sold on the market from the total AEGPD output (since that would double count purchased design services). Note, too, that, when calculating own-account data for business services, we exclude the design industry from the wage bill total.[10]

Table 3 (demonstrated graphically in Figure 3) reports the sector estimates of design own-account and purchased spending, according to a two digit industry classification (below we use the slightly more disaggregated NACE A31 classification, the finest level at which we could obtain cleared spending data (cleared employment data by occupation cannot be done at this level). Columns 1 and 2 report respectively the AEGPD own-account and the purchased estimates in millions of pounds.

9 In our work on the contribution to growth, where we need to move from spending to investment, we further scaled down this spend down by 25 per cent to be conservative.

10 In future work we may wish to subtract out designers who work in other industries in business services such as management consulting. We suspect that we may not have the data to do this.

Figure 3: UK firms spending on design, in house and purchased

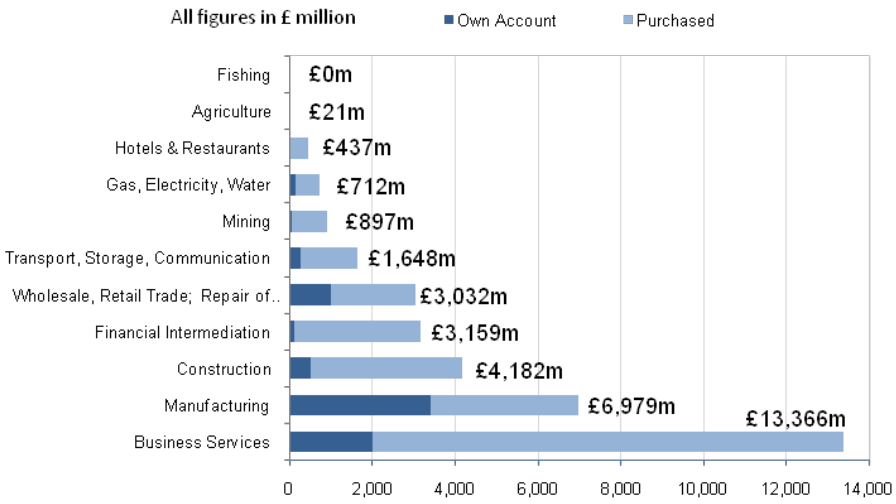


Table 3: spending on design services, by two digit industry, 2008

Category	Industry	Own Account (£m)	Purchased (£m)	OA+P/(Total OA+Total P)	oa/(oa+purch)
A	Agriculture	0	21	0%	0%
B	Fishing	0	0	0%	0%
C	Mining	38	859	3%	4%
D	Manufacturing	3398	3581	20%	49%
E	Gas, Electricity, Water	143	569	2%	20%
F	Construction	504	3678	12%	12%
G	Wholesale and Retail Trade; Repair of Motor Vehicles	996	2037	9%	33%
H	Hotels and Restaurants	2	435	1%	1%
I	Transport Storage and Communication	256	1392	5%	16%
J	Financial intermediation	116	3043	9%	4%
K	Business services	2015	11351	39%	15%
	Total Market Sector	**7468**	**26966**	**100%**	**28%**

Source: authors' calculations from SUTs and ASHE. The own-account spend excludes the design industry itself.

The first percentage column shows the proportion of total own-account and purchased expenditure by industry. The highest share of overall design spending is business services (39 per cent), followed by manufacturing (20 per cent), construction (12 per cent), finance (nine per cent) and retail (nine per cent). Interestingly, the patterns of own-account and purchased differ: manufacturing spends 49 per cent in-house, but construction only 12 per cent.

Table 4 provides more details on AEGPD for manufacturing (showing all the other numbers for comparison), giving data by two-digit sector. Within manufacturing, the biggest spenders are manufacturing of transport, publishing, and machinery and optical equipment. Note too that all these industries source the bulk of their AEGPD services from their own account. Indeed, in-house expenditure accounts for more than double purchased spending in 'machinery equipment' and 'communication equipment', and it is slightly higher than purchased in 'manufacturing of leather products', 'publishing and printing' and 'transport equipment'. These figures reflect the importance of engineering: as Table 1 showed, engineers are to be found predominantly in manufacturing.

Table 4: spending on design services, by industry, further detail for manufacturing, 2008

Category	Industry	Own Account (£m)	Purchased (£m)	OA+P/(Total OA+Total P)	oa/(oa+purch)
A	Agriculture	0	21	0%	0%
B	Fishing	0	0	0%	0%
CA	Mining and quarrying of energy materials	33	818	2%	4%
CB	Mining and quarrying of non-energy materials	5	42	0%	10%
DA	Food, beverages and tobacco	93	497	2%	16%
DB	Textiles	52	81	0%	39%
DC	Manufacturing of leather products	9	7	0%	56%
DD	Wood	15	27	0%	36%
DE	Publishing and printing	457	408	3%	53%
DF	Manufacture of Coke, Refined Petroleum Products and Nuclear Fuel	55	71	0%	44%
DG	Manufacture of Chemicals, Chemical Products and Man-Made Fibres	58	512	2%	10%
DH	Manufacture of Rubber and Plastic Products	114	161	1%	41%
DI	Manufacture of Other Non-Metallic Products	43	71	0%	37%
DJ	Manufacture of Basic Metals and Fabricated Metal Products	211	252	1%	45%
DK	Manufacture of Machinery and Equipment Not Elsewhere Classified	622	250	3%	71%
DL	Manufacture of Electrical and Optical Equipment	695	280	3%	71%
DM	Manufacture of Transport Equipment	889	863	5%	51%
DN	Manufacturing Not Elsewhere Classified	86	103	1%	46%
E	Gas, Electricity, Water	143	569	2%	20%
F	Construction	504	3678	12%	12%
G	Wholesale and Retail Trade; Repair of Motor Vehicles	996	2037	9%	33%
H	Hotels and Restaurants	2	435	1%	1%
I	Transport Storage and Communication	256	1392	5%	16%
J	Financial intermediation	116	3043	9%	4%
K	Business services	2015	11351	39%	15%
	Total Market Sector	**7468**	**26966**	**100%**	**28%**

Source: Authors' calculations from SUTs and ASHE. The own-account spend excludes the design industry itself.

One sector that is of interest is DN, since that includes furniture manufacturing, which holds quite a lot of design rights according to international data. The figures there seem much smaller than other spending, but this might just reflect the registration of design rights rather than the spending alone.

Finally, Table 5 estimates design activity within sector K, 'business services'. This is a complicated sector to interpret. As the table shows, "business services" is made up of five two digit classifications, SIC70, 'real estate, renting and business activities', SIC71, 'renting of machinery', SIC72, 'computer and related', SIC73, R&D, SIC74, 'other business activities'.

The following points are worth noting. First, in column 1, most of the own account spending is in 'other business activities', £1.18bn with £0.546bn in 'computer and related'. Moreover, the design sector itself, defined in Appendix 1, is excluded from SIC74, so this figure is based on the adjusted wage bill of designers working in all of SIC74 excluding the design subsectors set out in Appendix 1, though SIC74 does include designers working in industries such as consulting and accountancy. Second, we have not excluded designers working in SIC72, 'computer and related activities', as we have explicitly not included software engineers in our occupational code, so there is no danger of double-counting.

Table 5: More detail on business service sector, sector K, 2008

SIC Code	Industry	Own Account (£m)	Purchased (£m)
70	Real Estate, Renting and Business Activities	87	1102
71	Renting of Machinery and Equipment without Operator and of Personal and Household Goods	25	467
72	Computer and Related Activities	546	1724
73	Research and Development	176	56
74	Other Business Activities	1180	8002
	Total Category K	**2014**	**11351**

Source: Authors' calculations from SUTs and ASHE. The own-account spend excludes the design industry itself.

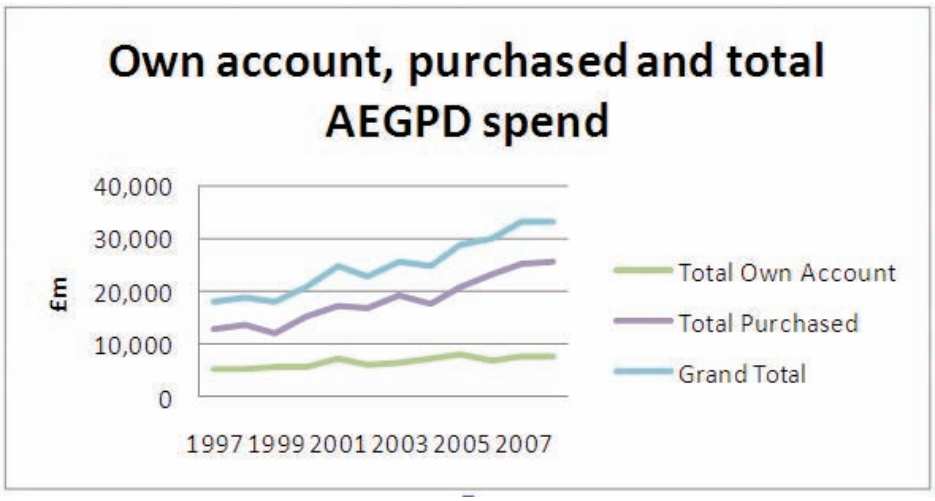
Third, the vast bulk of purchases of design are in SIC74, 'other business activities', which, as mentioned above includes design, where £8bn out of £11bn of purchases are made. What does this number indicate? Remember that these are recorded purchases of design services (not the output of design). So, a small element will involve design services purchased by designers themselves such as the design of their offices. Much more important is the likely use of subcontracting - purchases by a designer of design services, usually from self-employed designers. It is also possible that such data reflects the subcontracting by general consultants, who are in this SIC, offering software and design services.

This suggests the need for care in including these data in design investment. Insofar as they are measured accurately, they will reflect design purchases and we are correct to record them as such as we do not want to deliberately understate design investment. However, if such subcontracting is simply sold on by design consultants outside the industry, their value might be included a second time in the purchases by firms outside the design industry. In addition, to the extent that some of the £8bn also includes accountants, management consultants and advertisers, who might be offering consultancy services that bundle in design, one would want to count those services under management consultancy and branding.[11]

11 One might also want to exclude part of the £1.1bn from real estate if it is felt to correspond to inputted rents activity or domestic housing stock formation. Note that if one excluded the full £8bn of purchases in Table 6 to convert to investment one would be subtracting off 23 per cent of design spend (23 per cent=£8bn/(£7.5bn+£27.0bn)) in 2008. In our work for the innovation index, Haskel et al (2011) we in fact subtract off 25 per cent of total design spending (i.e. that includes the £8bn) to calculate investment in order to be conservative. So the effects of investment calculated there are very much in line with what one would obtain if one subtracted off the £8bn in Table 6.

Figure 4[12] shows total spending by own-account and purchased AEGPD design services 1997-2008 (the most recent year for which data are available). Total external spending rose from 71 per cent in 1997 to 77 per cent in 2008. The growth in total spending from £19bn to £33bn is almost entirely driven by growth in external purchases, which doubled from £13bn in 1997 to £26bn in 2008.

Figure 4: Own account, purchased and total AEGPD spend

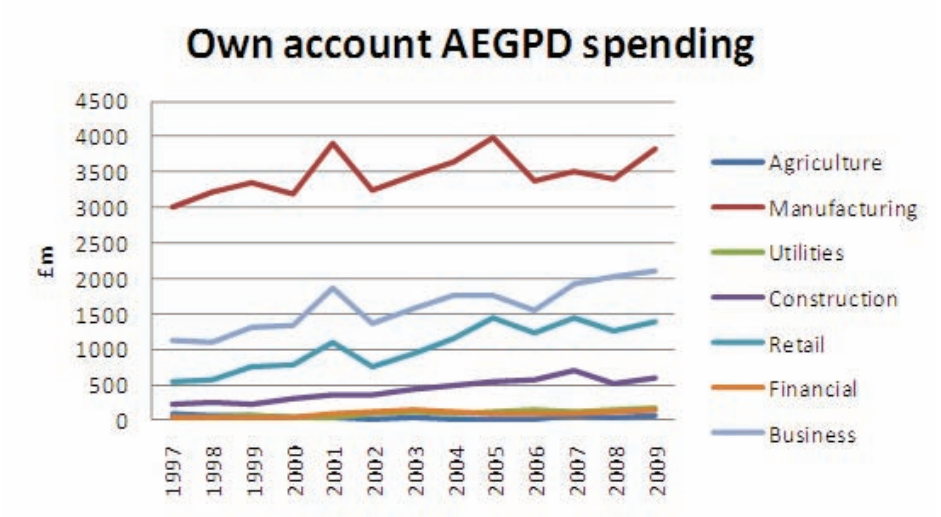


Source: Author's calculations from Annual Survey of Hours and Earning (ASHE). We exclude from own-account the design industry itself.

Figure 5 provides more details of own-account spending by industry for 1997-2009 (the most recent year for which these figures are available). Total spending is estimated at around £8.3bn in 2009, having risen steadily over the period. 50 per cent of own-account spending is in manufacturing, mainly engineering, and this explains why our results are different from other studies that exclude engineering as a design occupation. Reflecting the recession, the total fell in 2008 and then rose slightly in 2009, but it is hard to discern the exact movements over just two years of recession.

12 The data for the next three figures is set out in Appendix 2.

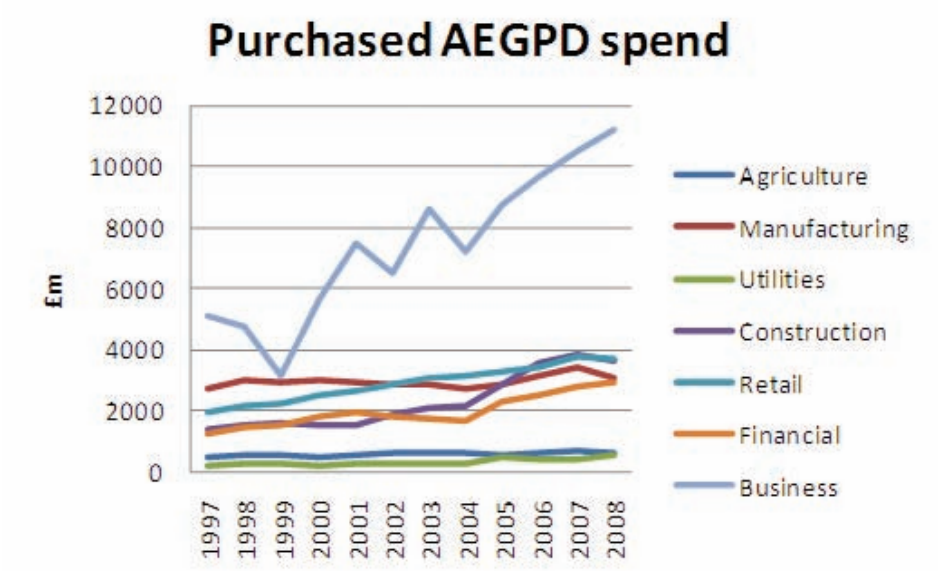
Figure 5: Own account spending, by industry 1997-2009



Source: Author's calculations from Annual Survey of Hours and Earning (ASHE). . We exclude from own-account the design industry itself.

Figure 6 sets out purchased design spending by industry 1997-2008 (in this case 2008 is the most recent year for which data are available, since SUTs come out with a longer lag than the ASHE data). It is clear that the total spending, of around £25bn by 2008, and its steady rise, is dominated by business services, which were buying in £11bn of design services by the end of the period.

Figure 6: Purchases of design services, by industry 1997-2008



Source: Supply Use Tables, various years.

All three time series graphs suggest that total expenditure on AEGPD services has risen steadily over time, with own-account rising only slightly and externally purchased services doubling in value. Increased spending patterns have, therefore, reflected more purchasing of design services externally. Within the doubling of purchased design services, there has been a rise from £5bn to £11bn in purchases from business services; in other words, 46 per cent of the £13bn rise in purchases is within the business services sector itself. This rise may reflect increased subcontracting of design services by companies. Taken in conjunction with the employment data, which shows the number of employees in design has hardly changed, this may also reflect increased subcontracting to self-employed designers.

This has implications for the extent of new design investment as opposed to spending. A conservative view would be that much of the £6bn rise in purchases from business services is accounted for by subcontracting of design services, which are then sold on directly to purchasers outside design; so, £6bn should be excluded from potential design investment.

3. The use of design rights by firms and life lengths of design

a. The use of design rights

A registered design is a legal right which protects the overall visual appearance of a product or a part of a product in the country or countries where they were registered. From a legal perspective, design is defined as “the appearance of the whole or part of a product resulting from the features of, in particular, the lines, contours, colours, shape, texture or materials of the product or ornamentation.”

Having looked at the use of design services by firms, we wish here to see how many firms report using design rights. To do this, we construct a balanced panel from the last three waves of CIS (2006, 2008 and 2010) giving more than 12,000 observations. In the survey, firms are asked if they use design rights. For example, in CIS6 (2006-8) firms are asked: “Q22. Did your enterprise: apply for a patent, register an industrial design, register a trademark, produce materials for copyright”. In the most recent CIS, the question has changed, so we excluded this year for consistency. Our main finding is that only 15 per cent of all firms in each of CIS4 and CIS5 reported registering a design. Table 6 reports the most intensive design rights users amongst those that registered a design (we cannot report other industries as the numbers reporting are so small as to be disclosive). The table reports the design rights used by that industry, as a fraction of all design rights used in each wave. As expected, the most intensive design right users are sector SIC74 ‘business services’, the sector that includes both architectural and creative design industries, with around the 12 per cent of total design rights. It is followed by SIC51 ‘wholesale trade’ at about nine per cent, and by SIC29, ‘manufacturing of machinery and equipment n.e.c.’, SIC28 ‘manufacturing of fabric metal’ and SIC45 ‘construction’, all at about five per cent.

Table 6: Percentage of firms by two digit SIC code all total firms in that CIS wave reporting having registered design rights

CIS_Version	SIC	% of design rights
Wave 5 (2004-6)	Construction	4.4
	Manufacture of Machinery and Equipment Not Elsewhere Classified	4.7
	Manufacture of Fabricated Metal Products, Except Machinery and Equipment	5.6
	Wholesale trade	8.6
	Business services	12.4
Wave 6 (2006-8)	Manufacture of Fabricated Metal Products, Except Machinery and Equipment	4.8
2007	Construction	5.3
	Manufacture of Machinery and Equipment Not Elsewhere Classified	5.8
	Wholesale trade	8.9
	Business services	12.1

Source: authors' calculations from CIS. Note: data are unweighted

b. Life lengths and the use of design rights.

There is little hard evidence about how long firms expect to benefit from a design. In some cases, it may be a short period by intention: design for a one-off event such as a Royal Wedding or Papal visit, or seasonal events, such as some summer fashions. Even here, one might argue that work on such designs is part of building the general platform for competency in design, so that some of their cost represents part of a long term investment. One might also argue that some designs are by their nature short-lived: fashion design, for example, can easily be imitated (which makes branding often the long-lasting asset in fashion). Equally, there are cases where design is longer lasting; interiors of trains or shops, for example. The current evidence base is rich in descriptions of particular cases but it would be good to have some more widespread data on this question.

We might also expect a correlation between the life of a design and the use of design rights. There should be such a correlation if design rights are used to protect long-lasting design assets. However, such correlations reflect causation in two ways. Firms might take out design rights to extend the life of their design, or they could just take out design rights for products that they think have a long life.

Finally, it is also of interest to note how life-spans vary between own-account and purchased designs. We might hypothesise that firms would purchase design externally when needing new and innovative designs from specialist design companies, leaving

their in-house teams with more routine tasks. This would mean purchased designs last longer in-house work. On the other hand, in-house design could be more innovative since it is undertaken when more protection of design is desired.

To gather some data on a large sample we use two data sets: the CIS gives us information on the use of design rights, but since it gives us no data on how long firms continue to benefit from a design, we match these data with the Intangible Asset Survey (IIA). In that survey, we asked firms about the expected length of return from design investment: they were asked "on average, how long do you expect to benefit from your spending on design?"

The match from the CIS and the IIA produces a small sample of 86 firms. As discussed above, very few firms in the CIS actually report that they register their designs. We are unable to separate those firms, since that would have contravened disclosure rules. Instead, we look at design length for all CIS and IIA firms matched together. The average length of return from design investment is about 3.86 years, with a minimum period of less than two months and a maximum of more than 25 years. The values reported at the 10th percentile and the 90th percentile of the design length distribution are respectively fewer than six months and more than seven years.[13] For the larger sample of all 838 firms reported in Awano, Franklin, Haskel and Kastrinaki (2010), we found average benefit lives of 3.7 years in services and 4.6 years in production. All these values are statistically significantly above one year, suggesting that design investment does give rise to benefits of at least a year.

The IIA also collects information on own-account and purchased design investment. This enables us to examine which has a longer lifespan. For our sample, we found a negative and insignificant correlation between bought-in design spend and life length (-0.03) but a positive and significant correlation between purchased design spend and life length (+0.28). Thus, firms that undertake their own design also report a statistically significant longer benefit from such spending. This may have two explanations. Either firms choose to undertake own-account spending when they see the chance of long lived projects or their own-account spend might unearth particular designs that then become long lived. At any rate, it refutes the idea that firms purchase external designs when they need new and innovative designs, leaving their in-house teams with more routine tasks. Our small sample suggests that it is in-house design that has longer lasting value.

13 We are again prevented from reporting more details, such as numbers at particular percentiles or variation by industry, due to disclosure problems.

4. Conclusion

This paper has tried to measure (a) the value of the AEGPD (architecture, engineering and design) services bought in the marketplace and those which companies produce in-house for internal use (b) the reported use of design rights and (c) the correlation, if any, between own account and purchased design and the length of life for which companies think they will gain benefit from design services. We find:

- In 2008, UK private sector firms purchased about £26bn worth of architectural and engineering design services, but produced about another £7.5bn worth on their own-account. The most intensive spenders on design are business services, manufacturing, and construction, accounting for 39 per cent, 20 per cent and 12 per cent of all design spending;

- Within manufacturing, the largest spenders are manufacturing of transport, computers and publishing;

- Each of these sectors has quite different patterns of own-account and purchased methods: manufacturing is about 50 per cent of each, whereas construction is 90 per cent bought in; and

- Only 15 per cent of firms report registering an industrial design; and on average, firms report that design gives benefits for around four years. Firms that do own-account design report a significantly longer benefit time then firms who purchase.

The extensive use of own-account design underlines the need to account for this when calculating the extent of the “knowledge economy”. However, there is still more to learn about how firms protect their designs and the extent to which the activities of designers create lasting assets.

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Appendix 1

Design industries, (SIC2003)

SIC	Title	Description
74.20/1	Architectural activities	This subclass includes: consulting architectural activities: ■ building design and drafting ■ supervision of construction This subclass excludes: activities of interior decoration design cf. 74.87/2
74.20/2	Urban planning and landscape architectural activities	
74.20/4	Engineering consultative and design activities	This subclass includes: advisory and consultative engineering activities and engineering design activities for: ■ the construction of foundations and building structures ■ mechanical and electrical installations for buildings ■ the construction of civil engineering works This subclass excludes: engineering design activities for industrial process and production cf. 74.20/5
74.20/5	Engineering design activities for industrial process and production	This subclass includes: drawing up of preliminary drafts, project development, specification of plans of execution or exact specifications on behalf of the contracting authority for the construction of industrial process and production
74.20/3	Quantity surveying activities	This subclass excludes: research and development activities cf. 73
74.20/6	Engineering related scientific and technical consulting activities	This subclass includes: geological and prospecting activities; weather forecasting activities and geodetic surveying activities. This subclass also includes: activities of technical consultants other than engineers. This subclass excludes other test drilling and test hole boring, activities of computer consultants, research and development activities and technical testing
74.20/9	Other engineering activities	This subclass also includes: integrated engineering activities for turnkey projects
74.87/2	Speciality design activities	This subclass includes: – fashion design related to textiles, wearing apparel, shoes, jewellery, furniture and other interior decoration and other fashion goods as well as other personal or household goods – activities of interior decoration designers – activities of graphic designers This subclass excludes: – machinery and industrial plant design; display of advertisements and other advertising design

Notes: Table 1 report industries with the term design in their description. SIC 74.30 is not included in our definition of design industry and this classification is “Technical testing and analysis”, which includes measuring related to cleanness of water or air, measuring of radioactivity; analysis of potential pollution and testing activities in the field of food hygiene.
Source: own tabulations from directory of SIC numbers and titles

Appendix 2

Data on purchased and own account spending, by industry, used in Figures 4, 5 and 6 (all data are in £m).

1. Own account

	Agriculture	Manufacturing	Utilities	Construction	Retail	Financial	Business	Total oa
1997	93	2996	49	226	550	47	1132	5094
1998	56	3223	41	243	566	45	1110	5284
1999	53	3353	60	229	760	49	1320	5824
2000	40	3200	50	296	788	49	1327	5749
2001	38	3914	48	353	1085	88	1875	7401
2002	16	3244	100	358	751	110	1352	5931
2003	35	3454	110	428	927	140	1562	6656
2004	16	3637	82	481	1145	117	1749	7228
2005	19	3977	115	532	1432	103	1768	7947
2006	23	3389	146	578	1217	93	1537	6984
2007	75	3500	127	691	1446	98	1907	7844
2008	38	3397	143	504	1253	116	2015	7468
2009	63	3827	174	593	1393	156	2116	8323

2. Purchased

	Agriculture	Manufacturing	Utilities	Construction	Retail	Financial	Business	Total pur
1997	473	2723	210	1373	1939	1251	5061	13030
1998	527	2952	258	1484	2122	1411	4759	13512
1999	521	2927	211	1558	2236	1538	3133	12125
2000	450	2966	209	1526	2473	1767	5677	15068
2001	557	2899	239	1528	2632	1911	7453	17220
2002	598	2817	255	1868	2866	1825	6490	16718
2003	591	2835	227	2078	3057	1689	8580	19056
2004	575	2698	252	2130	3115	1677	7179	17626
2005	534	2862	428	2854	3247	2268	8752	20945
2006	582	3117	375	3517	3431	2508	9627	23158
2007	636	3406	410	3846	3756	2744	10533	25330
2008	616	3088	495	3608	3681	2931	11234	25652

Source: Authors' calculations using ASHE and SUTs. See text.

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