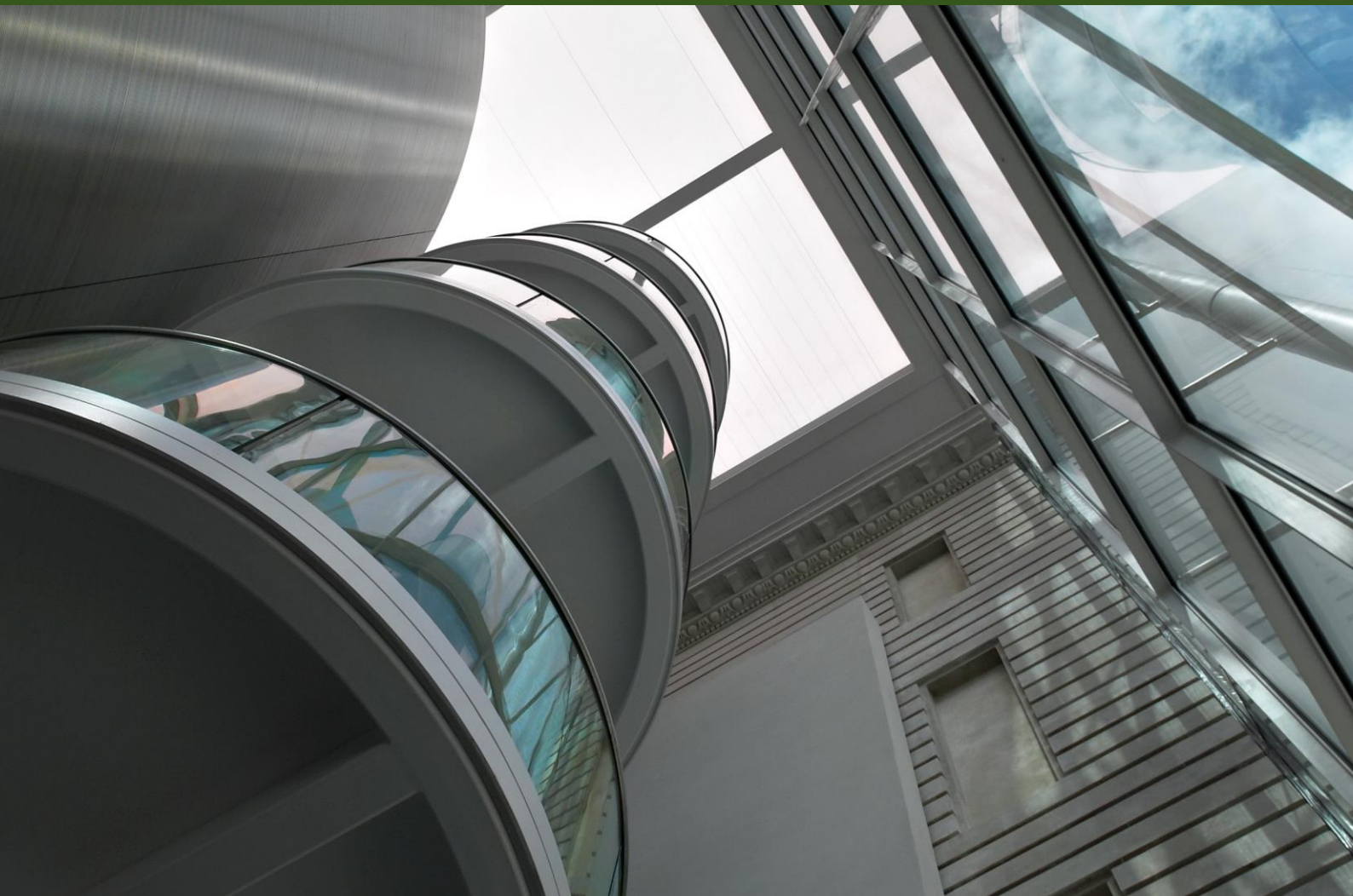


Peter Goodridge



**Film, television & radio, books, music and art: estimating
UK investment in artistic originals**

Discussion paper 2014/2

March 2014

Film, Television & Radio, Books, Music and Art: Estimating UK Investment in Artistic Originals*

Peter Goodridge
Imperial College Business School

February 2014

ABSTRACT

This paper evaluates official estimates of investment in artistic originals as recorded in the UK National Accounts. It lays out a framework for measuring investment in the creation of knowledge assets and proceeds to estimate gross fixed capital formation in this asset type using a variety of methods, including new data. Bringing these new data to bear suggests an upward revision to UK investment in artistic originals in 2008 of approximately £1.4bn. The data and procedures used in this chapter have recently been adopted in a revision to the UK National Accounts.

* I am very grateful for financial support for this research from the UK Intellectual Property Office and ESRC (Grant ES/I035781/1). I also wish to thank all those that provided me with data or insights into the workings of industries studied. In particular: Rachel Soloveichik (BEA); Shaun Day (BBC); Nicholas Maine (UKFC); Steve Gettings (OFCOM); Bruce Nash (the-numbers.com); Ben White (British Library), representatives of publishing houses and collecting societies led by Sarah Faulder (PLS); and Will Page and Chris Carey (PRSforMusic). This work contains statistical data from ONS which is Crown copyright and reproduced with the permission of the controller of HMSO and Queen's Printer for Scotland. The use of ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates. All errors are of course my own.

1. Introduction

This paper features work that is part of a broader project aimed at measuring investment in intangible or knowledge assets, and the contribution of those assets to growth. It also aims to contribute to the discussion on the contribution of the ‘creative sector’ to the UK economy. In this paper the specific focus is on investment in long-lived artistic assets formally protected by copyright, defined as artistic originals in the System of National Accounts (SNA).

As discussed extensively in Goodridge (2012), the standard approach taken in measuring the creative sector is to select industries from the Standard Industrial Classification (SIC) that are considered ‘creative’, collate measures of their output and present it as a fraction of aggregate output. Some examples are numerous analyses by the Department of Culture, Media and Sport (e.g. DCMS (2011)) and a report by the World Intellectual Property Organisation (WIPO 2003). However, there are a number of issues with this approach. First, there is considerable debate on which industries should be considered ‘creative’. These industries and sub-industries are discussed in more detail in the WIPO report, which introduces definitions such as ‘core’, ‘interdependent’, ‘partial’, and ‘non-dedicated support’ according to the extent and way in which industry activity (as defined by the SIC) is based on copyright. Second, measuring the economic size of the creative industries is inadequate for measuring creative activity or the input of creative workers, as it takes no account of creative activity in outside industries. For instance consider investment in design. Data for 2006 show that around half of investment in design was undertaken on the own-account of firms outside the design industry (Galindo-Rueda, Haskel et al. 2008). A simple measure of output for the design industry could miss as much as half of actual activity. Such an approach also measures all industry output, some of which is non-creative. For instance, expenditure on staff or equipment for administration or other non-creative business processes.

Therefore, rather than seeking to define which industries should be considered part of the creative sector, the plan of this paper is to set out a framework to identify and measure UK investment in long-lived creative assets formally protected by copyright. It proceeds as follows. Section two presents a general overview and compares official UK data with that from the US. Section three sets out a framework for analysing artistic sector output and investment in artistic originals. Section four evaluates current ONS measurement practice¹ in the context of that framework, highlighting some of the measurement issues that require consideration in measuring investment and a number of ways to build on official data, by asset type. Section five presents new estimates of investment for each individual asset, making explicit use of the framework set out previously.

¹ This refers to ONS practice at the time of writing. Since then the ONS have incorporated the outcomes of this work in a recent revision to the National Accounts, based on the findings in the original report.

As a result estimates for: i) Film are revised upward using data on a broader range of UK productions; ii) TV & Radio are revised downward due to adjustments in data and methodology; iii) both Books and Music are revised upward using new data and methodologies; v) miscellaneous artwork, not included in official data, are estimated as substantial. Section six concludes.

2. Definitions and general overview

Investment in Artistic Originals, sometimes referred to as “copyrighted assets” and more formally as ‘Entertainment, Literary and Artistic Originals’, is one of the few categories of intangible investment already officially capitalised in the National Accounts along with software and mineral exploration, and soon R&D². To get an idea of current estimates, Table 1 compares official estimates of gross fixed capital formation (GFCF) in artistic originals as a percentage of Gross National Product (GNP) for European Economic Area (EEA) countries in 1995 and 2001. UK estimates are among the highest of those presented for EEA states. US data for 2002, based on estimates outlined in Soloveichik (2010a), are included for comparison. The disparity suggests there may be some undercapitalisation in EEA countries including the UK.

Table 1: Investment in Artistic Originals as a percentage of GNP (1995 & 2001)

% of GNP	1995	2001
Austria	0.09	0.09
Belgium	0.05	0.03
Denmark	0.12	0.12
Germany	0.16	0.18
Spain	0.1	0.07
Finland	0.19	0.19
France	0.09	0.09
Ireland	0.17	0.11
Italy	0.07	0.1
Luxembourg	0.01	0.01
Netherlands	0.04	0.03
Portugal	0.17	0.22
UK	0.21	0.22
% of GDP		2002
US	-	0.62

Note to Table: Data for European countries taken from a report for the Eurostat GNI Committee, First meeting, 5-6th November 2003: ‘Report of the Task Force on Entertainment, Literary and Artistic Originals’ (2003). Since artistic originals are not currently capitalised in the US Accounts, US data are based on developmental BEA estimates (Soloveichik 2010c). Additionally they are presented as a % of GDP rather than GNP, and refer to 2002 rather than 2001.

From Table 1 it can be seen that US estimates are considerably higher as a share of GDP than those for the UK or other EEA countries. Table 2 makes a direct comparison between UK and

² Software, mineral exploration and artistic originals were officially capitalised in the 1993 revision of the SNA. R&D was officially capitalised in the 2008 revision of the SNA, and is due to be treated as an asset in the UK National Accounts from 2014.

BEA estimates, by asset category. Since only four of the five assets covered by the BEA are currently capitalised in the UK, column 4 adjusts the US data so it can be compared with the UK on a like-for-like basis. That is, miscellaneous artwork is excluded from US investment, and the percentages are re-calculated.

Table 2: Investment in Artistic Originals, % breakdown (2002)

	US (\$bn) (Soloveichik)	UK (£bn)	US (\$bn) approx, using UK breakdown
Total	\$65.1bn	£2.14bn	\$60.1bn
% of GDP	0.62%	0.20%	0.57%
Asset			
(1) Movies	\$9.8bn	£0.02bn	\$9.8bn
% of Artistic Originals	15.10%	0.94%	16.31%
% of GDP	0.09%	0.002%	0.09%
(2) Music	\$7.6bn	£0.13bn	\$7.6bn
% of Artistic Originals	11.70%	6.07%	12.65%
% of GDP	0.11%	0.012%	0.07%
(3) Books	\$7.1bn	£0.21bn	\$7.1bn
% of Artistic Originals	10.90%	9.81%	11.81%
% of GDP	0.07%	0.020%	0.07%
(4) TV	\$35.6bn	£1.78bn	\$35.6bn
% of Artistic Originals	54.70%	83.17%	59.24%
% of GDP	0.34%	0.165%	0.34%
(5) Misc	\$5bn	-	-
% of Artistic Originals	7.70%	-	-
% of GDP	0.05%	-	-

Note to table: Artistic Originals are not currently capitalised in the US National Accounts. Therefore, as a % of GDP, the above data are not quite on a like-for-like basis, with originals implicitly part of UK GDP but not US GDP. For Column 4, the data have been adjusted to account for the differing coverage of originals in the UK and US i.e. since miscellaneous artwork is not capitalised in the UK, \$5bn is subtracted from the US aggregates, and the percentages are re-calculated accordingly.

Inspection of investment in each category as a percentage of GDP reveals that UK data for Film, Books and Music in particular are considerably lower than US estimates and gives some indication of potential “missing” investment in the UK data. In particular the UK seems to record very little investment in Film relative to the US. This could reflect the central role of Hollywood in both the funding and production of motion pictures, mis-measurement of UK asset production, or both.

2.1. What assets should be counted as “Artistic Originals”?

Before identifying alternative approaches for measurement, one has to define just what assets to consider. Eurostat and the OECD have opined on this issue. The following discussion includes a summary of recommendations for National Statistical Institutes (NSIs) outlined in a Eurostat Taskforce report (2003) and further clarification issued by the GNI Committee (2004).

The Taskforce set four criteria for identifying investment in artistic originals. The item:

- 1) Must be covered by copyright
- 2) Should have primary artistic intent i.e. where the original is the end product in itself, and not an interim part of the production process for another good
- 3) Must satisfy capital criteria i.e. have a useful service life of more than one year
- 4) Should not be covered elsewhere in the National Accounts. Therefore software and valuables should be excluded

On the first criterion, there may appear to be an inconsistency with the treatment of say R&D, also recognised as a fixed asset in SNA 2008. That is, it is not necessary for R&D to be protected by patent in order to qualify as investment. The reason much R&D is not formally protected by IPRs is that firms can still exploit the asset without such protection and they often prefer not to make the acquired knowledge public in any way. In contrast, in order to commercially exploit an artistic original, it must be protected by copyright. Also, copyright protection is automatic whereas patents are registered rights that must be applied for.

On the second criterion, this does not mean the final asset cannot be used as an input in the production of final goods. It simply means that a component of the final asset should not be counted separately e.g. un-edited or animated images should not be counted separately to the final film/TV original they are a part of. A potential grey area is the treatment of film or television scripts, which can be covered by a separate copyright, and a case can be made for considering them separately.

The fourth criterion explicitly recommends the exclusion of ‘valuables’, which are goods held as stores of value as alternatives to financial assets, and typically include items such as fine art or jewellery. Valuables appear as a transaction item in the National Accounts within Gross Capital Formation (GCF), termed ‘acquisitions less disposals of valuables’. Note that GCF differs from GFCF, since the latter refers only to productive fixed capital.

$$GCF = GFCF + \Delta \text{ inventories} + \Delta \text{ valuables} \quad (1)$$

The Eurostat Taskforce considered that because items such as paintings, sculptures and fine art may be present in valuables, then they should be excluded from estimates for artistic originals. However, provided the data on valuables correctly pertains to alternatives to financial assets, and data on GFCF correctly pertains to fixed productive assets, it should be possible to avoid double-counting. According to the data, valuables are largely held by the insurance and pension industries. The values for acquisitions less disposals are typically relatively small, but volatile,

presumably because such assets tend to be held rather than frequently bought or sold. SNA (2008) states that valuables include, but are not restricted to: precious metals and stones, antiques and other art objects, where the latter can include collections of stamps, coins, china, books and jewellery.

However, GFCF in artistic originals ought to include investment in artistic assets that are part of the productive capital stock. That is, assets that can be exploited by their owner in generating final output. If an asset is produced, but then sold to an owner that intends to hold it as a store of value rather than employ it as productive capital, the transaction should be recorded as negative GFCF for the innovator and positive acquisition of valuables and therefore GCF³ for the new owner. At no point has the investment been counted twice and there is no reason to not record the initial investment in creation, or to not consider the role of the asset in production before it was sold.

More importantly, note that valuables refer to some copy, not the original asset itself and crucially not the rights to commercially exploit the original asset. Just because, say a piece of fine art is held as a store of value, that does not mean that the original has been removed from the stock of productive assets. Prints of the asset can still be produced and images of the asset can still be used in the production of final output. Likewise for book collections. If an investor has decided to purchase a copy of the very first print of an original as a valuable, because they expect it to maintain its value or achieve a capital gain, then that purchase does not mean that we should exclude the investment made in the creation of that original, as the original can still be used in the generation of final output. The purchaser has not bought the asset rights, they have simply purchased a piece of final output that the original was used to produce.

Therefore the composition of the data on valuables means that the potential for double-counting between 'artistic originals' and 'valuables' seems limited. Although not necessary, rather than excluding investment in a large portion of artistic originals, a more appropriate treatment would be to estimate investment in remaining types of artistic capital and subtract the measured data on valuables. This would guarantee no double-counting of assets, and avoid the exclusion of a potentially significant area of investment.

The following headings outline the asset categories considered by the Eurostat Taskforce as potential items for inclusion in artistic originals, their final recommendations on which types of originals should be capitalised in the National Accounts, and additional information considered

³ Note again the conceptual difference between investment in productive capital (GFCF) and investment in monetary alternatives (GCF).

relevant to the discussion. The recommendations of the Taskforce are summarised in Table 3 and discussed in more detail below.

Table 3: Summary of Eurostat Taskforce recommendations, by category

Category/Asset	Taskforce Recommendation (√/X)	Further considerations noted by Taskforce
Films	√	Only the final version should be capitalised, and not interim versions, so as not to double count. Estimation of investment requires information on residency of production company.
TV & Radio	√	Only “stock” programmes should be capitalised (i.e. those with service lives of more than 1 year).
Books	√	Magazines and newspapers should not be capitalised, since they generally have service lives of less than 1 year.
Music	√	Only the final version should be capitalised, so as not to double count. Advertising jingles should be excluded as they are not considered long-lived.
Images	√	Should be capitalised <i>provided</i> they are covered by copyright
Maps	√	Should be capitalised but likely already included under Books
Branding	X	Should not be capitalised since service life is generally less than 1 year
Technical Drawings	X	Should not be capitalised since their primary intent is not artistic, but rather they are a component of a different final asset (e.g. buildings)
Models	X	Should not be capitalised since they are neither ‘original’ nor have primary artistic intent
Artwork	X	Should not be capitalised to avoid any potential double counting with items already recorded as ‘valuables’

a) Films

The Taskforce recommended that GFCF in Film Originals should include the production of all short and long films that satisfy the above four criteria, including translations and re-worked originals, but that only the edited final version should be capitalised, and not interim versions. They also noted that it is important to establish the residency of the production company so investment is allocated to the correct country. However, rather than residency of production what actually matters for the purpose of measuring investment is residency of ownership, that is the country to which future revenues will flow when the asset is commercially exploited. Establishing ownership is particularly important for Film where national tax/subsidy arrangements encourage activity in different locations. This is especially true for the UK where a

significant amount of activity is funded by major US studios. In fact a number of the major production companies in the UK are subsidiaries of US producers.⁴

b) TV & Radio stock programmes (e.g. fiction, documentaries, drama, music, arts, history & education, children's)

Only long-lived TV & Radio productions ought to be capitalised. Programmes for broadcast in the television and radio industries are categorised as either 'Stock' or 'Flow' productions. 'Stock' programmes are long-lived, and include the genres listed in the heading above, whilst 'Flow' programmes include genres such as news, sport or game shows which are less likely to be repeated or re-produced on alternative formats such as DVD. The stock/flow distinction therefore provides a natural break in meeting capitalisation criteria.

However in some cases the distinction is less clear. Consider sport for example, with DVD releases of major events and re-runs on channels such as 'ESPN Classic' long after the original broadcast. The OECD explicitly recognise that some sports broadcasts have service lives of more than one year, but recommend that, due to very fast depreciation rates (on average), sporting rights be excluded from final estimates of GFCF in originals (OECD 2010). Furthermore, the proportion of sports broadcasts that generate long-term revenues is small, with those that are long-lived determined by the special nature of the event or a particular outcome. In the case of game shows, a differing view is taken by Soloveichik (2010a) who argues that although one programme may be short-lived, the format and therefore underlying asset is long-lived. This may be debatable since it could be argued that all formats are long-lived. But surely there has been some investment when a 'title' is re-produced either domestically or internationally for several years, even if the one-off programme itself is unlikely to be repeated.⁵

c) Books & Pamphlets (Literary Originals)

The Taskforce recommended that all investment in the creation of full books regardless of subject or style be included, and that audio or e-books also be included provided they hold a separate copyright. The recommendation for sheet music and scripts is that if they are protected by a distinct copyright they can be recorded as a separate item under literary originals, but should not be included within music or film.

⁴ According to the ONS Film & Television (FTV) release, in 2007 62% of UK film exports were by UK subsidiaries of major US film companies.

⁵ Obvious examples of this include numerous reality shows that are re-produced domestically and internationally on an almost annual basis. For instance: 'The X Factor', 'The Apprentice' or 'Big Brother' to name a few.

Since newspapers and magazines generally have a service life of less than one year it was recommended they be excluded from final estimates. A potential grey area is the treatment of journals, since their service life is often greater than one year, but data practicalities mean it can be difficult to disentangle them from magazines and similar publications.

d) Music (Recorded Originals)

As with Film it was recommended that only the edited final version be recorded as GFCF so as not to introduce double-counting. It was also recommended that all media types be included, including music videos, but that advertising jingles be excluded. On advertising, although the stand taken in this thesis is that the intent of some proportion of advertising expenditures is to create long-lived reputational capital, it is considered a distinct category in the intangibles framework and so will not be included in estimates of artistic originals (see for example, Corrado, Hulten et al. (2005) or Goodridge, Haskel et al. (2012)).

e) Slogans/Brand names

The Taskforce felt that although protected under Trade Mark, such investments should not be considered as part of GFCF in artistic originals. Again, although part of such expenditure certainly goes towards building brand and reputational capital, it is treated as a separate asset in the intangibles framework (Goodridge, Haskel et al. 2012).

f) Technical/Architectural Drawings & Models

The Taskforce felt these items ought not to be considered as artistic originals, even if they have copyright protection, since their primary use is as an input to construction output. Therefore they fail to meet the criterion of primary artistic intent. However, provided such blueprints (or prototypes or scaled models) have a service life of more than one year and are used in the production of final output then it is clear that they should be treated as capital, even if not as artistic originals. Therefore although not considered here in the context of originals, such assets are included in the broader intangibles framework under “Architectural and Engineering Design” (Goodridge, Haskel et al. 2012).

g) Paintings, sculptures, antiques, fine art & jewellery

The Taskforce recommended these items be excluded from estimates of investment to avoid double-counting, as according to the fourth capitalisation criterion and the presence of ‘valuables’ in the National Accounts. However, ESA95 does reference portraits, images, reproductions and pictures in its discussion of what should be included as artistic originals. As discussed above, the potential for double-counting and the rationale for exclusion of such assets are not clear.

h) Photographs & Images (reproductions or copies from books)

The Taskforce recommended these be included provided they are covered by copyright. Data for such assets are however more limited than that for other asset types.

i) Maps

The Taskforce recommended that maps be included, and noted that in any case, it is unlikely they could be separated from other publications.

j) Summary

As a minimum therefore, the Taskforce recommended that originals be defined to include Films, TV & Radio stock programmes, literary and musical works, and that other categories such as photography/images could be included provided they meet the criteria listed above. Broadly in line with these recommendations, this paper will present new estimates of UK investment in Film, TV & Radio, Books, Music and Miscellaneous Art, where the latter includes assets such as art, photography, images, choreography and maps, where data are available and where they are not counted elsewhere.

3. Theory: Review of methodological approaches for estimating investment in artistic originals

3.1. Model of the artistic sector

To understand the various measurement methods available, it is worth setting out a simple two sector model, analogous to that used in Corrado, Goodridge and Haskel (2011).

Consider an economy with an innovation (or artistic) sector and a final output sector. The innovation sector, or upstream, produces artistic originals which are used as an input in the final output, or downstream, sector: the film production (upstream) and cinema industry (downstream) for example. In this economy we may then write the value of gross output in the artistic/innovation sector as $P^N N$. This is equal to factor and intermediate costs in the sector times any mark-up (μ) over those costs, where μ represents the monopoly power acquired through ownership of a unique asset formally protected with intellectual property rights (IPRs):

$$P^N N = \mu(P^L L^N + P^K K^N + P^M M^N) \quad (2)$$

Where $P^L L^N$, $P^K K^N$ and $P^M M^N$ are payments to labour, capital and materials respectively, P^X their competitive prices, and μ the mark-up over competitively priced inputs. Payments for materials can include rental payments for the use of other originals in production e.g. the use of a

music original in film production, or even the sampling of a music original in another music original.

Consider next the downstream, which uses the artistic good in generating final output. If the downstream purchases the asset rights (or some component of them) outright, then the cost is (some proportion of) $P^N N$. If they purchase and use the original, they will pay an implicit annual rental for its use. Alternatively they may rent the asset explicitly e.g. pay a licence fee, $P^R R$, for T years to the IPR-holding artistic sector. In either case, capital market equilibrium implies that:

$$P^N N = \sum_{t=1}^T \frac{P^R R}{(1+r)^t} \quad (3)$$

Where r is a discount rate and R is the stock of knowledge accumulated from upstream artistic sector output; using the perpetual inventory method (PIM) this stock accumulates as:

$$R_t = N_t + (1 - \delta^R) R_{t-1} \quad (4)$$

Where δ^R is the rate of decay in revenues appropriated from artistic assets, the appropriate concept of depreciation for intangible capital, as first noted in Pakes and Schankerman (1984).

Equation (3) says that the asset value must equal the discounted rental payments from the users of the good. This condition is set out in, for example, the classic paper of Romer (1991).

The final output sector, which uses the artistic good in production, produces downstream output, $P^Y Y$:

$$P^Y Y = P^L L^Y + P^K K^Y + P^M M^Y + P^R R^Y \quad (5)$$

Where $P^L L^Y$, $P^K K^Y$ and $P^M M^Y$ are the payments to labour, tangible capital and materials, and $P^R R^Y$ are the payments to the artistic capital used in the downstream but created in the artistic

sector⁶. How then are we to measure investment in the creation of artistic originals, $P^N N$? A number of approaches are possible.

a) *Input cost based: Upstream Production Costs*

The most popular method for estimating investment in intangible assets is to estimate the cost of asset production in the upstream sector, using data on input costs (labour, capital and materials), as in equation (6). This is one of the two primary methods for measurement of GFCF in Artistic Originals, as recommended by both Eurostat (2003) and the OECD (2010). It is also the approach taken in estimating investment in R&D using a survey of R&D performers (BERD).

$$P^N N = P^L L^N + P^K K^N + P^M M^N \quad (6)$$

In practice, detailed data on capital compensation ($P^K K^N$) and intermediate inputs ($P^M M^N$) in the upstream sector(s) are sometimes not available. Therefore a variant of this approach is to use data on labour input costs and apply some factor ($\gamma > 1$) to cover other costs of production, as in equation (7). This is the method used to estimate own-account software investment in the UK National Accounts (Chamberlin, Clayton et al. 2007).

$$P^N N = \gamma \cdot P^L L^N \quad (7)$$

There are two issues worth noting in the context of artistic originals. First, the treatment of the use of other artistic goods in the upstream e.g. the use of music as an input to a movie original. It has been argued that including such payments could potentially lead to double counting. However, this would only be so if the measured input payment was the total cost of the musical original, $P^N N$, that is if it was bought outright with ownership transferred to the film producer. Provided what is being counted is a rental payment for its use, $P^R R$, then only the capital services from the use of the music original are included, as is appropriate, and there is no double-counting.

Second, note the difference between equations (2) and (6). Theoretically, the output of the upstream implicitly includes μ , the mark-up earned by the upstream innovator. Use of data on upstream input costs alone implicitly assumes that $\mu=1$. Assuming the copyright is enforceable

⁶ At first it may appear that there could be a measurement issue in the sense that both the upstream and downstream are renting from the artistic stock, as payments in the upstream can also include payments for the use of artistic originals. This is not the case. The upstream is renting a different asset to that which it is producing. For example, the producer of broadcasting assets is renting music assets.

then a mark-up such that $\mu > 1$ almost certainly exists, but there is little evidence of its magnitude. In reality the mark-up is likely to vary greatly not only by asset type but also by individual asset.⁷

b) *Upstream sector output: asset sales*

A second potential approach is to measure the left-hand side of (6), $P^N N$, using data on the value of sales in the upstream/artistic sector. This method is equivalent to measuring tangible investment by the value of sales in the investment goods industries. Note also that any estimate of $P^N N$ derived from data on industry revenues will implicitly include μ . However, there are a number of practical difficulties with this approach.

First, industries as defined by the SIC do not neatly correspond to upstream activity. Just as R&D is often undertaken on the own-account of firms that use that R&D output, artistic originals are often produced and used within the same firm, or at least by firms within the same SIC. Consider for example music, with record labels and publishers involved in both the creation and use of originals, including the production and distribution of copies. Furthermore, the ownership of IPRs can cross industry boundaries and be complex, making it very difficult to identify the upstream from data categorised by the SIC.

Second, upstream revenues could be received in a number of ways. First, in the case of vertically integrated firms involved in both upstream and downstream activity, the rental earned by originals is implicit and so cannot be observed from direct market transactions. It is therefore extremely difficult to split industry output into revenues that accrue to the asset and those that accrue to other factors.⁸ Second, the asset could earn revenues in a number of forms: as an explicit rental for one-off or short term use, for example the right to project a film at a cinema for one month⁹; or a sum of rentals for a longer period, perhaps for the right to manufacture the DVD for the next five years; or a payment for the outright purchase of the asset, or for a component of the asset rights such as a one-off payment to use a movie logo on merchandise for perpetuity. Accurate valuation requires that each payment is treated correctly and not simply summed, that is with each

⁷ The size of the mark-up will be determined by the commercial success of the individual asset. Therefore an estimate for μ generated by say, Harry Potter, would differ greatly from that generated by the author of this thesis.

⁸ This feature is not unique to artistic originals. Consider a firm such as Ford. The majority of its output is downstream since it represents the sale of final goods (vehicles). However, the firm also includes a significant upstream that the rest of the firm implicitly rents capital from. For example, the lab generates ideas through R&D. Likewise the units that design or brand the final goods are part of the upstream for those particular knowledge assets.

⁹ In practice, in film the owner (the funding studio) receives rentals as a percentage of revenues generated by the cinema, rather than as a flat fee (Soloveichik, 2010)

payment correctly discounted over the appropriate period as in (3). In practice, such detail is rarely available.

Third, measurement is further complicated by the fact that there are often numerous downstream industries which in turn may rent from a variety of different upstream owners. For example, a t-shirt manufacturer may rent the rights to use intellectual property from the film industry, but they may also rent similar rights from the music/recording industry. Additionally, those rights may be split across owners, for instance between producers and distributors (studios) in the case of film, or between artists and recording companies in the case of music.

Fourth, this approach could capture industry activity that is not in fact asset creation. For example, in the case of television, industry output will include the production of short-lived goods such as news, which is not an asset in the National Accounts framework. Of course in the case of television industry, output will also include downstream use (broadcast) as well as upstream creation. In the case of film, UK production companies may produce short-lived outputs, say infomercials, other forms of output not considered capital in the SNA such as advertising, and also long-lived outputs destined for export and not funded (or owned) by the UK. None should be recorded as part of UK investment.

Therefore whilst this method can be used to say something about the proportion of output or employment that is in some way *linked* to ‘creative output’, it cannot be used for an accurate analysis of the value or volume of artistic asset creation. For that we need instead to consider the sector from a broader viewpoint than that provided by the SIC.

c) Rental payments: capital compensation

A third potential method for measurement of investment in artistic originals is to exploit the data on payments for their use. As noted above, data on industry output is insufficiently detailed to observe such payments accurately. However, in cases where rental payments can be observed directly, it is possible to exploit the competitive equilibrium relationship in equation (3), where, at the margin, the owner is prepared to invest up to the point where the value of the investment equals the expected net present value (NPV) of future revenues generated by the asset. Such data is partly held by Collecting Societies, who provide a centralised payments receiving house for particular artistic assets, and distribute those payments to asset owners i.e. to the holders of IPRs.

A true measure of investment constructed using this method would require the allocation of royalties to each individual asset in a full longitudinal analysis, with each royalty correctly discounted according to the type of payment (i.e. the length it refers to), the timing of the

payment, and the vintage of each individual asset in question. For reasons of commercial confidentiality and other legal barriers, it was not possible to obtain such data. However, provided some fairly restrictive assumptions are employed, it is also possible to derive an estimate of investment based on the cross-sectional sum of royalties that accrue to all asset vintages. According to a standard PIM, the stock of originals at different points in discrete time is:

$$\begin{aligned}
R_t &= N_t + (1 - \delta)R_{t-1} \\
R_{t-1} &= N_{t-1} + (1 - \delta)R_{t-2} \\
R_{t-2} &= N_{t-2} + (1 - \delta)R_{t-3} \\
&\text{etc..}
\end{aligned} \tag{8}$$

Where R is the real stock, N is real investment and δ is the rate of decay in appropriable revenues. Substitution yields:

$$R_t = N_t + (1 - \delta)N_{t-1} + (1 - \delta)^2 N_{t-2} + (1 - \delta)^3 N_{t-3} + \dots + (1 - \delta)^{T-1} N_{T-1} \tag{9}$$

Assuming steady-state conditions, real output and investment grow at a constant rate (g^N):

$$\begin{aligned}
g^N &= \frac{\Delta N_t}{N_t} \\
N_t &= (1 + g^N)N_{t-1}
\end{aligned} \tag{10}$$

Applying the steady state condition to the expanded PIM yields:

$$R_t = N_t + \frac{(1 - \delta)}{(1 + g^N)} N_t + \frac{(1 - \delta)^2}{(1 + g^N)^2} N_t + \frac{(1 - \delta)^3}{(1 + g^N)^3} N_t + \dots + \frac{(1 - \delta)^{T-1}}{(1 + g^N)^{T-1}} N_t \tag{11}$$

Which reduces to:

$$R_t = N_t \left[\frac{1}{1 - \frac{(1 - \delta)}{(1 + g^N)}} \right] \tag{12}$$

And

$$R_t = N_t \left[\frac{(1 + g^N)}{(\delta + g^N)} \right] \tag{13}$$

The other key relationship is given by the user costs relation:

$$P_t^R = P_t^N (r + \delta) \quad (14)$$

Where P^N is the unit price of a finished original (an investment or asset price), P^R the price of renting a unit of the same original and r is the net rate of return to capital. For simplicity taxes and capital gains are ignored. Multiplying both sides by R , and then both multiplying and dividing the right-hand side by N :

$$P^R R = P^N N (r + \delta) \frac{R}{N} \quad (15)$$

Substituting in an expression for $\frac{R}{N}$ from (13):

$$P^R R = P^N N (r + \delta) \left[\frac{(1 + g^N)}{(\delta + g^N)} \right]$$

$$P^R R = \tau P^N N; \quad \text{where} \quad \tau = (r + \delta) \left[\frac{(1 + g^N)}{(\delta + g^N)} \right] \quad (16)$$

In golden rule steady-state, defined as the maximisation of intertemporal consumption as a constant proportion of output, quantities of output and capital grow at the same constant rate (Barro and Sala-i-Martin 2003). In this theoretical state, growth in gross investment is equal to growth in net (of depreciation) investment and growth in capital compensation, g^N approaches the economy-wide net rate of return r , and the investment share is equal to the capital income share (Jorgenson 1966; Corrado and Hulten 2012), that is, $\tau = 1$. Therefore provided it is assumed that the life-lengths and implied depreciation rates for all individual assets in the asset category are equal, and that the production of originals is in golden-rule steady-state, then the value of annual investment can be approximated using the annual cross-sectional sum of royalties. Clearly this method is only applicable for assets where royalties are readily observed. For this reason it is the method recommended by Eurostat and the OECD in the case of literary and musical originals. Note that an estimate derived in this way will implicitly include μ since it is based on the revenues earned by the asset through use.

d) *Proportion of downstream revenues*

Above it was shown that under certain conditions the annual cross-sectional sum of royalties is an approximation to annual investment. From this a potential variant of that method becomes clear. Licence fees are paid by downstream users and flow to owners of assets in the upstream. Therefore royalties are some component of downstream input costs and output, as shown in equation (17). If it is assumed that some constant proportion of downstream output equates to the payments made for the use of originals, and further assumed that the sum of these payments are a proxy for the value of annual investment using the reasoning above, then GFCF can be estimated in this way:

$$\begin{aligned} P^Y Y &= P^L L^Y + P^K K^Y + P^M M^Y + P^R R^Y \\ P^R R^Y &= \alpha \cdot P^Y Y \end{aligned} \tag{17}$$

Royalty rates can therefore be used to inform an estimate of the proportion of downstream output (α) that flows to upstream owners of originals. Again, an estimate derived in this way will implicitly include μ .

4. Official UK estimates of investment in artistic originals

The UK National Accounts include estimates of investment in the following types of artistic originals: Film; TV & Radio; Music and Books. The following section provides a brief description of current official data and methods and highlights some of the measurement issues faced for specific assets. Unfortunately not all of the data and its components can be presented as it is considered disclosive and in some cases commercially sensitive. Taking each item in turn:

4.1. Film

For Film the ONS use upstream input costs as the basis of estimation. The underlying series is based on funding for UK productions as provided by production companies and funding partners, predominantly FilmFour. The data can be found in Channel 4 Annual Report(s). For example, funding of £39m is recorded for 2009 (Channel4 2009). Due to a lack of coverage of UK-owned productions, official data and methods considerably understate UK investment in this asset.

There are a number of measurement issues that need to be borne in mind when estimating GFCF in film. The first concerns the distinction between production and ownership.

a. *Performance .vs. Ownership*

Eurostat and OECD recommendations note that in the case of Film it is important to consider the residency of the production company. However, for the measurement of investment, it is ownership that matters rather than where production took place. Consider UK film production. Only part of the UK film production sector constitutes the UK upstream for film assets. Of the following three elements of film production, only two form part of UK GFCF:

- i) UK-located firms that (part-)produce (part-)UK-owned film originals ((part)UK GFCF)
- ii) Non-UK located firms that (part-)produce (part-)UK-owned film originals, (imports but part of UK GFCF)
- iii) UK-located firms that produce film originals owned by the Rest of the World (exports and *not* part of UK GFCF)

If a film is produced wholly or partly in the UK, but the final asset is owned by say, a Hollywood studio, then licence fees and royalties for use of the film flow to owners in the US, and the investment is American. Consider a Harry Potter movie for example, and assume all filming took place in the UK, was carried out by a UK production company, and that the majority of the cast and crew were UK residents. However, also assume that the movie is owned by (i.e. the asset rights belong to) a Hollywood studio. In this example, the film is certainly part of UK production/output, since the payments for services from labour and capital all took place in the UK. But if the asset is owned by a US studio then the investment is American. That is, the production is part of UK output as recorded in the National Accounts, but is allocated to exports rather than investment. In practice measurement is less straightforward: it is likely that the UK production company would retain some proportion of asset rights as a production fee, and the US studio would acquire the remaining (larger) proportion. In addition the scriptwriter, and if applicable, the author of the literary work behind it, may be granted some proportion of rights. So continuing with the Harry Potter example, it is likely that some part of production does represent UK GFCF, but estimation is complicated by the fact that 100% ownership of rights is rare, and it is common for rights to be split among the primary funder(s), other investors, the distributor (studio), co-producers, writers, lead actors and directors, in private arrangements that differ case-by-case.

b. *Rental of copyrighted assets in the production of new assets i.e. embedded originals*

A further issue for measurement is that services from different artistic assets are sometimes rented in the production process. Continuing with the example of Harry Potter, inputs to the film include the book used as the basis of the script and music recordings used in the soundtrack. Therefore

production costs also include the royalty payments made to the author, J.K. Rowling, and musical artists, for the use of those assets. This is the correct treatment and not double-counting. Conceptually it is similar to, say, a firm using capital to produce an aeroplane, and a separate firm in the airline industry renting that aeroplane to provide transport services. Therefore, royalties for the use of other pieces of artistic capital should not be excluded from production costs.

c. Scope and divisibility of the final original

Another issue is the treatment of what could be considered components of the original, which could be viewed as distinct assets in their own right. That is, do we consider say scripts or sheet music to have already been counted within the value of the film or recording original, or should they be treated as separate originals? The Eurostat Taskforce recommended that if scripts are covered by a separate copyright then they can be recorded as a distinct component, in the category of literary originals, rather than Film (or Television). Conceptually the correct treatment depends on whether the value of the asset is divisible and a case can be made either way. A sensible general approach would appear to be the following. Where estimates are based on production costs then it is reasonable to assume that it is not possible to accurately decompose the asset value into constituent parts and that the value of, say, the script is already embedded in the value of the final asset. Where data on royalties are available then it should be possible to count payments for distinct categories.

4.2. TV & Radio

For TV & Radio the ONS use data on upstream input costs as the basis of estimation. They include components for both the own-account production of originals and those purchased from the independent sector. Costs are adjusted so as to exclude short-lived productions (e.g. news). Data for are also split into those investments made by public corporations and private sector broadcasters. The data for television and radio, and in fact total artistic originals, are dominated by the estimated investments of private sector broadcasters for a reason discussed below. Data for individual components are not presented here but inspections of the data suggested that difficulties in identifying all in-house, purchased and commissioned productions have led to some under-estimation of investment by public corporations. There is also a lack of documentation on the types of programmes covered.

Although estimates for private sector broadcasters are also based on costs of production, there is a significant conceptual difference in the methodology compared to that for other artistic originals and TV and radio originals produced by public corporations. In short, for private sector broadcasters, costs are adjusted using a factor based on the percentage of downstream revenues earned through the sale of advertising space. The intent of the adjustment appears to be to

incorporate the additional value of TV assets in generating commercial revenues, this is essentially an estimate of the factor μ discussed above. It is this adjustment that is responsible for this component being by far the largest item in official estimates of artistic originals, with estimates of investment around four times greater than pure production costs for private sector broadcasters.

It is worth making a point here on consistency. It would seem reasonable to argue that estimation and application of μ should either be done for all assets, or excluded entirely. So if it is thought that μ should be estimated for private sector broadcasting, then for consistency perhaps it should also be estimated for the public broadcasting corporations, which do generate at least part of their revenues on a commercial basis.¹⁰ Alternatively, an assumption that $\mu=1$ would achieve consistency with UK measurement of other knowledge assets such as R&D¹¹ and, own-account software, where investment is measured as the cost of production with no adjustment for value or market power.

Issues surrounding the measurement of GFCF in this asset type include the residency of owners, rental of other copyrighted assets in the production of television assets, and the scope and divisibility of the final original, as already discussed above in the context of film. Another important issue for measurement, particularly in the UK, is the need to consider commissions and the role of the independent sector.

a. Outsourcing and the independent sector

For television, estimation of investment requires consideration of the increasing trend to outsource production to the independent sector, and final estimates ought to include both direct investments in in-house productions and funding for commissions. In the case of commissions, funding provided by broadcasters may not be entirely sufficient in measuring the investment in those originals, since some proportion of asset rights remain with the independent producer, providing the incentive for additional investments by that party.

¹⁰ For instance, BBC Worldwide have the first right to commercial exploitation of any originals produced/owned by the BBC. Although classified as public corporations, Channel 4 and S4C also earn revenues through the sale of advertising space.

¹¹ Mark-ups that account for the market power of innovators are an important conceptual issue relevant to measurement of investment of knowledge assets in general. In the US R&D satellite account, the costs of R&D exchanged between R&D establishments classified in a different industry than the parent/owner firm are marked up (Robbins and Moylan 2007, p.52). The mark-up is estimated using the ratio of net operating surplus to gross output for miscellaneous professional, scientific, and technical services, which for the US averages about 1.20. The ONS have also recently incorporated a mark-up into the measurement of own-account software, set at 1.15, although this mark-up is to account for capital input into software production rather than the additional revenue earned by unique software assets.

4.3. Music

Official estimates for investment in Music, or recording originals, are estimated as a percentage of annual UK sales (i.e. of downstream revenues, using the method and reasoning described above), which is assumed to equate to the cross-sectional sum of royalties. The percentage used is 9.5%, an estimated royalty rate for artists. However, this method results in an under-estimate of UK investment for a number of reasons.

First, ownership rights for music originals are split between a number of parties, namely songwriters, artists, record labels and publishers, with the ownership share for each depending on the specific right in question. The royalty rate used in the official method only considers the share received by artists, with no allowance for the compensation earned by other owners.

Second, the downstream for music consists of more than just the sales of recorded music. Consider for example, merchandise, live performance including performance of covers, radio play and the playing of music in clubs. Such activities generate performance and synchronisation royalties, among others, and the revenue split between owners depends on the particular right in question.¹² Payments for such rights are primarily distributed by the collecting societies e.g. PRS (Performance Rights Society) and PPL (formerly Phonographic Performance Limited), but these are not accounted for in the official data and method. The current ONS method also does not account for the growing tendency for live performance to be used as a means to compensate for revenues lost through piracy of recorded music. Live performance is not investment activity in itself but rather rental from the existing capital stock, exactly analogous to the rent of the original in the production of a copy, and performers receive an implicit rental payment in the percentage of ticket revenues they earn. An improved estimate based on the ONS method could therefore be constructed as:

$$\text{GFCF(MUSIC)} = \lambda(\text{RECORDED SALES}) + \theta(\text{LIVE REVENUES}) + (\text{Additional royalties})$$

(18)

Such an adjustment to the method would result in a significant revision to estimates of investment, with the live performance market large in terms of revenue and comparable to that for the sale of recordings (Page and Carey 2010). It is worth noting that, conceptually, the income that artists earn from live performance is ‘mixed income’, that is income that includes a return for labour as well as artistic capital, and the implied royalties could be adjusted to account for this.

¹² Thanks are due to Will Page and Chris Carey of ‘PRS for Music’ for providing valuable insights into the structure of the music industry.

Third, rather than the UK sales of recorded copies which could have originated (be owned) in any country, conceptually the correct basis for this method is the worldwide sales of copies of UK-owned originals. The current method therefore implicitly assumes trade balance in the sales royalties that flow out of the UK to Rest of the World (RoW) owners and that flow into the UK to UK owners. However, the UK is a prolific producer of music, and a net exporter, suggesting that use of data for UK sales of recorded copies may under-estimate the royalties earned through the sale of copies of UK musical assets.

4.4. Books

Official estimates for investment in Books are produced using a method similar to that used for Music. Specifically investment is estimated as 7.5% of UK book sales, where the factor of 0.075 is an estimated royalty rate for authors. Newspapers, magazines and other short-lived goods are therefore correctly excluded since they do not meet the capitalisation criteria. However the result is again an understatement of UK investment activity in producing literary originals for the following reasons.

First, as with Music, the method does not account for the capital compensation earned by other owners of literary originals, namely publishers but can also include illustrators for instance. The royalty rate used only accounts for the incomes that flow to authors. Even then, it appears conservative. Royalty rates are agreed between authors and publishing houses and can vary, usually depending on the past commercial success and therefore market power of the author in question. However, in the UK, typical royalties for hardbacks are between 10 to 12.5%, and 15% for successful authors. For paperbacks, the typical range is 7.5 to 10%, increasing to 12.5% in exceptional cases (Wikipedia 2011). For e-books the royalty rate for authors is higher at around 25% (Flood 2013) and can be as high as 70% (Neill 2010).

Second, the factor used also does not consider the capital compensation earned from other sources besides the sale of copies including fees for secondary rights, such as audio-visuals and public lending rights. The ownership share for each depends on the specific right in question.

Third, as with music, a more appropriate sales measure would be based on the worldwide sales of copies of UK assets, rather than UK sales of copies of assets owned worldwide. The current method implicitly assumes a trade balance in royalties from book sales. If the UK is a net exporter in this field, the current method will under-estimate UK investment in literary originals.

4.5. Miscellaneous Art

At present the UK National Accounts include no estimates for investment in any other form of artistic assets such as fine art, photography/images, choreographed routines, etc. Some preliminary estimates for investment in this diverse group of assets are estimated and presented in the following section, referred to as ‘Miscellaneous Art’. There are some measurement issues that require consideration however.

a. Identification of productive fixed assets

The main measurement issue for estimating GFCF in this asset type is that it is important to ensure the correct identification of productive assets and avoid double-counting with assets already included in the National Accounts. This was discussed above, in the context of valuables, where it was argued that the potential for double-counting is limited.

Another aspect to this point is that it is important that actual investment is identified rather than other (short-lived) production activity. Consider photography. Estimates should only include investments in long-lived images that generate revenues over a period greater than one year. It would not be appropriate to include activity that corresponds to final (say wedding or passport photographs) or intermediate consumption. Likewise for choreographed routines, where it would not be appropriate to capture instruction activity.

Despite the difficulties in measurement, investment in this heterogeneous group of assets is a significant omission in UK estimates. Estimates for ‘Miscellaneous Artwork’ are included in the US data developed by Soloveichik (2010a), where investment is estimated at 7.7% of total US investment in artistic originals. In terms of estimation, data on royalty payments (e.g. for the use of photographs, images and potentially art) would be useful, since they would ensure, by definition, that the asset counted is being commercially exploited and estimation could be more easily restricted to only those goods that have a service life of greater than one year.

4.6. Summary

To summarise: official data for investment in Film are under-estimates since they only refer to a sample of UK-funded productions; for private sector broadcasting the official estimates are affected by a large adjustment for the revenues earned through the sale of advertising; for public broadcasting corporations there seems to be an under-recording of own-account investment and the funding for productions commissioned from the independent sector; for Books and Music, official data on investment is estimated as a percentage of sales where both the sales data and percentage used might be improved, and estimates do not account for royalties earned from the

use of secondary rights. No estimates for other forms of originals are currently included in the National Accounts.

5 New data on the UK Artistic Sector, including new estimates for UK GFCF in ‘Artistic Originals’

Despite Table 1 showing that UK GFCF in artistic originals is among the highest in the EEA, discussion of the recommendations made by Eurostat and the OECD, and evaluation of official UK data, has highlighted a number of identifiable gaps in UK coverage. The following section presents ways to build on ONS measurement and improve current estimates in the National Accounts. As a result, new official estimates, largely based on the contents of this paper, have been incorporated into the National Accounts in a recent revision.

In setting out a model of the upstream and downstream sectors and how they interact with each other, it has been shown that there are numerous ways to estimate investment in artistic originals. The two primary methods involve, first, using data on the input costs to upstream asset creation and, second, using data on the incomes that flow to upstream asset owners. The preferred method depends on the asset being considered and data quality/availability. The following section presents estimates of investment, by asset, and where possible triangulates data from different methods to help determine the robustness of the final estimate.

5.1. Film Originals

In line with Eurostat and OECD recommendations, preferred results for film were produced using data on upstream input costs. Estimation was conducted using a dataset for the entire universe of UK films produced since 1991. The dataset was constructed from three sources. First a list of all UK-certified films produced between 1998 and 2010 was acquired from the UK Film Council (UKFC),¹³ along with some accompanying data. Second a similar list was acquired from the British Film Institute (BFI 2003a),¹⁴ this time for UK productions between 1991 and 2001, again with some additional data. Third a dataset was purchased from the website “the-numbers.com” containing information on all films they had listed as UK (co-) productions, as well as data they held for all films listed in the UKFC and BFI datasets.¹⁵ By definition, films listed by the-numbers.com but not by the UKFC/BFI, are those that either did not meet the requirements, or did not apply for, UK certification. Note that UK certification is primarily based on cultural content and does not necessarily translate to UK ownership. It was therefore necessary to determine UK

¹³ Thanks are due to Nicholas Maine of the UK Film Council for providing this data.

¹⁴ A list of films produced between 1991 and 2001, with additional data, was taken from the BFI publication, “Producing the goods?” (2003).

¹⁵ I am grateful to Bruce Nash of the-numbers.com for extracting this data and for valuable insights into the industry structure.

ownership shares for each production, and the method for doing so is described below. The final dataset included data for all variables listed in Table 4.

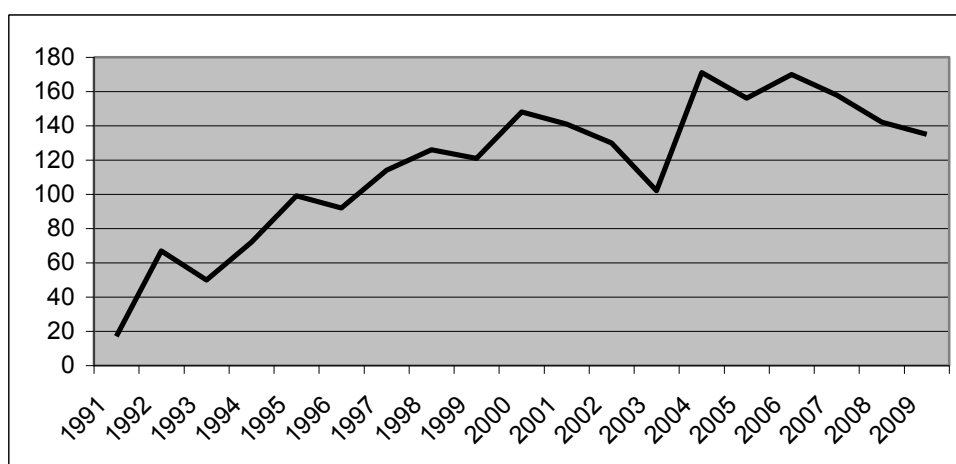
Table 4: List of variables, by source

Variable	Source		
	the-numbers.com	UKFC	BFI
<i>Film Title</i>	√	√	√
<i>Production Company</i>	√	-	√
<i>Distributor (Studio)</i>	√	-	-
<i>Country of Production</i>	√	√	√
<i>Release Date</i>	√	-	-
<i>Opening Date (UK)</i>	-	√	-
<i>Int'l (non-US) Box Office</i>	√	-	-
<i>US Box Office</i>	√	-	-
<i>Multi-territory Box Office to date</i>	-	√	-
<i>UK Box Office (as of May 03)</i>	-	-	√
<i>UK Box Office to date</i>	-	√	-
<i>UK Audience</i>	-	√	-
<i>Multi-territory Audience</i>	-	√	-
<i>North American DVD Sales Revenue</i>	√	-	-
<i>North American DVD Sales Units</i>	√	-	-
<i>Production Method (Live, Animation etc.)</i>	√	-	-
<i>Production Type (Fiction, Factual etc.)</i>	√	-	-
<i>Source (Orig screenplay, literary etc.)</i>	√	-	-
<i>Genre (Comedy, Horror etc.)</i>	√	-	-
<i>Production Budget</i>	√	-	√
<i>BFI Category (majority UK funding etc.)</i>	-	-	√
<i>UKFC Category (Schedule 1, Co-prod etc.)</i>	-	√	-

Note to Table: Final dataset constructed by matching three datasets from a) UKFC, b) BFI and c) the-numbers.com. Dataset includes the above list of variables. BFI categories are defined as follows: “A” refers to films where the cultural and financial impetus is from the UK and the majority of personnel are British; “B” refers to majority UK co-productions, where although there are foreign partners, there is a significant amount of British finance; “C” refers to minority UK co-productions, that is, foreign (but non-US) films in which there is a small UK involvement in finance; “D” refers to US financed or part-financed films produced in the UK, most have a UK cultural content; “E” refers to US films with some British financial involvement. Of the UKFC categories, “Schedule 1” refers to films that are UK-certified according to Schedule 1 of the Films Act (1985). Criteria include at least 70% of spend taking place in the UK and since 2007 UK certification has depended on passing a ‘cultural test’. “Co-productions” are also UK-certified via official bilateral co-production treaties or membership of the European Convention on Cinematic co-production. Note that UK ownership is not a requirement for UK certification.

The final dataset therefore includes data for a total of 2,291 UK productions, produced between 1991 and 2011. However, because the data do not include all films produced in 2010/11, the dataset is only used to produce estimates of GFCF for the years 1991 to 2009. Figure 1 below shows the number of UK films in the dataset by year of release.

Figure 1: No of UK (co-)produced films, by release year



Note to figure: Number of UK produced films in dataset by year of release. In total there are data for 2291 films produced between 1991 and 2011, including 80 that were produced in either 2010 or 2011. Since the data do not include the complete universe of UK films for 2010/11, estimates for GFCF only extend to 2009.

After cleaning, combining data from the UKFC, BFI and the-numbers.com gives data on production budgets for over half of these films.¹⁶ For most remaining films, where production budgets were missing there were data on international box office revenues which were used to impute missing production budgets, using the “impute” command in Stata. Where international box office revenues were also missing then based on information provided by the-numbers.com it was assumed US box office revenues were equal to North American DVD revenues, and international box office revenues were imputed from the US figures.¹⁷

It is worth noting that an ideal dataset would also include information on all unfinished or failed projects, as such expenditures are also investments even if they are not successful. However, the nature of the dataset was such that it only included data for completed and released projects. With no information on the frequency of, or expenditure on, failed projects, they were implicitly assumed to be zero.

As the final dataset only included film release dates rather than dates of actual production, allocation of GFCF to the year(s) of investment activity required some assumptions on the average length of film production, as it would be inaccurate to allocate the entire estimate of GFCF in each film to the year of release. Mean production lengths of one year and two years

¹⁶ Since the-numbers data are denominated in dollars and the BFI/UKFC data in sterling, all monetary values in the former are converted using an average annual exchange rate for dollars:sterling, taken from ONS Financial Statistics (AUSS).

¹⁷ I was provided with the following industry information by Bruce Nash of the-numbers.com: a) US DVD sales are typically roughly equivalent to US Box Office revenues; b) Typically 50-60% of Box Office revenues return to the studio, as do 50% of DVD revenues.

were assumed for live action films and any form of animation respectively.¹⁸ Costs were then spread across the production period as shown in Table 5. So for live action films: 10% of costs were allocated to the pre-production phase, assumed to last 6 months; 60% to the production phase, assumed to last 2 months; and 30% to the post-production phase, assumed to last 4 months. So for example, if a live action film was released in say April 2006, 30% of costs were allocated to GFCF in 2006, and the remaining 70% to GFCF in 2005.

Table 5: Assumptions to allocate GFCF

Production phase	Production Type			
	Live Action		Animation	
	Month	%	Month	%
Pre-production	1-6	10	1-6	10
Production	7-8	60	7-24	90
Post-production	9-12	30		

Note to table: Percentage of production costs allocated to each stage of production. Production schedules and percentages based on industry information provided by Bruce Nash of the-numbers.com

Since the majority of films in the final dataset are co-productions, the main issue faced in estimation was determining the percentage of budgets that represented investment in UK-owned assets. With no direct information on ownership shares, some assumptions were necessary. A number of alternative assumptions were tested but the final estimates proved relatively robust to those alternatives. The following text sets out the assumptions used for the preferred final estimates, which were agreed credible by the UK Film Council.

- 1) Where the-numbers.com, BFI and UKFC data all indicated that there were no other co-producing countries, it was assumed that the UK holds 100% of the copyright and the entire budget was allocated to UK GFCF.
- 2) For films listed as BFI Category A or B, that is films for which the majority of funding is from the UK, it was assumed that 55% of IPRs are held in the UK. For those listed as BFI Category C, D or E, that is where minority funding is from the UK, it was assumed that the UK owns a minority of rights and 25% of production costs were allocated to UK GFCF.¹⁹

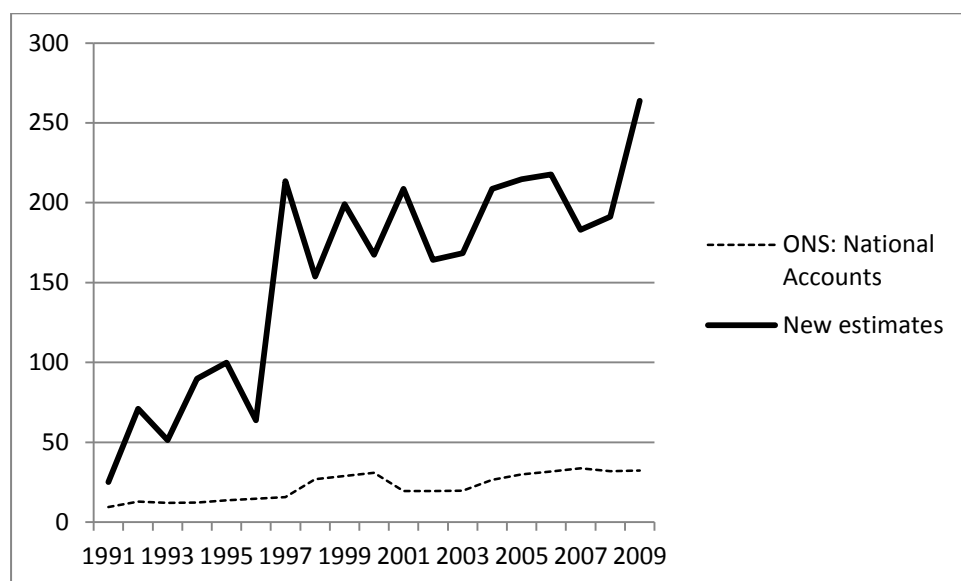
¹⁸ A production length of 2 years was also assumed for films that are part-animated and part-live. The assumptions for production length for each genre were based on information provided by Bruce Nash of the-numbers.com

¹⁹ BFI categories are defined as follows: “A” refers to films where the cultural and financial impetus is from the UK and the majority of personnel are British; “B” refers to majority UK co-productions, where although there are foreign partners, there is a significant amount of British finance; “C” refers to minority UK co-productions, that is, foreign (but non-US) films in which there is a small UK involvement in finance; “D” refers to US financed or part-financed films produced in the UK, most have a UK cultural content; “E” refers to US films with some British financial involvement.

- 3) For co-productions with no other information on ownership from the BFI categories, budgets were evenly split according to the number of co-producing countries e.g. if the UK was one of four co-producing countries, 25% of the budget was allocated to UK GFCF.
- 4) To ensure investment was not overcounted, for films where either the UKFC or BFI listed the UK as a (co-)producer, but the-numbers.com listed a country other than the UK as a sole producer, just 10% of production costs were allocated to UK GFCF.
- 5) For non-English language films where the UK was listed as a co-producing country, it was assumed that the UK was a minority partner, and 25% of production costs were allocated to UK GFCF.

Figure 2 presents estimates of Film GFCF as included in the National Accounts alongside the new estimates.²⁰ Comparison suggests that official estimates understate GFCF by a factor of around eight in 2009.

Figure 2: Estimates of UK GFCF in film originals, Nominal £mns



Note to figure: New estimates use custom dataset for universe of UK films, built using data from the-numbers.com, UKFC and BFI. ONS estimates based on a small sample of UK productions.

Alternative methods of estimating GFCF in Film

Although not presented here for reasons of space, alternative methods to estimate investment in film were tried, including using data on the earnings of relevant occupations involved in UK film production, as according to the Annual Survey of Hours and Earnings (ASHE). ASHE is a business survey sent out to employers, based on a random sample of National Insurance numbers and contains information on earnings by occupation and industry. To account for other upstream

²⁰ Since the dataset used only includes productions from 1991, new estimates were also extended back to 1970 using a series for the budgets of UK/US co-productions kindly supplied by Soloveichik of the BEA.

inputs, data on the occupational wagebill were multiplied by a factor to account for the use of capital and materials, based on information for the film production industry from the Annual Business Inquiry (ABI). This gave an estimate of the total value of UK production. Since only part of UK production constitutes UK investment, some information on the time-use of workers, that is the time spent creating UK assets, would have been required to form estimates of UK GFCF. Comparison with the preferred estimates above suggested a time-use assumption of 50% would result in estimates close to those from the preferred source.

5.2. TV & Radio Originals

The ONS methodology for estimating GFCF in broadcasting originals is an upstream cost-based approach. The following re-estimation builds on the ONS method and improves the data using industry sources. The data used for the new estimates are based on the production spend of UK broadcasters, as published in OFCOM reports on the Public Service Broadcasters (PSBs) (OFCEM 2010) and the Communications Industry (OFCEM 2010). UK Public Service Broadcasters include the BBC, ITV, Channel 4 and Channel 5. The Channel 4 business model is based entirely on commissions and acquisitions, with no in-house production. ITV broadcast a mix of own-account and commissioned productions, but must meet a requirement that 25% of broadcast hours are filled by productions from the independent sector. Similarly the BBC is based on a mixed production model, with 25% of broadcast hours filled by independent productions and the additional requirement that 50% of hours are filled by in-house productions. Remaining broadcast hours are filled competitively, by either party. Channel 5 has no such obligations.

The OFCEM data cover the costs of in-house productions and PSB funding for commissions from the independent sector. From equation (6) we know that, conceptually, estimates of upstream input costs should also include estimates of capital compensation for the use of assets in the upstream e.g. cameras, set equipment etc. From discussions with the BBC it was determined that such assets are typically explicitly rented from either a commercial arm or an outside source, and so these rental payments are already included in the OFCEM data.²¹

The OFCEM data only pertain to UK PSBs. However, virtually all UK investment in the creation of broadcasting originals is undertaken by the PSBs. The major non-PSB broadcaster is Sky. However, despite broadcasting on approximately 400 channels, Sky investments in UK originals

²¹ I am grateful to Shaun Day for useful information on production practices in the television industry.

are relatively small at around £100m p.a. once sports and other flow programmes are excluded.²² Instead their model is primarily based on licensed imports and repeats, with the majority of expenditure on stock programmes made up of rentals for broadcast rights rather than actual creation. For short-term rentals, it is correct to record such spend as intermediate consumption by the user (in this example Sky), and capital compensation for the owner (say, a US television network). The appropriate treatment becomes more complicated when rights are acquired for a number of years, particularly if they are exclusive in the acquiring country. In that case, it could be argued Sky has made an investment in a “licence for use”, using OECD terminology (OECD 2010). Accounting for this in practice would require detailed data on the timing, type and value of all payments. Such data were simply unavailable.

Figure 3 contains estimates of the total costs incurred by PSBs in the creation of UK stock programmes, whether they originate in-house or are commissioned from the independent sector²³. They are based on data for production spend by genre and extend back to 1998²⁴. In line with international guidelines, GFCF is estimated to include only spend on the production of stock programmes, defined here as ‘Arts and Classical Music’, ‘Religion’, ‘Education’, ‘Factual’, ‘Drama’, ‘Entertainment’ and ‘Children’s’, thereby excluding ‘News, current affairs and weather’ and ‘Sport’. Since ‘Film’ is treated as a separate asset, and as PSB spend on that category will mainly be composed of payments for short-term broadcast rights rather than actual production, spending data for that genre is also excluded.

Additional data were also incorporated to account for investments made in BBC radio stock programmes and Welsh language S4C productions. For radio, estimates were based on OFCOM estimates of BBC radio spend from 2000 to 2009 and data on BBC radio broadcast hours by genre in 2009/10. Multiplying production spend by the share of broadcast hours filled by stock programmes gives an estimate of BBC expenditure on the creation of radio stock originals of around £153m in 2009. Estimates for radio are extended back from 2000 to 1998 using the growth rate of BBC TV expenditure. Note that if the composition of BBC radio broadcast hours by genre has changed significantly over time, there will be some inaccuracy in the back-series (1998 to 2008). There will be further inaccuracy if the production costs for radio vary widely by

²² Source: Discussions with BBC, and Lecture by BBC Director General, Mark Thompson, Edinburgh International Television Festival. Available at: <http://www.guardian.co.uk/media/2010/aug/27/mark-thompson-mactaggart-full-text>

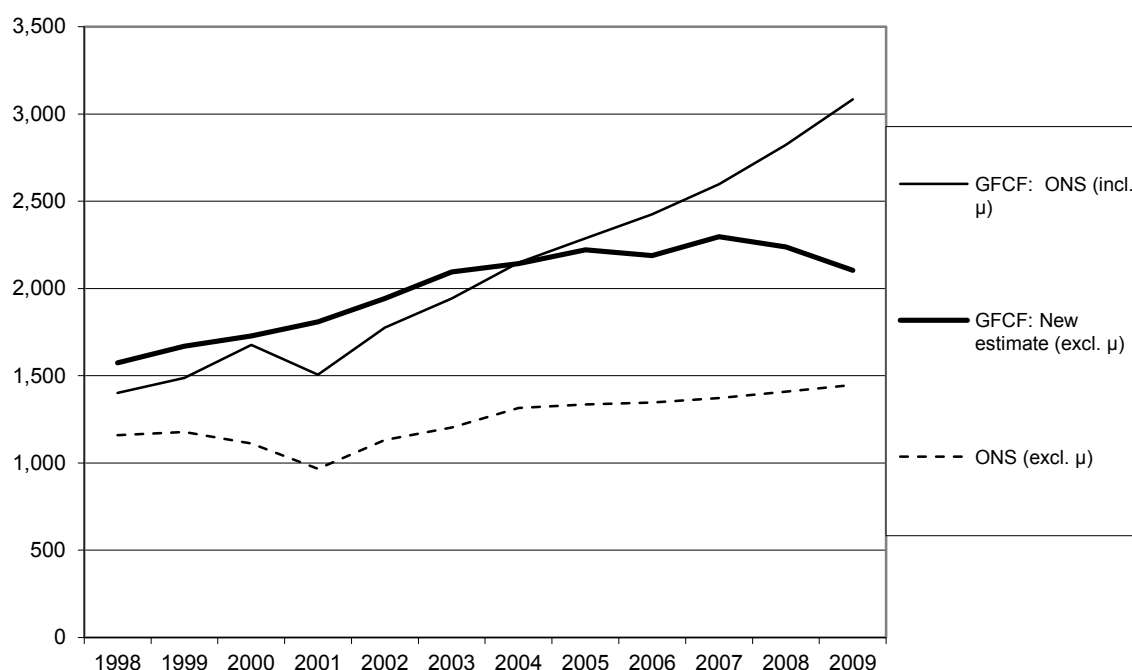
²³ I am grateful to Steve Gettings of OFCOM for his assistance and provision of data

²⁴ Unfortunately the OFCOM data only extends back to 1998. The series is extended further using the growth rates of the existing ONS data. Since the methodologies are similar, and with data for broadcasting originals being the best-measured component of official data, this was considered a reasonable approach.

genre. For S4C there are data on spend for producing Welsh language output, back to 2004. They are extended back to 1998 using the mean growth rate of expenditure in 2004 to 2009.

Figure 3 shows that for much of the period after 1998, new estimates are similar to those in the National Accounts. The divergence in the 2000s is primarily due to the conceptual difference in method, with official data incorporating an adjustment for revenues earned by private sector broadcasters through advertising. This adjustment is particularly large in the late 2000s. For comparison, the chart includes a series based on official estimates but excluding the calculation of that factor (μ in the notation given above).

Figure 3: GFCF in TV & Radio Originals, Nominal £mns



Notes to figure: Thin black line is the ONS estimate, as recorded in the National Accounts. Dotted black line is an implied ONS estimate after removing the monopolists mark-up, μ . Thick black line is the new estimate, based on data published by OFCOM.

Although the new estimates are an improvement on those currently recorded in the National Accounts, they still include a number of imperfections. First, estimates of investment in Radio stock programmes are based on the share of BBC broadcast hours by genre in 2009/10. If the genre split for previous years was not similar, or if production costs vary considerably by genre, there will be some bias in the final estimates. However, the data for radio is but a small component so the aggregate figure for TV & Radio should not be too adversely affected.

Second, the coverage of multi-channel platforms is inadequate. Whilst the data do include the costs of producing programmes for BBC Digital, they do not include data for Sky or other such providers. However, as noted, investment in the creation of UK stock programmes by Sky is limited.

Third, funding for commissions is usually provided in exchange for the short to medium-term broadcast rights, but some proportion of rights for commissioned programmes remain with the independent production company, for instance long-term broadcast rights, international rights and DVD distribution rights. Therefore there is an incentive for the production company to invest additional resources in creation, alongside that provided by the funder. The OFCOM data only includes the funding provided by PSBs and so do not account for such additional investments. It was not possible to obtain data on any additional investments made by independent production companies.

Fourth, some sports broadcasts are clearly long-lived²⁵, but there would appear to be an element of randomness in those which are, with it being determined as much by the final result or outcome as the nature of the event itself. In practice it is virtually impossible to allow for this using a cost-based approach and so sports are excluded in line with international guidelines. It may be that it is possible to account for long-lived sporting rights using a revenue-based approach, but such data were not available.

Alternative methods for estimating GFCF in TV & Radio originals

Although the preferred estimates for investment in TV & Radio are those based on the data from OFCOM, alternative estimates were also produced using ASHE microdata on the earnings of relevant occupations in the television and radio industry, adjusted for additional overheads using data for the industry from the ABI. As an example of how the two series' compare, estimated GFCF using ASHE was £4.2bn in 2008, compared to the £2.2bn suggested by the OFCOM data. Note however, that the ASHE estimates make no allowance for time-use, that is the amount of time devoted to production of stock and flow programmes respectively, and so would be expected to overestimate GFCF. The comparison therefore suggests that the ASHE data are consistent with around 50% of production expenditures being on the creation of stock programmes and therefore constituting GFCF.

²⁵ The re-use of news material from archives also suggests that some small part of that genre can also be long-lived.

5.3. *Literary Originals: Books*

In line with current official UK practice and OECD/Eurostat recommendations, new preferred estimates for investment in literary originals were produced using a primarily revenue-based approach. The main reason royalty based estimates are preferred is that we do not seek to measure all expenditure on creating copyrighted written material, much of which has little value, does not have a long service life and will never be published or commercialised. Rather we wish to measure investment in assets that meet SNA capitalisation criteria and generate a stream of income for owner(s) over a period longer than one year. Data on revenues is therefore helpful as it restricts the sample to only those assets that have been commercialised, by definition. Estimates should also include compensation earned by the other owners of literary originals aside from authors, namely publishers, including that earned from the publication of long-lived periodicals including academic journals.

Before outlining the data and method, it is worth saying a little more about the industry and arrangements for the distribution of royalties, which will help clarify the measurement approach taken. Publishers typically reach individual agreements with authors for the right to commercialise the underlying asset. In some cases the author may retain the copyright, but importantly, they will have signed over the rights to publish, in return for an advance based on a percentage of anticipated revenues. The advance payment made by the publishing company is some proportion of $P^N N$ in this framework, that is publishers have purchased some component of asset rights in return for a share of revenues. Therefore although the author is the creator, there is actually joint ownership of the final asset in the upstream sector. After the advance has been recovered, author royalties are normally calculated as some percentage of the wholesale price, with the remainder flowing to the publishers. The returns to artistic capital are therefore split between the publisher and author, with the split depending on the negotiating power of each party. There is considerable variation in the type of agreements reached and contracts also usually specify a schedule of revenues for specific media,²⁶ sometimes depending on the genre of the book. The business model for textbooks is different, and the rights to those tend to be wholly owned by publishers. Since such works are frequently revised with new editions published, the publisher acquires all rights and edits are typically made by employees of the publishing house.²⁷

Literary royalties are also earned from a variety of sources. Primary rights are the largest source, that is, from the sale of copies of the final asset (book sales). Royalties for secondary rights are

²⁶ A fairly common practice is to determine the royalty rate based on the number of sales achieved i.e. the percentage received by the author increases after the book reaches milestones in sales. Royalties for foreign sales are also typically subject to a different schedule than those from domestic sales.

²⁷ I am grateful to Rachel Soloveichik, and Sarah Faulder and representatives of UK publishing houses, for discussions on the business model and ownership of different types of originals.

primarily distributed through various collecting societies and include payments for educational use (largely textbooks), photocopying, broadcasting (audio-visual) and public lending (libraries). Such royalties are split between owners (authors, co-authors, illustrators, publishers) with the split depending on the right in question.

To ensure all these sources of revenues are accounted for, new estimates of UK Investment in literary originals are produced from a number of different sources.²⁸ First, data on total advances cover the direct investments made by publishers, which in equilibrium equate to the anticipated future revenues earned by publishers. Second, these are added to data for the royalties received by UK authors from sales, with those (expected to be) received by publishers already accounted for with the data on advances. Third, to account for revenue from secondary rights, data for royalty distributions by the Authors Licensing and Collecting Society (ALCS) in return for public lending rights, and Publishers Licensing Society in return for educational licencing and copying rights, are also added.

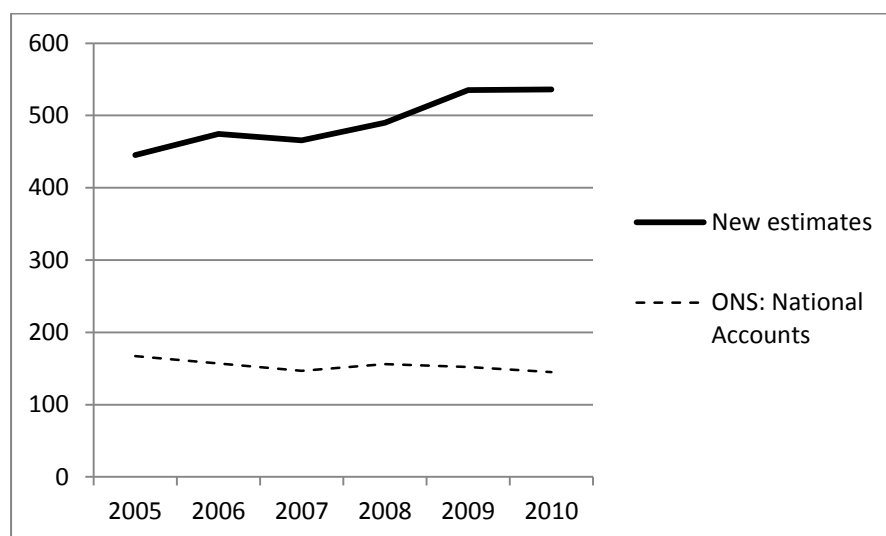
Finally, to account for further direct investments, estimates of the cost of own-account writing and editing by publishing houses, for example for textbooks, are also added. Since the rights to such works are typically owned by publishing houses, this element ought not have been counted elsewhere. On this component, the data were for half of the top 11 UK publishing houses and subsidiary publishing firms. Therefore they were scaled up, by doubling the estimate, to represent the full top 11 publishing houses. There are some additional 120 publishing firms registered with the Publishers Association²⁹ and likely some other small firms in the universe of publishing. This figure is therefore considered a lower bound.

New estimates of UK investment in literary originals are presented below in Figure 4 alongside official estimates. It is worth noting that the official figure corresponds very closely with an element of the new estimates, that is, the primary royalties received by authors from sales. The difference between the two series is due to the adjustments to methodology to take account of revenues earned from the use of secondary rights and the inclusion of direct investments made by publishing houses. It is also worth noting that the (primary and secondary) royalties data include payments transferred from international collecting societies to their UK counterparts, for the use of UK assets outside the UK. The data therefore account for the sale of copies of UK assets in other countries, and the method therefore overcomes one of the limitations of the current UK method, which implicitly assumes a trade balance in book royalty payments.

²⁸ Thanks are due to representatives of publishing houses and collecting societies led by Sarah Faulder (PLS) for help in acquiring these data.

²⁹http://www.publishers.org.uk/index.php?option=com_content&view=category&layout=blog&id=73&Itemid=1202

Figure 4: UK GFCF in literary originals, Nominal £bns



Note to figure: New estimates based on industry data for revenues earned by owners of rights and direct investments made by publishers. ONS estimates based solely on revenues earned by authors through sales.

Alternative estimates for estimating GFCF in literary originals

Using the same method as described previously, alternative estimates were also produced using data on the earnings of particular occupations in the relevant industries for the creation and publishing of literary works, as recorded in ASHE, and marked up to account for the input of capital and materials using industry data from the ABI. The results using each method are relatively similar. With no information on industry or occupational time-use, and therefore the proportion of workers output that is investment and consumption goods respectively, it might be expected that the ASHE method would produce an over-estimate of GFCF in literary originals. On the other hand, if authors are inadequately sampled in ASHE, as would be expected since they are largely freelance or self-employed, the result may be an under-estimate. Comparison with the preferred estimates suggests that the impact of these two factors roughly cancel each other out.

5.4. Musical (or Recorded) Originals

In line with the current official method and international guidelines from Eurostat (2003) and the OECD (2010), new estimates of investment in music originals are based on the revenues earned by the owners of rights, which is assumed to equate to annual investment. However, the official data and methodology as currently used by ONS are added to in numerous ways.

First the current ONS method includes estimates of the revenues returned to artists via sales, but not those returned to publishers and record labels who also own some proportion of asset rights after investing in artists. Based on discussions with the industry, it was determined that the total

revenues that accrue to all rights holders from recording sales³⁰ are better estimated by removing VAT, margins for manufacturing and distribution, and marketing costs.³¹ What remains is the return to music capital, from the sale of copies, that flows to all the owners of rights. This methodology is similar to that used by the BEA in forming estimates of investment in music originals (Soloveichik 2010b).

Second, added to the income from sales are the incomes returned to creators by music collecting societies, including royalties earned from the rights to lyrics; composition; direct live performance (for performance of covers); re-production (e.g. on CDs, DVDs etc.); public performance and synchronisation.

Third, the sources of artist revenues have changed considerably in recent years, with a much greater proportion now earned through the live performance of their own works. These revenues are effectively rental payments earned by artists for the performance of their own songs. These payments are also accounted for in the new method by adjusting estimates of total live revenues and removing other components, so what remains are the revenues that flow to artists. The following elements of total live revenues are subtracted: secondary ticket sales; at-event-spend; VAT; booking fees; promoter margins and venue costs. Direct live royalties are also subtracted so as not to double-count with the revenues earned through live performance of covers. What remains are the earnings of performers. Conceptually these earnings are “mixed income”, representing a return to both labour and capital. Therefore the capital component is estimated as 33% of the mixed income based on the long-standing ratio between Compensation of Employees and Gross Operating Surplus in the National Accounts.

Data on the above components of revenue earned by music originals were collated following discussions with industry representatives who also assisted with the provision of data.³² The following chart presents a breakdown of all revenues earned by UK music originals in 2008. First it includes the revenues earned by all owners of music originals through the sale of copies, therefore consisting of £174m each earned by songwriters and publishers, record labels and artists. Note that the current ONS method estimates only a part of these revenues: those royalties earned by artists through the sale of recordings. The new estimate for this component of royalties in 2009 is £174m, very close to the £168m investment figure recorded in the National Accounts.

³⁰ Data on recording sales are taken from British Phonographic Industry (BPI) statistics

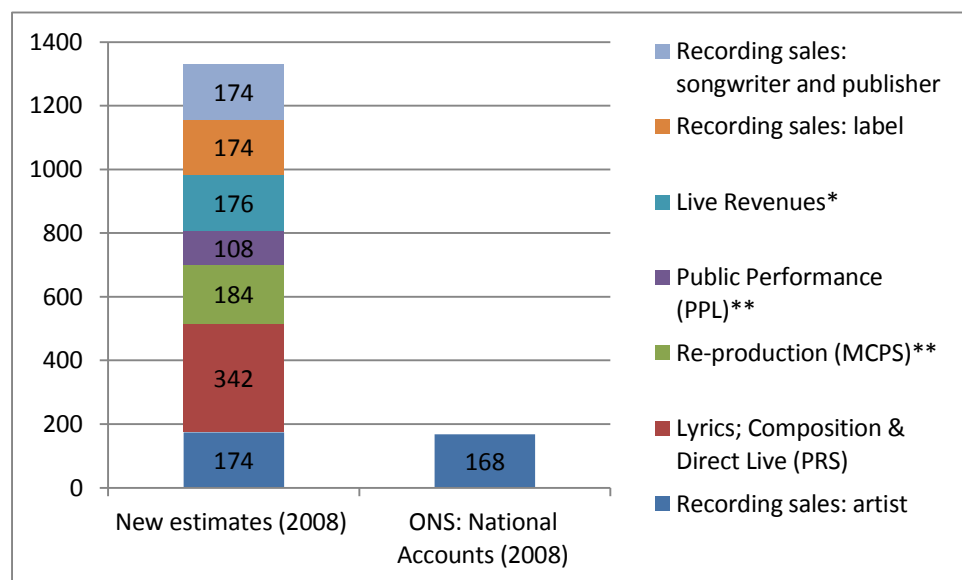
³¹ VAT and retail margins had already been removed from the BPI numbers. In the US work (Soloveichik, 2010) the manufacturing and distribution margins are estimated at 15%. Since the distribution margin has already been removed, a margin of 10% is assumed for manufacturing. Then of the remainder, 33% is estimated to cover marketing, with this factor again based on Soloveichik (2010).

³² I am extremely grateful to Will Page and Chris Carey of PRSforMusic for making this data available and for providing valuable insights into the structure of the music industry.

Second, the new estimates also include data on the additional royalties earned from the use of secondary rights. It therefore includes royalties distributed by PPL (formerly Phonographic Performance Limited) which cover the payments made to record companies and performers for the playing of music or music videos in public (for instance in pubs and clubs) and for that broadcast on TV or radio. It also includes royalties distributed by ‘PRS for Music’. Under the umbrella of PRS for Music are the Performing Right Society (PRS) and the Mechanical-Copyright Protection Society (MCPS). PRS collect on behalf of songwriters, composers and publishers, and distributed payments include those for the public performance of either live or recorded music. MCPS also represents songwriters, composers and publishers and collects payments for the re-production of music, for instance for CDs, downloads, toys etc.

Third, the method also incorporates revenues earned by music originals through live performance, estimated in the way described above, which amounted to £176m in 2008.

Figure 5: Breakdown of capital income earned from music originals, (P^RR), 2009



Note to figure: Components of revenue earned by music originals. *direct live royalties subtracted to avoid double-counting; **adjusted for potential double-counting, overseas payments and collecting society commissions.

Source: PRSforMusic

As the data on secondary royalties and total live revenues were only available for 2008, the data were backcast using data on sales of recordings (BPI 2010).

In terms of comparison between methods, it is worth making two points. First, the ONS method applies a factor of 0.095 to an estimate of recording sales. These new estimates suggest that a

more appropriate factor, that would account for all the royalties earned by all owners of music originals, is more in the order of 0.57. Second, the current method includes no estimates of revenues earned from a) the use of secondary rights or b) live performance of own work. On live performance, a similar factor that could be applied to total live revenues would be in the order of 0.11.

One of the weaknesses of the official method, highlighted in a previous section, partly remains in these new estimates. The data for recording sales and live revenues are revenues earned in the UK by world artists, rather than world revenues earned by UK artists. Although more appropriate conceptually, data on the worldwide earnings of UK artists were not available. This part of the data and method therefore implicitly assumes a trade balance in UK music. Since the UK is a net exporter of music, these estimates can be considered a lower bound. However the royalties distributed by the collecting societies are those distributed to UK members including those transferred from sister societies abroad. Similarly the revenues earned by non-UK artists in the UK are transferred to similar societies in other countries and so are excluded from those estimates. These elements of the data and method therefore do account for the international revenues earned by UK rights holders.

Alternative estimates for estimating GFCF in music originals

Again, alternative estimates for investment in music originals, using the upstream input cost-based approach, were produced using ASHE, which provides data on the incomes of relevant occupations. To account for remaining input costs a ratio of non-employment costs to employment costs in relevant industries was used, based on data from the ABI. The result using this method was considerably lower than that from the preferred method, possibly because musicians and related occupations are not well sampled in ASHE.

5.5. Miscellaneous Artwork

From the discussion of the Eurostat Taskforce reports ((2003) and (2004)) and their criteria, as well as the development work by Soloveichik (2010a) of the BEA, we know that investment in any original: that is covered by copyright; can be commercialised; has a service life of greater than one year; and is not already recorded elsewhere in the National Accounts; can be counted as GFCF in artistic originals. Outside of the four assets already discussed, no other forms of investment in artistic originals are included in official estimates of GFCF in the UK National Accounts. This leaves a wide range of potential candidates for inclusion, including investments in photography, images, artwork, choreography and cartography, although in the case of the latter, it may be these are already partly included in estimates for literary originals. The difficulty when

considering such asset types, for which less data are typically available, is that it is necessary to ensure that what is being counted is the production of assets rather than intermediate goods.

One method for estimating investment in this diverse group of assets is to estimate the input costs to their creation, using ASHE data on the earnings of relevant creative occupations. To account for other inputs to production, detailed industry data from the ABI can be used to generate a reasonable proxy for a factor, γ in (7). However, even with this information from ASHE and the ABI, this remains a difficult category to estimate. The result might be an underestimate if the coverage of the survey is incomplete e.g. lack of coverage of the self-employed. It might be an overestimate if those reporting these professions are actually earning wages from some other occupation.

Table 6 below presents the list of occupations identified from ASHE that were considered to be involved in the creation of artistic originals not already counted elsewhere. Cartographers were excluded so as to avoid potential double counting.

Table 6: Miscellaneous Artwork, occupations involved in asset creation

Asset	SOC2000	Additional note:
<i>Miscellaneous</i>	3411: Artists	Excluding those in: Film (92.1); TV & Radio (92.2); Design (74.2 & 74.872); Printing (22)
	3414: Dancers and choreographers	
	3434: Photographers and audio-visual equipment operators	

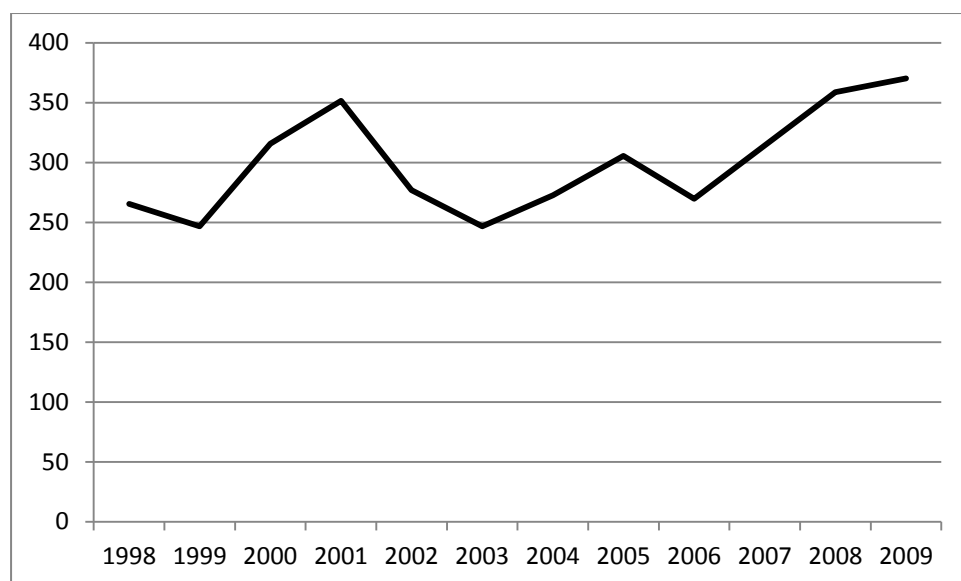
Note to table: All occupations used to calculate investment in all other intangible assets are excluded. Workers recorded in public sector dominated industries (Public Administration & Defence (L), Education (M) and Health (N)) are also excluded, so final estimates are reflective of the market sector.

ABI data on employment and non-employment costs are available for the following industries: ‘Photographic Activities’ (74.81), ‘Other Artistic and Literary Creation’ (92.139) and ‘Dance Halls and Dance Instructor Services’ (92.341). Although these industries do not provide an exact match for the activities we are looking to estimate, they should provide a reasonable proxy for overheads incurred in the creation of these assets. Using data for an aggregate of these industries over the period 1999 to 2007 gives an average estimate for γ of 2.87.

As already discussed in the context of other assets, estimates of activity or production may not be representative of investment as some activity will represent production of short-lived consumption goods. Kretschmer, Bently et al. (2011) report on a survey of 5,500 visual artists earnings registered to the Design and Artists Copyright Society (DACS). Most of the sample

consisted of artists, illustrators and photographers, with some designers, 87% of whom spent at least 50% of their time on visual creation, and 35% of whom had a second job. For some of the detailed questions, the response rates were very small, but one figure stands out: in 2009, economy wide median wages were £21,000, but earnings from artistic endeavour were £12,000 (page 43). Even for those reporting themselves as professional artists, only 50% of their total income was from their professional activity (page 51). Based on this information it was assumed that 50% of the earnings reported in ASHE are derived from the creation of long-lived artistic assets. Applying this factor to the data on wage-bills provides the results displayed in Figure 6.

Figure 6: GFCF in Miscellaneous Artwork, Nominal £mns



Source: ONS (ASHE, ABI)

Note to figure: Series estimated using data on earnings for relevant occupations, adjusted for additional overheads using data from the ABI. A time-use assumption of 50% was applied to try to account for investment activity rather than short-lived production and to exclude earnings that are potentially from other sources.

Prior to estimation the preferred approach for estimating investment in this asset category was to use data on royalty payments for their use, such as from DACS, thus avoiding a number of conceptual and practical difficulties. The use of data on royalties would mean that:

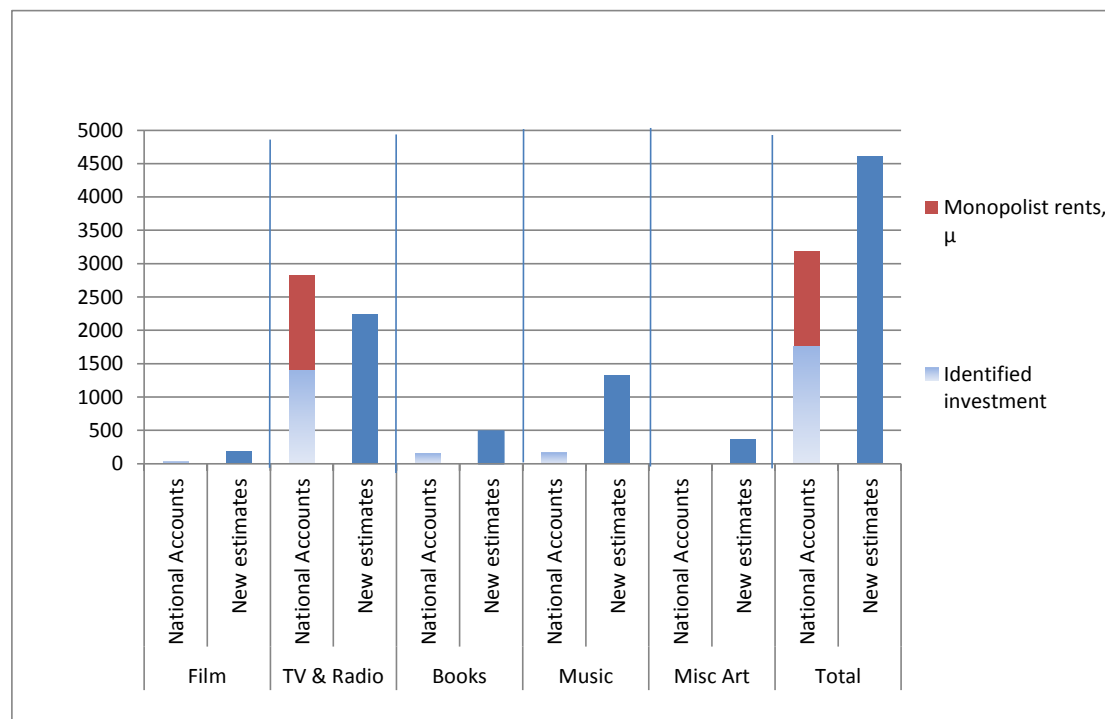
- by definition ‘valuables’ would be excluded, since they are non-productive assets that are held as stores of value and not used in the generation of final output. Royalties would only be paid for assets that are being actively used in production;
- by definition, all estimates of investment would be in assets that are protected by copyright;
- it would be possible to only include goods with a service life of longer than one year. Any good that generated royalties for less than one year could be excluded, thus removing the problem in distinguishing between the production of assets and consumption goods.

Theoretically it should be possible to generate valid estimates of GFCF in photography and artwork using data from the Design Artists Copyright Society (DACS) and the major photography libraries e.g. Corbis. Whilst it was intended to make use of such data, due to legal and data protection issues, the data were not available.

5.6. Summary of results

The following chart presents a snapshot of new estimates of investment in artistic originals and those recorded in the National Accounts for 2008, for the five asset categories and the final aggregate. Total investment in 2008 is estimated at £4.6bn, exceeding official estimates of £3.2bn. Investment in TV & Radio is estimated at £2.2bn, lower than the official estimate of £2.8bn. However, as noted, official estimates for TV & Radio include an adjustment designed to account for additional revenues earned through the sale of advertising. Removing that element reduces the official figure for TV & Radio to £1.4bn in 2008, and reduces total investment in originals to just £1.8bn. New estimates for Film, Books and Music, particularly the latter, are all higher than the official numbers, due to new data and methods accounting for a broader range of production in the case of Film, and a broader range of revenues in the case of Books and Music. The new data also include estimates for investment in Miscellaneous Art, a category not previously included in official estimates.

Figure 7: Investment in Artistic Originals, 2008, Current Prices (£m)



Source: ONS estimates are from the National Accounts. For new estimates the sources are: i) Film, the-numbers.com, UK Film, Council, British Film Institute; ii) TV & Radio, OFCOM; iii) Books, Publishers Association; iv) Music, PRSforMusic; v) Misc Art, ONS, ASHE

Note to figure: All data are nominal and for 2008. Dark blue bars show new estimates and are compared to investment as measured by ONS and recorded in the National Accounts, represented with light blue bars. The latter are effected by an assumed mark-up for monopoly power in private sector broadcasting, highlighted with the stacked red contribution for 'ONS TV & Radio' and 'ONS Total'.

6. Conclusions

The work described in this paper attempts to contribute to the measurement of the UK creative sector and the creation of long-lived artistic original assets protected by copyright. Official data and methods for measuring investment in artistic originals were evaluated in light of the appropriate conceptual framework for measurement and international guidelines, and UK investment re-estimated using new data and improved methods. The main outputs are improved estimates of UK investment in artistic originals, with the data and methods incorporated into the National Accounts in a recent revision. Using the preferred method for each asset type it is shown that in 2008, official UK data in the National Accounts under-estimated investment in originals by approximately £1.4bn.

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This paper has been produced by the Department of Management at Imperial
College Business School

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ISSN: 1744-6783

Imperial College Business School
Tanaka Building
South Kensington Campus
London SW7 2AZ
United Kingdom

T: +44 (0)20 7589 5111
F: +44 (0)20 7594 9184

www.imperial.ac.uk/business-school