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

Peter Goodridge
Imperial College Business School and Ceriba

Jonathan Haskel
Imperial College Business School, CEPR, Ceriba, IZA and UK-IRC

Keywords: copyright, IP, innovation, knowledge, investment, productivity growth
JEL reference: O47, E22, E01

February 2011

Abstract
This report reviews the definition of artistic originals and official estimates of investment in 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. Throughout we compare with recent estimates produced by Soloveichik of the BEA. Finally we also consider the role of prices and depreciation, and use our new data to estimate the UK stock of artistic originals. Bringing these new data to bear suggests an upward revision to investment in 2008 of approximately £1.1bn. Combining these data with new depreciation rates suggests an upward revision of £3.5bn to the UK stock of artistic originals in 2008.

*Contacts: Jonathan Haskel and Peter Goodridge, Imperial College Business School, Imperial College, London. SW7 2AZ. j.haskel@ic.ac.uk, p.goodridge10@ic.ac.uk. This report reflects ongoing work with ONS on these issues. We are very grateful for financial support for this research from the UK Intellectual Property Office. We also wish to thank all those that provided us with data or insights into the workings of industries studied. In particular we wish to thank: Craig McLaren from ONS, Rachel Soloveichik of the BEA, both for her valuable advice and providing us with access to her data; Will Page and Chris Carey of PRS for their assistance in understanding the process of asset creation and commercialisation in the case of Music. 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 the 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 our own.
Table of Contents

1. Introduction 9

2. Background: Copyrighted assets or ‘Artistic Originals’ in the SNA 11

3. Theory: Review of Methodological Approaches for estimating Investment 14
   3.1. Model of the artistic sector 14
   3.2. Example of Model using Film 20
   3.3. Summary 23

4. What assets should be counted as “Artistic Originals”? 24
   4.1. Eurostat Taskforce Criteria: identifying investment in artistic originals 24
   4.2. Recommendations on the Scope and Valuation of GFCF 25

5. Measurement Issues: by asset 31
   5.1. Film 31
   5.2. TV & Radio 34
   5.3. Books 34
   5.4. Music 35
   5.5. Other Miscellaneous Artwork (Photography, Choreography, Art) 35
   5.6. Summary 35

6. The current UK National Accounts: GFCF in Artistic Originals 36
   6.1. Artistic Originals; Private Sector Broadcasting & Recording 37
   6.2. Entertainment literary and artistic originals; Public Corporations 39
   6.3. Publishing 40
   6.4. Summary 40

7. New data on the value of the Artistic Sector, including new estimates for UK GFCF in 42
   ‘Artistic Originals

8. Film Originals 42
   8.1. \( \Sigma P(X)X, \) Upstream Input Costs. Film 42
   8.2. \( PrR, \) Downstream Rental Payments. Film 53
   8.3. \( P(N)N, \) Upstream Output. Film 54
   8.4. \( P(Y)Y, \) Downstream Output. Film 60

9. TV & Radio Originals 61
   9.1. \( \Sigma P(X)X, \) Upstream Input Costs. TV & Radio 61
   9.2. \( P(R)R, \) Downstream Rental Payments. TV & Radio, B.2 65
   9.3. \( P(N)N, \) Upstream Output. TV & Radio 66
   9.4. \( P(Y)Y, \) Downstream Output. TV & Radio 67

10. Literary Originals: Books 68
    10.1. \( \Sigma P(X)X, \) Upstream Input Costs (ASHE). Books 68
    10.2. \( P(R)R, \) Downstream Rental Payments. Books 69
Executive Summary

This report contributes to the measurement of the UK creative sector. Here we focus on what the System of National Accounts (SNA) define as the creation of long-lived artistic original assets protected by copyright. The main outputs are revised estimates of UK investment from 1990-2008 and the total stock(s) of artistic originals. We also make contributions to the measurement of depreciation and prices. Artistic originals are, in order of magnitude in UK spending: TV & Radio, Books, Miscellaneous Art, Music and Film.

The report includes:

i. a description and explanation of the appropriate conceptual framework for estimating investment in artistic assets
ii. a brief description of official ONS methods in the context of that framework (a forthcoming paper by ONS will describe methods in more detail)
iii. new estimates of investment for the UK, using new data and methods
iv. triangulation of estimates using other methods suggested by the conceptual framework
v. a comparison of those estimates with data from the US
vi. estimates of depreciation rates based on work in the US
vii. a discussion of appropriate price indices, required to deflate data on investment and construct real capital stocks
viii. estimates of the newly measured UK capital stock

We regard this work as a step forward in the measurement of UK artistic asset creation and the contribution of the ‘creative industries’. We stress that for some assets our estimates should be regarded as preliminary, and that further work is required. In the case of Music, Books and Miscellaneous Art, accurate estimation requires a longitudinal analysis of the income earned by assets over their lifetime. We had hoped to include such estimates in this report, but legal and administrative complications have prevented us from doing so. We intend to collaborate with ONS in the near future, resulting in new estimates for Artistic Originals incorporated in the National Accounts, and so we anticipate an update to our estimates sometime in the near future. The following is a brief summary of the contents of this report:

1. First, we take a general overview and compare official UK data with that from the US. We discover an interesting comparison, with UK estimates considerably lower on both an absolute and relative basis. In particular the UK seems to invest very little in Film relative to the US.
2. Second, we set out a framework for analysing artistic sector output and investment in artistic originals. Since little data on market transactions exist, for conceptual and practical reasons our preferred methods are based on input costs or royalty payments.

3. Third, we evaluate ONS measurement practice, highlighting a number of ways to build on official data. We plan to collaborate with ONS in the near future and if possible incorporate new estimates into the National Accounts (Blue Book 2012).

4. Looking at assets in more detail: i) for Film we estimate an upward revision using data on a broader range of UK productions; ii) similarly for TV & Radio we use data for a broader range of productions, but our final estimate is lower because we don’t assume a mark-up for upstream monopoly power; iii) for Books we generate a larger figure by estimating the cost of asset creation; iv) for Music we generate a slightly larger figure by estimating the cost of asset creation, but our data on royalties indicate a larger figure still; v) official data do not include GFCF in any other types of long-lived artistic assets, which we estimate as substantial.

5. We use our framework to produce estimates of GFCF in Artistic Originals according to a variety of methods and triangulate those data as a check on the quality of the results. A summary of these results are presented in the table below.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A. Film</td>
<td>B. TV &amp; Radio</td>
<td>C. Books</td>
<td>D. Music</td>
<td>E. Other</td>
</tr>
<tr>
<td>(1) ( \Sigma P(X)X )</td>
<td>£183m</td>
<td>£2,297m</td>
<td>£846m</td>
<td>£209m</td>
<td>£718m</td>
</tr>
<tr>
<td>(2) ( \Sigma P(R)R(t) )</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(3) ( \Sigma P(R)R(x) )</td>
<td>-</td>
<td>-</td>
<td>£609m</td>
<td>£1,096m</td>
<td>-</td>
</tr>
<tr>
<td>(4) ( \lambda P(Y)Y )</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(5) P(N)N</td>
<td>£890m</td>
<td>£1,992m</td>
<td>-</td>
<td>£251m</td>
<td>-</td>
</tr>
<tr>
<td>(6) Official ONS estimate</td>
<td>£34m</td>
<td>£2,598m</td>
<td>£147m</td>
<td>£159m</td>
<td>-</td>
</tr>
</tbody>
</table>

(1) Upstream Input costs: A) the-numbers.com B) OFCOM C) ASHE D) ASHE E) ASHE
(2) Downstream Rental Payments, allocated over lifetime of individual assets, adjusted for additional capital revenues. Data unavailable for this report
(3) Downstream Rental Payments: D) Based on aggregates: PPL/PRS/MCPS/VPL/BPI/ Live performance. Indicative only, accurate estimation requires a full longitudinal analysis as in (2)
(4) Proportion of downstream revenues. Estimates for Books and Music are based on ONS method with new estimates for components
(5) Approximation derived from aggregate industry output. Presented for information. Not suitable to use in estimating GFCF. A) ABI, alternative available from UKFC presented in Annex B) ABI D) ABI
(6) Official ONS estimates based on: A) input costs B) input costs adj. for market power in private sector broadcasting C) proportion of revenues D) proportion of revenues E) no official estimate
Note to table: All data are nominal and refer to 2007. In cases where we have more than one dataset for that method we choose what we consider to be the superior source. Green highlighted cells in rows (1) and (2) indicate the preferred method for final estimates. Patterned green cells in rows (1) and (3) indicate the second-best approach where data for the preferred method were unavailable. Orange highlighted cells in row (6) contain official data as recorded in the National Accounts.

It is worth commenting a little more on the second row of the above table. We had hoped to estimate the value of investment as the discounted sum of royalties earned over the life of individual assets. This has not proved possible in time for the publication of this report. The estimate of £1,260m for Music (2007) in row 3 is a cross-sectional sum of royalties that accrue to assets of all vintages, including estimates of implicit royalties based on revenues from recordings and live performances. Under certain conditions it can be shown that the cross-sectional sum of royalties is a proxy of annual investment, however the assumptions required are unrealistic in the context of Music. Without a full longitudinal analysis, we are unable to comment on the validity of this figure as a proxy for investment. For conservatism we use the estimate of £209m, presented in row 1. We accept that this is likely an underestimate and expect a more accurate measure to lie in between the figures presented in rows 1 and 3.

We are unable to present a similar figure for books, as although we have some limited data on the royalty rates that accrue to authors, we have little data on those that flow to publishers who also have ownership rights to original assets.

6. From the array of methods and estimates summarised in the table above, we make a decision on our final estimate for each asset, and explain the reasoning behind our choice, whether it be conceptual or practical. The following chart compares our new estimates of investment with those produced by the ONS (2008) for the five asset categories and a final aggregate. Overall spend in 2008 was approximately £4.3bn, exceeding official estimates of approximately £3.2bn. We estimate TV & Radio at £2.2bn, lower than the official estimate of £2.8bn, but we estimate Film, Books, Music and Miscellaneous Art to all be higher than official estimates. When using our alternative measure for music, we reach an aggregate figure of £5.5bn. We would expect this figure to increase if estimates for Books and Miscellaneous Art were to be based on the royalties and revenues that flow to those asset types.
To construct estimates of the UK capital stock of artistic originals we need to define suitable price indices and depreciation rates. For prices, we discuss a variety of options but settle on an implied output deflator. For depreciation, we draw on the ground-breaking work of Soloveichik (2010) of the BEA, using the reasonable assumption that US and UK originals depreciate at similar rates. We bring these data together and present estimates of the UK stocks compared with those implied by the
National Accounts. The result is an upward revision of the UK stock of around £3.5bn, even when estimates for ‘Miscellaneous Artwork’ are excluded.
1. Introduction

This report is part of a broader project aimed at measuring investment in intangible or knowledge assets, and the contribution of knowledge to growth. In recent years there has been a great deal of interest in the value of what has been termed the ‘creative sector’ and the industries that reside within it. We aim to contribute to this discussion using the framework laid out in Haskel et al (2009), specifically in this report to industries that invest in long-lived artistic assets formally protected by copyright.

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 output, and then present ‘creative output’ as a share of aggregate output. Some examples are numerous analyses by the Department of Culture, Media and Sport (DCMS, 2010), a report by the World Intellectual Property Organisation (WIPO, 2003), and an ONS analysis based on the Input-Output tables (Mahajan, 2006). 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 (WIPO, 2003), 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. For example, the publishing industry primarily exists for the purpose of producing and distributing copyrighted literary works, and is therefore considered a ‘core’ industry. ‘Interdependent’ industries are those whose function is to facilitate the production or distribution of originals. Sticking with our literary example, this could include the manufacture or distribution of e-book readers or paper. ‘Partial’ industries are those whose activity is related to protected works, this could include the manufacture of merchandise for a particular book or literary brand such as Harry Potter. ‘Non-dedicated support’ covers the remaining industries in which a portion of activity facilitates the production or distribution of protected works, such as the wholesale or retail industries.

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, if we 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. 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 that is in fact non-
creative. For instance, expenditure on staff or equipment for administration or other non-creative business processes. Importantly, such an approach also introduces potential for double-counting, since the output measure can include investments in tangible or intangible assets already counted elsewhere.

Therefore, rather than seeking to define what is and what is not creative output, and what industries should be considered part of the creative sector, the plan of this paper is to set out a framework to identify and measure investment in long-lived assets formally protected by copyright, and the associated capital stock. We then use those data in a growth-accounting analysis to estimate the contribution of copyrighted assets to UK market sector growth. The results of that exercise are presented in the accompanying report, ‘The Role of Intellectual Property Rights in the UK Market Sector’ (Goodridge and Haskel, 2011). This project has meant an improvement to the underlying data and outputs of the broader intangible framework summarised in Haskel et al (2009) for the UK and Corrado, Hulten and Sichel (2006) for the US.

1.1 Defining the components of the UK National Accounts

Since investment in Artistic Originals is one of the few categories of intangible investment already recorded in the National Accounts, as part of this report we also evaluate official estimates in light of our conceptual framework, and compare data from the National Accounts with our own estimates. As mentioned, a forthcoming report from ONS will set out fully the methods involved. Data for investment, and the underlying component terms used to estimate it, are discussed in Section 6. For simplicity, we define those series’ here.

1) Film

For Film the ONS use input costs as the basis of estimation. The underlying series is based on the funds provided by production companies and funding partners. Within the UK, among examples of channels producing film is Channel 4. Data can be publicly found in the Channel 4 Annual Report(s). For example, funding of £39m is recorded for 2009 (Channel 4, 2009. p71). Hereafter, these data shall be referred to as ‘measured UK investment in Film Originals’ or similar.

2) Television and Radio

For TV & Radio the ONS use input costs as the basis of estimation. The basis for the data are the production costs incurred by companies with a public service licence. Within the UK, examples of channels with a public service licence are BBC, ITV,
Ch4 and S4C. All series’ used can be sourced from the Annual Reports for each of these organisations.

Hereafter, the aggregate for these data shall be referred to as ‘measured UK investment in TV & Radio Originals’ or similar.

3) Books
Estimates for books are based on an assumed fraction of book sales. As shown later in the report, assuming the presence of certain conditions, this can be shown to equate to annual investment.

4) Music
Estimates for Music, or recording originals, are produced on the same conceptual basis as those for Books, namely an assumed fraction of music sales.

5) Miscellaneous Artwork
At present the UK National Accounts include no estimates for any other form of artistic assets such as photography/images, choreographed routines, fine art, greeting card design etc. We do produce some preliminary estimates for this diverse group of assets, and we refer to it as ‘Miscellaneous Art’.

2. Background: Copyrighted assets or ‘Artistic Originals’ in the SNA
Investment in copyright-protected assets is one of the few categories of intangible or knowledge investment included in the System of National Accounts (SNA), formally referred to as ‘Entertainment, Literary and Artistic Originals’ since the 1993 revision of the SNA. The European System of Accounts\(^1\) (ESA) states that the valuation of originals ought to be based on prices paid, production costs or the discounted value of future receipts. Receipts are in the form of licence fee payments,\(^2\) recorded as service transactions and paid to the owner of the asset, with payments recorded as a flow of property income. Sale of the asset itself (i.e. of the full asset rights) is treated as negative fixed capital formation for the seller, and positive fixed capital formation for the purchaser.

---

\(^1\) ESA refers to the formalisation of SNA recommendations into EU legislative requirements.  
\(^2\) SNA 2008 has introduced additional changes to reflect the measurement of i) licences to re-produce and ii) licences to use. This distinction is discussed in greater detail later.
The immediate measurement problem is that data on market transactions for originals are rare, since they are often created on the organisations own-account. Therefore, in practice, production costs or discounted future revenues tend to be used when estimating investment.

To get an idea of initial estimates, Table 1 below compares current official data on investment or 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, taken from a report produced by the Eurostat GNI Committee.3 As can be seen, estimates for the UK are the highest of those presented for EEA states. Data for the US in 2002 are also included for comparison, based on experimental estimates outlined in Soloveichik (2010). The disparity suggests there may be some undercapitalisation in the EEA countries including the UK, although it should be noted that the US estimates are reflective of the size of the film, television and music industries in that country.

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

<table>
<thead>
<tr>
<th>% of GNP</th>
<th>1995</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Belgium</td>
<td>0.05</td>
<td>0.03</td>
</tr>
<tr>
<td>Denmark</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>Germany</td>
<td>0.16</td>
<td>0.18</td>
</tr>
<tr>
<td>Spain</td>
<td>0.1</td>
<td>0.07</td>
</tr>
<tr>
<td>Finland</td>
<td>0.19</td>
<td>0.19</td>
</tr>
<tr>
<td>France</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Ireland</td>
<td>0.17</td>
<td>0.11</td>
</tr>
<tr>
<td>Italy</td>
<td>0.07</td>
<td>0.1</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Netherlands</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td>Portugal</td>
<td>0.17</td>
<td>0.22</td>
</tr>
<tr>
<td>UK</td>
<td>0.21</td>
<td>0.22</td>
</tr>
</tbody>
</table>

% of GDP  | 2002  |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>0.62</td>
</tr>
</tbody>
</table>

Note to Table: Data for European countries taken from the Report of the Task Force on Entertainment, Literary and Artistic Originals (First meeting of the GNI Committee). Since artistic originals are not currently capitalised in the US National Accounts, US data are developmental estimates produced by the BEA (Soloveichik, 2010). Additionally they are presented as % of GDP rather than GNP, and refer to 2002 rather than 2001.

We know from Table 1 that US estimates are considerably higher as a share of GDP than those for the UK or other EEA countries. Therefore Table 2 makes a direct comparison between official UK estimates and developmental BEA estimates (Soloveichik, 2010), by category. Since only four of the five assets covered in the BEA work are currently capitalised in the UK, column 3 adjusts the US data so it can be compared with the UK on a like-for-like basis.

---

basis. That is, miscellaneous artwork is excluded from the US investment figures, and the percentages are re-calculated accordingly.

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

<table>
<thead>
<tr>
<th>Asset (1)</th>
<th>Movies</th>
<th>US ($bn)</th>
<th>UK (£bn)</th>
<th>US ($bn) approx. using UK breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>$65.1bn</td>
<td>£2.14bn</td>
<td>$60.1bn</td>
<td></td>
</tr>
<tr>
<td>% of GDP</td>
<td>0.62%</td>
<td>0.20%</td>
<td>0.57%</td>
<td></td>
</tr>
<tr>
<td>% of Artistic Originals</td>
<td>15.10%</td>
<td>0.94%</td>
<td>16.31%</td>
<td></td>
</tr>
<tr>
<td>% of GDP</td>
<td>0.09%</td>
<td>0.002%</td>
<td>0.09%</td>
<td></td>
</tr>
<tr>
<td>(2) Music</td>
<td>$7.6bn</td>
<td>£0.13bn</td>
<td>$7.6bn</td>
<td></td>
</tr>
<tr>
<td>% of Artistic Originals</td>
<td>11.70%</td>
<td>6.07%</td>
<td>12.65%</td>
<td></td>
</tr>
<tr>
<td>% of GDP</td>
<td>0.11%</td>
<td>0.012%</td>
<td>0.07%</td>
<td></td>
</tr>
<tr>
<td>(3) Books</td>
<td>$7.1bn</td>
<td>£0.21bn</td>
<td>$7.1bn</td>
<td></td>
</tr>
<tr>
<td>% of Artistic Originals</td>
<td>10.90%</td>
<td>9.81%</td>
<td>11.81%</td>
<td></td>
</tr>
<tr>
<td>% of GDP</td>
<td>0.07%</td>
<td>0.020%</td>
<td>0.07%</td>
<td></td>
</tr>
<tr>
<td>(4) TV</td>
<td>$35.6bn</td>
<td>£1.78bn</td>
<td>$35.6bn</td>
<td></td>
</tr>
<tr>
<td>% of Artistic Originals</td>
<td>54.70%</td>
<td>83.17%</td>
<td>59.24%</td>
<td></td>
</tr>
<tr>
<td>% of GDP</td>
<td>0.34%</td>
<td>0.165%</td>
<td>0.34%</td>
<td></td>
</tr>
<tr>
<td>(5) Misc</td>
<td>$5bn</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>% of Artistic Originals</td>
<td>7.70%</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>% of GDP</td>
<td>0.08%</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Note to table: Artistic Originals are currently not capitalised in the US, whilst they are (partially) in the UK. Therefore, as a % of GDP, the above data are not quite on a like-for-like basis. For Column 3, implied US GDP has been adjusted to account for the differing definitional coverage of artistic originals i.e. since miscellaneous artwork is not included at all in the UK, $5bn is subtracted from the US aggregate for originals and GDP, 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 are considerably lower than the estimates for the US and gives some indication of potential “missing” investment in the UK data. Of course we do need to remain aware of the vast size of the film and music industries in the US, which will impact any comparison.

To summarise, the data for the US provides an interesting comparison with that for the UK. Official UK estimates are considerably lower than those for the US on both an absolute and relative basis. 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.
3. Theory: Review of Methodological Approaches for estimating Investment

3.1. Model of the artistic sector

To understand the various measurement methods available, we need to set out a simple model, analogous to that used by Corrado, Goodridge and Haskel (2010).

Consider an economy with an innovation 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 (\( \mu \)) over those costs, where \( \mu \) represents the monopoly power of the artist due to protection from intellectual property rights (IPRs) for a unique asset:

\[
(1) \quad P(N)N = \mu(\sum P(X)X^N + P(R)R^N)
\]

Where \( X \) is a vector of inputs to the innovation sector (such as labour, capital, materials etc.), \( P(X) \) their competitive prices, and \( \mu \) the mark-up over competitively priced inputs. \( P(R)R^N \) are the rental payments for the use of other originals in production e.g. the use of a music original in film production.

Consider next the final output sector, which uses the artistic good. If they buy the asset rights (or some component) outright, then their input costs are \( P(N)N \) plus the costs of labour, intermediates and other forms of capital. If they rent the good e.g. pay a licence fee, \( P(R)R \), for \( T \) years to the IPR-holding innovation sector then capital market equilibrium implies that:

\[
(2) \quad P(N)N = \sum P(R)R/(1+r)^t
\]

Where \( R \) is the stock of knowledge created by the good; in a perpetual inventory model (PIM) this might be represented by:

\[
(3) \quad R_t = R_{t-1}(1-\delta) + N_t
\]
Equation (2) says that the asset value of the good 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 (1990).

The final output sector, which uses the artistic good, produces output, \( P(Y)Y \)

\[
(4) \quad P(Y)Y = \sum P(X)X^Y + P(R)R^Y
\]

where \( P(X)X^Y \) are made up of labour, capital and materials payments in the using sector, and \( P(R)R^Y \) are the rental payments for using the artistic capital created in the innovative sector. We assume that the final output sector is competitive and so there is no mark-up, \( \mu \).

The final equation simply aggregates both the innovative and output sectors.

\[
(5) \quad P(G)G = P(Y)Y + P(N)N
\]

A value-added figure for the same aggregation is simply the sum of factor incomes to labour and capital in each sector, including the income generated by artistic originals. Or put another way, aggregate value-added is aggregate gross output excluding materials and adjusted for rental payments that flow from the downstream to the upstream.

The above framework is represented in Figure 1 below, using the example of movie production.

**Figure 1**: Theoretical Framework. Upstream and Downstream. E.g. Movies

---

Note to Figure: To make the symmetry clear, a term for \( \mu \) could also be included in the downstream. We assume that the downstream is competitive, so \( \mu = 1 \), always. Monopoly power does however exist in the upstream, due to the the ownership of rights to a unique asset. So in the upstream, \( \mu > 1 \).

---

At first it may appear that there is a measurement issue in the sense that both the upstream and downstream are renting from the artistic stock. This is not the case in this model. The upstream is renting a different type of asset to that which it is producing. For example, the producer of broadcasting assets is renting music assets.
The above framework is also represented in Figures 5-8, alongside some notes on each sector, some practical data considerations, and notation for recommendations and methods to estimate GFCF. How then are we to measure investment in the creation of artistic originals, P(N)N? There are four broad approaches

a. Input cost based: Upstream Production Costs
The first method is to estimate the cost of asset production in the upstream sector, using data on input costs (labour, capital and materials) i.e. measures for the right hand side of (1). This is the approach taken in valuing investment in R&D using a survey of R&D performers (BERD). A variant of this approach is to just use labour input costs and apply a factor to cover other costs of production. This is the approach used for own-account software investment in the UK National Accounts (Chamberlin, et al, 2007), and for knowledge assets such as ‘Design’ in the intangibles framework (Haskel et al, 2009).

One difficult issue is treatment of the use of artistic goods in the upstream sector e.g. payments for the use of music as an input to a movie original. It has been argued that this potentially leads to double counting. However, this would only be so if the measured input was the total asset cost of the recorded original, P(N)NREC, rather than the rental payment for its use, P(R)R. Provided the rental payment is used, and the payment is for the use of a different asset, then there is no double-counting. We expand on this issue later.

A second issue is whether or not to include an estimate for μ, the mark-up applied by the upstream monopolist. Assuming the copyright is enforceable then such a mark-up almost certainly exists since that is the very purpose of copyright protection, 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.5

b. Creative sector output: asset sales
A second approach is to measure the left-hand side of (1), P(N)N, using data on the value of sales of the upstream/artistic sector. This is equivalent to measuring tangible investment by the value of sales of the investment goods industries. To do so one has to select industries that are considered part of the upstream or ‘creative sector’ and collate measures of their output, as in analyses produced by DCMS, WIPO and the ONS.6

5 The mark-up will be proportional to the commercial success of the individual asset. Therefore an estimate for the μ generated by say, Harry Potter, would differ greatly from that generated by the authors of this report.
6 The WIPO and ONS analyses can be found at: www.wipo.int/copyright/en/publications/pdf/copyright_pub_893.pdf
There are a number of issues with this approach, both in general and particularly when trying to measure investment in artistic assets protected by IPRs. First, and most important, is that industries as defined by the SIC do not accurately measure upstream activity. For example, the measured output of banks includes the software written by financial service firms. Measurement of just the software industry would miss this. Additionally, since the ownership rights of IPRs tend to be complex and cross industry boundaries, it is very difficult to identify the upstream from data categorised by the SIC. Whilst some cases are clear, there are a number on the edges, hence the discussion of ‘core’, ‘partial’, ‘interdependent’ and ‘non-dedicated support’ industries (WIPO, 2003).

Second, and related to the first point, is that this approach captures industry activity that is not in fact upstream asset creation. For instance, using the example 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. Such issues are the root of the WIPO definitions discussed e.g. industries whose activities contribute to asset creation, with the remainder of output being other goods and services that do not function as assets. Of course in the case of television industry, output will also include downstream use (broadcast) as well as upstream creation.

Third, such an approach would require detailed data on the sources of revenue and the rights associated with each payment. It would also require a very careful treatment of international flows. The level of detail required would make obtaining such data and subsequent estimation difficult and problematic.

Fourth, 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. Instead we need to consider the sector from a broader viewpoint than that provided by the SIC.

c. Licence payments: capital compensation

An alternative method is to use data on the revenues that accrue to copyright owners through royalties or licence fee payments, often referred to as capital compensation or in the SNA terminology, ‘Operating Surplus’. The method exploits the competitive equilibrium relationship (see memo item at the bottom right of Figure 1), where it is assumed that at the margin the owner is prepared to invest up to the expected net present value (NPV) of future
revenues generated by the asset. Provided ownership is retained, those future revenues are largely received in the form of royalties or licence fees. If ownership is transferred (i.e. the asset is sold), the NPV of remaining future revenues will be reflected in the transaction cost, $P(N)N$. Data on such revenues, correctly cumulated according to the rights they allow the payee and the length of period to which they refer, and correctly discounted to retrieve the NPV, are a potential source for estimating the value of the artistic investment. Such data is partly held by Collecting Societies, who provide a centralised payments receiving house for particular artistic assets, and distribute those payments to the asset owners i.e. to the holders of IPRs.

Licence fees are paid by downstream users and flow to the owners of assets in the upstream. Therefore fees and royalties are some component of downstream input costs and output, as shown in (4). The ONS exploit this relationship in their estimates for Books and Music, by assuming that a constant proportion of (partial) downstream output equates to the payments made for the use of original assets. They further assume that the sum of these payments (that flow as income to the upstream sector) are a proxy for the value of annual investment in asset creation. Deriving such a relationship relies on numerous assumptions regarding steady-state conditions, as discussed in more detail later.

More generally, in the case of licence fees it is important to think about the nature of the transaction and its purpose. This brings us to an important distinction emphasised by the OECD (2010). The OECD Handbook on IP measurement (OECD, 2010) states on page 15 that:

“If the acquisition of a copy with a licence to use is purchased with regular payments over a multi-year contract and the licensee is judged to have acquired economic ownership of the copy, then it should be regarded as the acquisition of an asset. If regular payments are made for a licence to use without a long-term contract, then the payments are treated as payments for a service. If there is a large initial payment followed by a series of smaller payments in succeeding years, the initial payment is recorded as gross fixed capital formation and the succeeding payments as payments for a service”.

How does this fit into our framework? If we are estimating investment in the creation of originals as the expected NPV of revenues generated from the commercialisation of the asset, it is appropriate to use data on all multi-period fees. These payments are normally thought of as fees for the short-term use of the asset e.g. payments made by cinemas to a studio for the
right to project a film original for say 3 months, and it is these that provide the return to the asset owner. In that case it is correct to think of those payments as rentals for services that show up in the data as intermediate consumption for the using firm, who are simply purchasing a short-term good or service.7

The difficulty arises where those payments are for rights that last longer than 12 months. In practice, in the National Accounts this is treated as an investment by the using sector, since the user has acquired economic ownership of (some portion of) the asset. Consider the case of software, where there is investment by the creator, say Microsoft, and also investment by the user provided the software has a service life of at least one year. The producer is investing in the creation of an asset which it can commercialise and generate future revenues. The user is also investing in a piece of capital to enhance its productive potential. This treatment, applied in the capitalisation of software, is not accepted by all, since some believe that it is double-counting. We understand that concern, but summarise our view as follows:

- if the payment for rights are exclusive and permanent then that is simply transfer of ownership i.e. negative GFCF for the seller, and positive GFCF for the buyer
- if the payment is for long-lived or permanent rights, but they are not exclusive, then the owner has not ‘lost’ capital. But the buyer has acquired a good that will contribute to output for more than one year. This is investment in use by the buyer

For artistic originals, the purchase of long-term exclusive asset rights to use in the production of other goods and services is rare in most cases, but where a licence is purchased for more than one year, additional investment can be allocated to the using industry. This is also consistent with our view on embedded originals which we shall discuss later. At present the UK National Accounts include no estimates for investment in the use of artistic originals. Calculation of such a measure is difficult since it requires detailed data on all transactions to identify which payments were one-off or across multiple years, and whether or not they involved any transfer of economic ownership.

d. Proxy of upstream output using aggregate data

As shown in Figure 1, it is possible to infer a proxy for P(N)N using data on aggregate industry sales, where the aggregate industry is some mix of up and downstream activity. That is if:

7 Capital compensation, or operating surplus, is a component of value-added, but it is generated in the industry that is leasing the capital i.e. in the industry that owns the capital. In this example, film studios. Rental payments in the downstream cinema are not part of the value-added of cinemas, but they are a part of value-added for a more widely defined “film industry”.
$P(G)G = P(N)N + P(Y)Y$

Where $P(G)G$ are gross revenues, $P(N)N$ are upstream revenues and $P(Y)Y$ are downstream revenues, then it is in principle possible to take some proportion of $P(G)G$ as representative of $P(N)N$. This is a variant of method b).

### 3.2 Example of Model using Film

The following text provides a more detailed description of various components of output and inputs, which have been or can be used to study the output of the creative sector. These include those terms necessary for estimating investment, using the four broad approaches set out above. For simplicity and consistency we continue to use the example of Film Originals to help describe each term.

1: Upstream input costs $\sum P(X)X$ e.g. Costs of Movie Production

These are the costs of factor and intermediate inputs to asset creation and are the basis for one of the two primary methods for measurement of GFCF in Artistic Originals, as recommended by both Eurostat and the OECD. It is also the basis of the method used by ONS to measure GFCF in Television Originals by UK Public Service Broadcasters (PSBs), and in Film Originals for a sample of UK production companies and funding bodies. As mentioned in the discussion of our framework, data on input costs will not necessarily equate with the revenues data without some additional estimation or allowance for a monopolists mark-up, $\mu$. Put another way, use of data on upstream input costs alone implicitly assumes that $\mu=1$.

Since, in practice, detailed data on capital compensation and intermediate inputs in the upstream sector(s) are rarely available, data on labour costs are sometimes multiplied by some factor ($\gamma$) to account for additional overheads. This is the method used by ONS in the estimation of own-account software GFCF (Chamberlin et al, 2007).

2: NPV of $\sum P(R)R$ [Downstream rental payments] e.g. Rental payments made by cinema to owner of new movie

This the basis of the other primary method for estimating GFCF in artistic originals as recommended by Eurostat and the OECD. As the owner of a unique IPR, upstream annual revenues are generated from royalties and licence fees paid by downstream users. The sum of those payments over the lifetime of the asset can be used to estimate the value of the asset by making use of the equilibrium condition set out in equation (2), which states that the value of investment equates with the NPV of licence fees and royalty payments that accrue to the asset.
owner. This is the basis of the method used by Soloveichik (2010) for Books and Music. Note that this method is equivalent to direct measurement of $P(N)N$, provided data on rentals, their timing and the length of time to which they refer are sufficiently detailed, and that such an estimate will implicitly include $\mu$, the mark-up received by the innovator due to its market power as the owner of a unique asset. Potential sources for part of such data are the transactions mediated by collecting societies and rights management agencies.

It is worth noting that the ONS also use a variant of this approach in calculations for Books and Music. As we discuss later, by applying steady-state conditions it can be shown that aggregate cross-sectional royalties can be used to approximate annual investment. To calculate aggregate cross-sectional royalties the ONS apply a royalty rate, $\lambda$, to downstream sales of copies of originals.

3: $P(N)N$ [Upstream output] e.g. Sales of film production companies

This is the output of the upstream or innovation sector, as defined in equation 1, that is, the revenues received by the asset owner but based either on data for direct market transactions or industry sales aggregates. Such revenues could be received in a number of ways. First the upstream could receive a rental for the one–off or short term use of the asset, for example the right to project a film at a cinema for one month. Second, it may receive a rental for a longer period, perhaps for the right to manufacture the DVD for the next five years. Third it may receive payment for the outright purchase for a component of the asset rights, such as a one–off payment to use the movie logo on merchandise for perpetuity. Therefore accurate valuation requires that each payment is treated correctly and not simply summed. Any estimate of $P(N)N$ based on revenues will implicitly include $\mu$, the innovators mark-up over the costs of production reflecting its market power as a holder of a copyright protected asset.

Data on direct market transactions for artistic originals are hard to find and industry revenues provide no information on: the type of payment received (i.e. asset purchase or rental); the length of time those payments cover (i.e. more or less than 1 year); or the rights those payments provide access to (i.e. all rights or some rights, and whether or not they are exclusive). Since the upstream and downstream sectors are often present in the same industry/firm and the initial investment often takes place on the firm’s own-account, it is

---

8 In practice, in film the owner (studio) receives the rental as a percentage of revenues generated by the cinema, rather than as a flat fee (Soloveichik, 2010).
extremely difficult to split industry output into those that revenues that accrue to the asset and those from sales of final output.\(^9\)

4: P(Y)Y [Downstream output] e.g. sales of cinemas

Continuing with our example of Film, the innovator is the owner of the final asset. In practice this may be a studio which has outsourced production to a production company, but funds and owns the final asset. The using sector is made up of a collection of industries and sub-industries including chiefly cinema projection but also DVDs, TV broadcasting; merchandise production etc. Accurate measurement of P(Y)Y would require data on the revenues generated from the commercialisation of artistic assets in all those industries, and in all countries, but only where they relate to UK-owned artistic assets. A component of those revenues, P(Y)Y, is the rental payments made for the use of IP, P(R)R, in this example the projection of the film or sale of some merchandise.

This is a measure that is used frequently in studies that try to estimate the value or size of the creative sector. It is important to note that the sales of UK-resident downstream firms rent from IP owned by upstream producers resident in the UK and worldwide. Conceptually this is not the correct basis for measuring UK investment in artistic assets. Also note that if this data is combined with upstream output, P(N)N, as is often the case, then there is a double-counting issue which such studies largely ignore.

5: P(G)G [Upstream and Downstream output] e.g. sales of total “film industry”, as defined by the SIC

Measurement of this term is common in attempts to value the creative industries. In practice it is an overestimate of creative output and reflects the reality of data measurement. Measured industry data are not conveniently split into the innovating and using sectors, and industries undertake a host of activity besides the creation of artistic originals including merchandising, marketing and product distribution. Instead industry output relates to both. Measurement is further complicated by the fact that there are often numerous downstream industries which in turn rent from a variety of different owners. For example, a t-shirt manufacturer may rent the right to produce merchandise for films, but they may also rent similar rights from the music/recording industry. The owners of those rights may be split between producers and

\(^9\) 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.
distributors (studios) in the case of film, and between artists and recording companies in the case of music.

Also note that upstream revenues accrue from all downstream users regardless of their residency or location. Likewise the UK downstream does not only rent from the UK upstream, rather it rents capital from the world upstream. So in the case of film, owners of UK IPRs generate revenue from cinemas and other downstream users worldwide, whilst the UK downstream rent IP from the world stock of films.

6: $\alpha \cdot P(G)G$ [Proxy of Upstream output] e.g. sales of film producing companies as a proportion of the total film industry defined by the SIC

This is a variant of the previous term, designed to produce an estimate more reflective of innovative or artistic output. As discussed, total industry output, $P(G)G$, is actually a sum of innovative output, $P(N)N$, and downstream output, $P(Y)Y$. Multiplying industry output by some factor is a way of removing $P(Y)Y$ and deriving an estimate of upstream output or asset creation, $P(N)N$. ONS methods for Books and Music could be interpreted as an application of such an approach, but to the best of our knowledge no documentation on the reasoning behind the ONS methodology is available. Therefore we consider it more likely that the ONS method is an attempt to derive the cross-sectional sum of royalties based on sales in the downstream sector.

3.3 Summary

Since little data on market transactions exist, for both conceptual and practical reasons our preferred methods for estimating investment in originals are those based on input costs or royalty payments. This way we can avoid the inherent difficulties of matching industry data to up and downstream activity. Estimation using microdata on upstream royalty revenues would provide the additional advantage of identifying the frequency and type of payments made i.e. payment for the right to use for a long period purchased outright; one-off payments for short-term use; payments for short-term use paid in multiple periods.
4. What assets should be counted as “Artistic Originals”? 
In addition to identifying alternative approaches for measurement, one has to define just what assets to consider. Eurostat and the OECD have opined on this issue. We discuss their recommendations in the context of our theoretical model, and compare them with ONS practice. The following text is built around a summary of recommendations outlined in a Eurostat Taskforce report and further clarification issued by the GNI Committee,\textsuperscript{10} in 2003 and 2004 respectively.

4.1. Eurostat Taskforce Criteria: identifying investment in artistic originals
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\textsuperscript{11}
3) Must satisfy the capitalisation criteria (i.e. have a useful 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 criteria, there may appear to be an inconsistency with the treatment of say R&D, which was also recognised as fixed asset in SNA2008 and will soon be capitalised in the National Accounts framework. That is, it is not necessary for R&D to be protected by patent in order to qualify as investment. The reason that much R&D is not formally protected by IPRs is that firms can still exploit the asset without formal protection, and they often prefer not to make their 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.

The fourth criterion explicitly recommends the exclusion of goods termed ‘valuables’, which are goods that are held as stores of value as an alternative to financial assets, and typically include items such as fine art or jewellery. In summary we do not consider it appropriate to exclude all other types of artistic capital simply because of the presence of ‘valuables’ in the Accounts. Although not necessary, a more appropriate treatment would be to estimate investment in remaining types of artistic capital and subtract off the measured data on

\textsuperscript{10} Second meeting of the GNI Committee, 25-26\textsuperscript{th} March 2004, State of play on Entertainment, Literary and Artistic Originals.

\textsuperscript{11} This does not mean the final asset is not an input to 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 from a broadcasting original should not be counted separately to the final film/TV original that 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.
valuables. This would guarantee no double-counting of assets, and avoid the exclusion of a potentially significant area of investment. Further detail on ‘valuables’, how they fit into the National Accounts, along with our reasoning are provided in Appendix 1.

### 4.2 Recommendations on the Scope and Valuation of GFCF

The following headings outline the asset categories considered by the Taskforce, their recommendations on which types of originals should be capitalised in the National Accounts, and additional information we considered relevant to the discussion. The recommendations are summarised in Table 3 and we comment below.

**Table 3: Summary of Eurostat Taskforce recommendations, by category**

<table>
<thead>
<tr>
<th>Category/Asset</th>
<th>Taskforce Recommendation (√/X)</th>
<th>Additional note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Films</td>
<td>✓</td>
<td>Only final version should be capitalised, so as not to double count. Requires information on residency of production company</td>
</tr>
<tr>
<td>TV &amp; Radio</td>
<td>✓</td>
<td>Only stock programmes to be capitalised (i.e. those with service life of more than 1 year)</td>
</tr>
<tr>
<td>Books</td>
<td>✓</td>
<td>Goods such as magazines and newspapers should not be capitalised, since they have service lives of less than 1 year</td>
</tr>
<tr>
<td>Music</td>
<td>✓</td>
<td>Only final version should be capitalised, so as not to double count.</td>
</tr>
<tr>
<td>Images</td>
<td>✓</td>
<td>Should be capitalised <em>provided</em> they are covered by copyright</td>
</tr>
<tr>
<td>Maps</td>
<td>✓</td>
<td>Should be capitalised but likely already recorded in book publications</td>
</tr>
<tr>
<td>Branding</td>
<td>X</td>
<td>Should not be capitalised since service life is generally less than 1 year</td>
</tr>
<tr>
<td>Technical Drawings</td>
<td>X</td>
<td>Should not be capitalised since the primary intent is not artistic, rather a component of the final asset (building)</td>
</tr>
<tr>
<td>Models</td>
<td>X</td>
<td>Should not be capitalised since they are neither ‘original’ nor have primary artistic intent</td>
</tr>
<tr>
<td>Artwork</td>
<td>X</td>
<td>Should not be capitalised to avoid any potential double counting with items already recorded as ‘valuables’</td>
</tr>
</tbody>
</table>

**a) Films**

GFCF in Film Originals should include the production of all short and long films that satisfy the above criteria, including translations and re-worked originals. However, only the edited final version should be capitalised, and not interim versions. It is important to establish the residency of the production country so the asset value is allocated to the correct country. 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.\textsuperscript{12,13}

Regarding valuation, the Taskforce recommend the use of production costs. ESA95 states that production costs should be defined to include compensation of employees (CoE), intermediate consumption (IC), taxes less subsidies (T-S) and depreciation (D), with a mark-up for operating surplus ($\beta$).

$$\text{Production Costs} = \beta(\text{CoE} + \text{IC} + (\text{T-S}) + \text{D})$$

Initially there was some division among the Taskforce on whether costs should include rentals for embedded originals, since the investment in their creation will have already been counted e.g. where one original is used in the production of another, such as the soundtrack to a film. It was later decided they should be included, and we agree with this recommendation.

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

Both the television and radio industries categorise their programmes as either ‘Stock’ or ‘Flow’ productions. ‘Stock’ is defined in the heading above, whilst ‘Flow’ refers to genres such as news, sport or game shows which are unlikely to be repeated and therefore provide a natural break according to the capitalisation criterion.

In the case of sports we feel the distinction is less clear, 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 sports broadcasts do often have a service life of more than one year, but recommend that, due to very fast depreciation rates, sporting rights be excluded from final estimates (OECD, 2010, p152). In the case of game shows, a differing view was taken by Soloveichik who argues that although one programme may be short-lived, the format and therefore underlying asset is long-lived (Soloveichik, 2010). This may be debatable since it could be argued that all formats are long-lived. But surely there has been some investment

\textsuperscript{12} According to the ONS FTV release, in 2007, 62% of UK film exports were by UK subsidiaries of major US film companies. In the same year 56% of film imports were purchased by such subsidiaries.

\textsuperscript{13} One of the difficulties in capitalising assets protected by IPRs is the treatment of acquisitions of previous knowledge (Galindo-Rueda, Haskel and Pesole, 2010). The purchase (sale) of copyrighted assets from (to) abroad should be treated as imports (exports).
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.\textsuperscript{14}

The Taskforce also recommended the exclusion of advertising since it would generally be used for less than one year. Although we feel part of advertising expenditure certainly goes towards building brand and reputational capital, it is treated as a separate asset in the intangibles framework.

Regarding valuation, as always the preferred source would be recorded market transactions, but such data are rarely available. The Taskforce recommended the use of production costs. They did note that firms often do capitalise such assets, but suggested it would not be possible to combine data from company accounts with aggregate sources due to the potential for double-counting.

c) \textbf{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 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 as a separate item within music or film.

Since newspapers and magazines generally have a service life of less than one year it was recommended they be excluded. 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.

Regarding valuation, for music, literature and images, it was recommended that royalty flow data from the rights management agencies should be used. A number of European countries apply the following formula:\textsuperscript{15}

\[ W_j = H_j*(1+r_j-i_j) \]

\textsuperscript{14} Obvious examples of this include numerous reality shows re-produced on an annual basis in a range of countries. For instance: ‘The X Factor’, ‘The Apprentice’ or ‘Big Brother’ to name a few. It may be however that it is more appropriate to consider these under branded investments, rather than investments in the creation of long-lived originals.

\textsuperscript{15} This formula is an approximation derived by the German National Statistical Office. Using data on royalties and interest rates from the early 1950’s, the NPV of royalties were estimated using 6 different service life and age-price profile combinations. The above formula was found to closely approximate the average of the six results.
where:

$W_j$ is the present value of originals produced in year $j$,

$H_j$ is the sum of royalties paid,

$r_j$ is the annual growth rate of royalty payments, and

$i_j$ is the interest rate.

Additionally the Taskforce recommended that estimates for growth in royalties ($r$) and the discount rate ($i$), be either annual or moving averages (up to 5 years) and produced independently.

Potential issues include the flows of payments between agencies which could give rise to double-counting, so these ought to be separated out. Questionnaires for the UK showed such splits to be conceivable, provided the business register is sufficiently detailed. For international flows, use of the Survey of International Trade in Services (ITIS) was discussed. ITIS includes categories for “other royalties and licence fees”, “audio-visual services” and a memo item for “audiovisual transactions”. Of these the Taskforce noted that: the first is likely dominated by software-related flows but may include other types of royalties; the second includes limited distribution rights and fees for motion picture production; the third does not appear distinct from the first two categories, particularly the second.

Payments for one-off and longer-term use should also be considered separately:

i) Payments for permanent transfer of specific (not necessarily all) rights associated with the original i.e. for indefinite use

ii) Payments for a time-limited transfer of rights

iii) Payments for the one-off use of an original

Such data would raise the possibility of splitting the original into constituent rights. There is disagreement over whether originals are divisible, and whether the sale of some right(s) changes the value of the asset, or whether it is just the sale of a service. In principle, the Taskforce felt the sale of a right(s) would diminish the value of the original to the owner, and generate value for the purchaser. Note that such distinctions are consistent with our framework. Payments for permanent or exclusive transfer of (some) rights would represent the purchase of (some component of) the asset, $P(N)N$, and the payment equivalent to the discounted sum of expected future royalties.
d) **Music (Recorded Originals)**
As with Film it is important that to ensure that only the edited final version is recorded as GFCF and there is no double-counting. It was recommended that all media types be included, including music videos, but that advertising jingles be excluded. The recommended method is data on royalty flows mediated by the Collecting Societies.

One potential issue is estimation of investment in music videos, due to SIC definitions. In SIC03, video production is wrapped up within motion picture production (film). Although it should be possible to avoid double-counting, there is potential for mis-classification e.g. part of GFCF in music originals incorrectly allocated to Film.

e) **Slogans/Brand names**
The Taskforce felt that although protected under Trade Mark, they should not be considered as originals. Although we do not agree with the broader judgement that branding is not a form of capital, we already count such investments in the broader intangibles framework (Haskel et al, 2009). Therefore they will not be included in our estimates for artistic originals.

f) **Technical/Architectural Drawings & Models**
The Taskforce felt these items ought not to be considered, even if they have copyright protection, since their primary use is as an input to construction output. Therefore they fail to meet the criterion that assets should have primary artistic intent.

However, provided such blueprints (or prototypes or scaled models) have a service life of one year it is clear that they should be treated as capital, even if not as artistic originals. That is, if they are used as an input to the production of numerous structures across a period of more than one year, then they should be considered as a distinct asset. Although we do not include such assets in our estimates of artistic originals, they are included in the broader intangibles framework under “Architectural and Engineering Design” (Haskel et al, 2009).

g) **Paintings, sculptures, antiques, fine art & jewellery**
The Taskforce recommended these be excluded 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

---

16 SIC07 does separate these activities at five-digit level, but much of our data is classified according to SIC03 since much of the historical data has not yet been transferred to the new classification. Additionally, post-production activity for motion pictures, video and television remain combined in SIC07.
discussion of what should be included as artistic originals. As discussed in Appendix 1, the potential for double-counting and the rationale for exclusion 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 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 their royalty flows could be separated from those for other publications.

*Our preferred asset breakdown*

As a minimum, 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 also be included provided they meet the criteria listed above.

Broadly in line with these recommendations, we estimate investment in artistic originals for the asset categories listed below. In doing so we compare data from a variety of sources, and our final estimate is chosen according to conceptual preferences, data quality and methodological practicalities. The final category, Miscellaneous Art, includes assets such as artwork, photography, images, choreography and maps, where data are available and where they are not counted elsewhere. The following section discusses some of conceptual and practical measurement issues posed in the case of each asset.

1) Film
2) TV & Radio
3) Books
4) Music
5) Miscellaneous Art
5. Measurement Issues: by asset

The section above set out the asset categories considered to meet the criteria for artistic originals. In this section we review numerous measurement issues in the context of specific assets, namely: ownership, embedded originals, divisibility, outsourcing and double-counting.

5.1 Film

Performance vs. Ownership

For Film, determining the value of investment requires information on the residency of the owner of the final original. For instance, if a film is produced wholly or partly in the UK but the final asset is owned by a Hollywood studio, then the licence fees and royalty payments flow to the US, and the investment should be recorded in American output. Consider an example such as a Harry Potter movie, and let us assume that all of the 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, since the intermediate purchases and 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 within output, the expenditure 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 the asset rights, and the US studio would acquire the remaining (larger) proportion. In addition the scriptwriter, and possibly the author of the literary work behind it, may also 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.

It is now clear that data on ‘UK productions’ are not conceptually consistent with UK investment in Film Originals. A film that is classified as a UK production is not necessarily owned by a UK organisation. Instead the classification for UK-certification is based on criteria set by the UK Film Council (UKFC). That is, a film must either pass a so-called ‘Cultural Test’ or be an official co-production (qualification for which is via official treaties). The incentive for UK certification is to benefit from tax relief which has the additional requirement that 25% (70% prior to 2007) of total production costs be spent in the UK. A film-producing company (FPC) does not need to own the final rights to the film to benefit from tax relief. Further information on UK film classification is provided below in Box 1.
A similar conceptual issue is present in the construction of the ONS R&D satellite account (Galindo-Rueda, 2007). In the case of R&D performed by a UK firm but funded by the ‘Rest of World’ (RoW), the funder is deemed to own 90%, and the performer 10%. Applying a similar principle to artistic originals would mean that if the final asset was owned by a US studio but created in the UK, then 10% of GFCF would be allocated to the UK, and 90% to the US. However, such an approach appears quite arbitrary in a National Accounts context. Additionally, this convention is not based on international guidance. In the US, R&D ownership is allocated to the funder, although where data on the funder is unavailable, ownership is allocated to the performer instead. The reasoning is that the incentive to fund is based on future ownership and that although cases of shared ownership do exist, they tend to be rare. The ONS intends to look into this issue further in the context of R&D, using a new question in the BERD survey.

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

A further issue is that services from different asset types are sometimes rented in the production process. Continuing with the example of Harry Potter, one of the inputs to the
film is the book used as the basis of the script. Others include music recordings used in the soundtrack. Therefore the production costs include the royalty payments made to the author, J.K. Rowling, and musical artists. 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, we will follow the Taskforce recommendation and not attempt to exclude royalty payments to other forms of artistic capital from production costs.

It is worth re-iterating that there is a crucial difference between the sale of an asset and licensing. The first is a sale of permanent asset rights and would represent negative GFCF (e.g. to Rowling and her publisher, but positive GFCF for the film company). The second are rented services, with associated royalties or licence fees that flow to the owner of the asset (e.g. Rowling) as Gross Operating Surplus. It is correct to treat the latter as both a cost of production in the case of the film, and capital income earned by the book.

Scope and divisibility of the final original
This takes us onto another point. 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 in their own right? The Eurostat Taskforce recommends that if scripts are covered by a separate copyright then they can be recorded as a distinct component, but within the category of literary originals, rather than Film (or Television). Conceptually the correct treatment depends on whether the value of the copyrighted asset is divisible and a case can be made either way.

In the work by Soloveichik (2010), sheet music is considered as a separate item within Music Originals, with its revenues contributing to the valuation of investment. 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 the script/sheet music 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 scripts/sheet music as distinct categories. This may benefit final estimates disaggregated at industry-level as the owners of rights to say, a soundtrack, will not necessarily be the same as the owners of the rights to a film.

Summary: Film
Replicating the BEA approach and building bottom-up estimates using data on UK titles requires identifying films where ownership rights are held in the UK. Data for films
considered to be 100% owned by UK resident firms could be used to inform a lower-bound estimate. An upper-bound estimate would include some percentage of the costs of all other UK-located productions and co-productions. 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.

5.2. TV & Radio

Outsourcing

For television, estimation requires consideration of the increasing trend to outsource production to the independent sector. One potential way of addressing this is to make use of firm- and/or household-level microdata, to estimate the input of relevant occupations, across organisations and industries. The drawback of this technique is that it can make disaggregation by asset category more difficult and does not ensure that the measured output is in fact asset creation covered by copyright. For instance, a writer allocated to the industry ‘Artistic and Literary Creation’ (92.31 in SIC03) may produce books, and/or scripts for television, and/or scripts for films, and/or articles in short-lived publications. Ideally such a method should include some explicit or implicit assumption on what percentage of time is devoted to asset creation rather than the production of short-lived goods.

Because of the need to identify actual assets, rather than occupations who may be involved in asset creation for some proportion of their time, we feel the best approach for TV & Radio is to identify the investments in content creation by UK broadcasters, whether they be in-house productions or commissioned from the UK independent sector. In the case of commissions, the costs of the funding broadcaster may not be sufficient since some proportion of the asset rights remain with the independent producer, providing the incentive for additional investment by the independent. This issue is prevalent throughout the creative sector and for almost all of the assets we consider in this report.

Other issues for measurement of GFCF in this asset type include the rental of copyrighted assets in the production of television assets, and the scope and divisibility of the final original. These are already discussed above in the context of film.

5.3 Books

As in the case of TV & Radio, the use of firm- and/or household-level microdata is an option but may make it difficult to accurately split GFCF estimates by asset type, and does not ensure that the output is an asset that is covered by copyright. The best way to address this
would appear to be the use of data on royalty payments including those mediated by the Collecting Societies.

5.4 Music
For Music, the use of firm- and/or household-level microdata would present potential data issues similar to those for Books. Therefore the superior data source would again appear to be data on royalty payments mediated by Collecting Societies.

5.5. Other Miscellaneous Artwork (Photography, Choreography, Art)

Identification of productive fixed assets
In the case of Miscellaneous Art, it is important to ensure correct identification of productive assets and avoid double-counting with assets already included in the National Accounts. This is discussed in greater detail in Appendix 1, in the context of valuables, where we argue that the potential for double-counting is limited. ‘Miscellaneous Artwork’ is included in the framework developed by Soloveichik (2010), where it is estimated at 7.7% of total US investment in artistic originals. UK investment in such assets may be considerable, and complete exclusion has implications for the quality of the final estimates. Data on royalty payments (e.g. for images and potentially art) would be useful, since they ensure, by definition, that the asset counted is being commercially exploited and estimation could be restricted to only those goods that have a service life of greater than one year.

5.6 Summary
Despite Table 1 showing that UK GFCF in originals is among the highest in the EEA, discussion of the recommendations advocated by Eurostat and the OECD highlights a number of identifiable gaps in the UK asset coverage. We suggest ways of building on ONS measurement as a means to improve current estimates in the National Accounts. We intend to collaborate with the ONS on this issue in the near future, with new estimates largely based on the contents of this report.
6. The current UK National Accounts: GFCF in Artistic Originals

Overview of UK estimates and their composition
The current UK estimates for GFCF in copyright/artistic originals, as included in the National Accounts, are made up of 3 components:

- artistic originals; broadcasting & recording, private sector
- entertainment, literary and artistic originals by public corporations
- artistic originals, publishing industry

Before looking at each of these in turn, it is worth considering a definitional point. The second category is entitled ‘entertainment, literary and artistic originals by public corporations’, and uses data on a small sample of UK-based production companies. Within the UK, examples of channels that could be used are the BBC, Channel 4 and S4C. Our data for this category is drawn from public sources (OFCOM reports). We note that we include the BBC as a public corporation. The BBC was re-classified from a public corporation (market sector) to general government (non-market sector) in 2006, when the ONS re-classified the BBC licence fee from a service charge to a tax. S4C was also re-allocated to general government since it is funded directly by DCMS.\(^17\)

Our definition of the market sector for this (and our accompanying) report(s), that is sections A-K & OP (SIC2003). Or put another way, the whole economy excluding Public Administration & Defence; Education & Health,\(^18\) in line with the definition used in EUKLEMS.

ONS estimates, by broad National Accounts category
Figure 2 presents current price (CP) GFCF for each of the three components of GFCF in artistic originals, as recorded in the National Accounts.

Figure 2: Total GFCF in Artistic Originals, by broad category: broadcasting, recording and publishing, public and private sectors, (CP, £mns)

\(^17\) For the BBC, the reasoning behind the change was that, because of its compulsory nature, the licence fee should be recorded as a tax rather than a service charge. Additionally, S4C is funded directly by DCMS. The ONS Press Release that accompanied this change in classification can be found at [http://www.statistics.gov.uk/pdfdir/cpst0106.pdf](http://www.statistics.gov.uk/pdfdir/cpst0106.pdf)

\(^18\) Therefore we will also be excluding from the market sector those parts of Education and Health that are delivered privately.
Note to figure: The solid bold line represents total investment in artistic originals. Its three broad components are also shown, with the unbroken black line being private sector investment in broadcasting and recording originals. The dashed line is investment in artistic originals by public broadcasting corporations. The dotted line represents investment in artistic originals by (book) publishers. Exact details of underlying data and the calculation are provided in section 1.1.

The data show that in 2002,\(^{19}\) nominal UK investment in artistic originals was £2.14bn. In the same year nominal UK CP GDP at market prices was £1,076bn. Therefore investment in artistic originals represented 0.20% of whole economy GDP, compared to 0.62% in the US.

In Figure 2, the series for total investment in artistic originals is dominated by private sector investment in broadcasting and recording originals, that is, private sector investment in television & radio and music recordings. Of these two components, broadcasting is by far the dominant figure. To emphasise just how much, in 2010 it made up 93% of estimated private sector investment in broadcasting and recording originals, and 67% of total GFCF in Artistic Originals as recorded in the National Accounts.

The details of calculation, for each of the three main categories and their sub-components, are summarised in the separate paper. Here we provide some overall comments.

### 6.1. Artistic Originals; Private Sector Broadcasting & Recording

\(^{19}\)Data for 2002 have been chosen simply to provide a comparison with breakdowns produced by the BEA (Soloveichik, 2010). The corresponding data for 2008 show investment of £3,179m, GDP @ market prices of £1,448,391m, meaning investment in artistic originals represented 0.22% of whole economy GDP.
6.1.1 Private sector broadcasting

The largest sub-component within this series is the data for private sector broadcasting. The ONS method is based on inputs costs for “stock” (long lasting) programmes with costs for flow programs subtracted off. In addition, these costs are then marked up to capture monopoly power in artistic creation, with an implied mark-up in 2008 of 3.5.

It should be noted that the data do not currently cover stock productions costs for new digital channels though these providers invest relatively small amounts in the production of UK originals, and mainly broadcast imported material not owned in the UK.

Finally, although data for the public corporations (discussed below) likely include radio broadcasting, there are no data for private/commercial radio within the estimates for private sector broadcasting. We feel that this is the correct treatment, since much of the output of such stations should be regarded as either flow programmes, or rentals from the existing capital stock for music originals, rather than the creation of a new asset.

6.1.2 Recording or Musical Originals

GFCF is estimated as a percentage of sales of recorded media. Rather than being based on ONS Retail Sales data, the sales figure is from an external source (British Phonographic Industry). There are a number of issues here. First, the sales of recordings has likely fallen in recent years: the industry reaction to counteract this has been to increase the prices for live performance to replace lost revenues (Soloveichik, 2010).

Note that like merchandising and sales of copies, live performance activity is not investment in itself, but rather rental from the existing capital stock. That is, performers will pay themselves an implicit rental from the percentage of ticket revenues they receive. But if the method to obtain investment is to assume revenues from music originals as a percentage of downstream activity, then an improved estimate would be as follows:

\[
GFCF(REC) = \lambda(SALES) + \theta(LIVE\ REVENUES)
\]

Second, note that sales royalties flow to record labels as well as artists, songwriters and publishers. A constant factor of sales, \(\lambda\), implicitly assumes that they all flow to artists.\(^{20}\) Therefore the true value of \(\lambda\) is likely higher. The current exclusion of live performance

\(^{20}\) Note that conceptually the correct sales figure to use is that of “worldwide sales for copies of UK assets”, rather than “UK sales for copies of worldwide assets”. However, the latter is all that is available.
revenues is particularly significant in the current industry environment, where such revenues are being used to make up for lost revenues from sales of recordings. The market is large in terms of revenue, comparable to that for recordings. The proportion of live revenues paid to artists and songwriters (θ) is also high. It should be noted that the income artists earn from live performance is ‘mixed income’. That is it implicitly includes a return for labour as well as a return to their asset(s). Therefore the implied royalties could be adjusted to account for this, either using some estimate of the opportunity cost for the time of artists as an estimated return to labour, or using the average ratio of ‘Compensation of Employees’ to ‘Gross Operating Surplus’

Further capital income is earned from performance and synchronisation royalties, among others. The split between artists/record labels/songwriters/publishers depends on the particular right in question. These are primarily distributed by the collecting societies: PRS (Performance Rights Society) and PPL (formerly Phonographic Performance Limited).

6.2 Entertainment literary and artistic originals; Public Corporations
The main question here is whether the data take sufficient account of the increased practice of contracting out production of new programmes. For instance from our discussions with the BBC we know that it is committed to filling 50% of its broadcast hours from in-house productions, 25% of hours from the independent sector, with the remainder competed for and allocated between the independent sector and its in-house divisions.

Overall the general principle of estimating GFCF using production costs is reasonable. Note that the estimates for public corporations include no allowance for monopoly power unlike the data for private sector broadcasting. This is relevant since revenues from copyrighted stock programmes must surely have increased in recent years, with the introduction of new digital channels whose output is completely made up of broadcasts of already exiting originals.

6.2.3 Film
We review the data for Film within public broadcasting corporations since that is where it fits into the ONS framework. The data show that in 2010, the estimated total investment in UK-owned film originals was around £33m. A comparative series from OFCOM on the production costs of Film, incurred by the Public Service Broadcasters (PSBs) suggests a

---

21 We are extremely grateful to Will Page and Chris Carey of ‘PRS for Music’ for valuable insights into the structure of the music industry.
22 We are grateful to Shaun Day, Rowena Goldman and Julia Read of the BBC for information on the structure of the television industry and of the BBC itself.
figure of around £200m for the same year. Although the series for the PSBs is likely closer to a truer estimate of UK investment than that from the ONS, the OFCOM expenditure data may include PSB rentals of non-UK productions. If it does include such rentals, they should be subtracted before use in any estimation of GFCF.

6.3. Publishing

We turn now to the third (dotted) line in Figure 2: GFCF in book publishing. The method used by the ONS is similar to that used in the recording industry. GFCF is estimated as a percentage of sales, which corresponds to an approximation of the royalty rate received by authors for the sale of paperbacks. With regard to the sales data, newspapers, magazines and other short-lived goods should be excluded since they do not meet the capitalisation criteria. Therefore the sales figure should refer only to Books (and Maps). Data for the resulting GFCF in literary originals are shown below in Figure 9.

Figure 3: Publishing: GFCF

![Literary Originals GFCF](image)

Source: ONS, based on a percentage of book sales

As with music originals, this method does not yield a representative estimate of investment. Rather it is an estimate of the annual capital income generated by the stock of UK book originals. It also takes no account of the royalties earned on sales that take place outside the UK. The royalty rate also appears to be based only on that received by authors, and does not make any allowance for the capital income earned by publishers who also own some of the asset rights. Lastly the sales figure does not include any other revenue sources such as those fees received from the rental of secondary rights, such as audio-visuals.

6.4. Summary
To summarise, we have discovered that: data for Film are almost likely an under-estimates since they are lower than UK Film Council data and only refer to a sample of UK production; for private sector broadcasting the estimates incorporate a mark-up; for the public broadcasting corporations more might be done on the role of the independent sector; for Books and Music, investment is estimated as a percentage of sales and both the sales data and percentage used might be reviewed.
7. **New data on the value of the Artistic Sector, including new estimates for UK GFCF in ‘Artistic Originals’**

In laying out our model of the interaction between the upstream and downstream sectors, we have shown that there are numerous ways to estimate investment in artistic originals, including use of data on the income flows to upstream asset owner(s); the aggregate input costs in asset creation; or the output of the creative sector. Our preferred method for each asset category depends on the asset type being measured and data quality/availability. In the following section we attempt to estimate investment using a variety of methods and triangulate data from each approach to help determine the robustness of our final estimate.

8. **Film Originals**

8.1. \( \Sigma P(X)X \), Upstream Input Costs. Film

To estimate upstream input costs, we have constructed a dataset for what we believe is the complete universe of UK films produced since 1991. First we acquired a list of all UK-certified films produced between 1998 and 2010 from the UK Film Council,\(^{23}\) along with accompanying data. Second we downloaded a similar list from the British Film Institute,\(^{24}\) this time for films produced between 1991 and 2001. Third we acquired a dataset from 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. 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. Therefore the final dataset includes all films classified as UK productions according to the-numbers.com, and all other UK-certified films.\(^{25}\) The final dataset includes data for all variables listed in Table 4.

\(^{23}\) We are extremely grateful to Nicholas Maine of the UK Film Council for providing us with this data. It is the same data that underlies published UKFC data on UK production, presented later in the report.

\(^{24}\) A list of films produced between 1991 and 2001 was taken from the BFI publication, “Producing the goods?” (2003).

\(^{25}\) We are extremely grateful to Bruce Nash of the-numbers.com for extracting this data and for valuable insights into the industry structure.
Table 4: List of variables, by source

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

Note to Table: BFI categories are defined as follows: A refers to films where the cultural and financial impetus is from the UK and where the majority of personnel are British; B refers to majority UK co-productions, where although there are foreign partners, there is a UK cultural content and a significant amount of British finance and personnel; C refers to minority UK co-productions, that is, foreign (but non-US) films in which there is a small UK involvement in finance and personnel; 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. See Box 1 for details on UKFC categories.

Source: thenumbers.com, UKFC, BFI

Figure 10 below shows the number of UK films in our dataset released in each year.

Figure 4: No of UK (co-)produced films, by release year

Note to figure: In total we have data for 2291 films produced between 1991 and 2011, including 80 that were produced in either 2010 or 2011. Since we do not have the complete universe of UK films for 2010/11, our estimates for GFCF only extend to 2009.
After cleaning, combining data on budgets from the BFI and the-numbers.com gives us data on total costs for over half of these films. Note that our data on production budgets do not include the advertising and marketing costs incurred by the studios in the distribution of the film. This is not an issue for this report since advertising is counted as a separate asset in the intangibles framework. For most of the remaining films, where production budgets are missing we do have some data on either international, US, or UK box office revenues, from either the-numbers.com or the UK Film Council. In those cases we impute budgets based on international box office revenues. Additionally we have some data on revenues from North American DVD sales. Where data on box office revenues are missing, based on information provided to us by the-numbers.com, we assume that US box office is equal to North American DVD revenues, and we impute international box office revenues based on the US figures. In turn we use international box office revenues to impute the remainder of missing values for budgets. It is worth noting here that ideally all estimates should be adjusted to account for unfinished or failed projects. However with no information on the frequency of, or expenditure on, such projects, we implicitly assume them to be zero.

Our dataset only includes the film release date rather than the dates of actual production. Therefore we need to make an assumption on the average length of film production, since it would be inaccurate to allocate the entire estimate of GFCF for each film to the year of release. We assume a mean length of production of one year for live action films, and two years for any form of animation. Costs are then spread across the production period as documented in Table 5. So if a live action film is released in say March 2006, 30% of costs are allocated to GFCF in 2006, and the remaining 70% to GFCF in 2005.

Table 5: Assumptions to allocate GFCF

<table>
<thead>
<tr>
<th>Production phase</th>
<th>Live Action</th>
<th>Animation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Month</td>
<td>%</td>
</tr>
<tr>
<td>Pre-production</td>
<td>1-6</td>
<td>10</td>
</tr>
<tr>
<td>Production</td>
<td>7-8</td>
<td>60</td>
</tr>
<tr>
<td>Post-production</td>
<td>9-12</td>
<td>30</td>
</tr>
</tbody>
</table>

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

27 We were 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.

28 We also assume a length of 2 years for films that are part-animated and part-live.
Note to figure: The above production schedules are based on industry information provided by Bruce Nash of the-numbers.com

The main issue in calculating GFCF is estimating the percentage of expenditure that represents investment in UK-owned assets/IPRs. We have already discussed the method used in the ONS R&D satellite account, where of R&D that is performed in the UK but funded by the Rest of the World, 10% is allocated to UK GFCF and 90% to the funder (Galindo-Rueda, 2007, Table 2). A similar technique could be applied to Film. Additionally, co-productions in Film are common, and we need some way of making a reasonable estimate of the split of ownership rights. A number of alternatives are available and there are arguments for and against each. We proceed by calculating three separate measures based on differing assumptions. The following text sets out the assumptions for each estimate in detail.

Central Estimates

1) Where the-numbers, BFI and UKFC data all indicate that there were no other co-producing countries, we assume the UK holds 100% of the copyright and allocate all production expenditure to UK GFCF

2) For co-productions we evenly split GFCF according to the number of co-producing countries e.g. if the UK is one of four co-producing countries, we allocate 25% of costs to UK GFCF.

3) Where the film is listed as BFI Category A or B, we assume that 55% of IPRs are held in the UK. For films not yet allocated, but listed as BFI Category C, D or E, we assume the UK owns minority rights and allocate 25% of production costs to GFCF.

4) To ensure we do not overcount investment, for films where either the UKFC or BFI list the UK as a (co-)producer, but the-numbers.com lists a country other than the UK as a sole producer, we apply a factor of 10%, in line with the methodology for funders/performers used in the ONS R&D satellite account (Galindo-Rueda, 2007). We do this to explicitly recognise that co-ownership does not apply an equal share of rights.

5) For non-English language films that are UK-certified, we assume that the UK was a minority partner, and apply a factor of 25% to estimate UK GFCF

---

29 BFI categories are defined as follows: A refers to feature films where the cultural and financial impetus is from the UK and where the majority of personnel are British. B refers to majority UK Co-productions, where although there are foreign partners, there is a UK cultural content and a significant amount of British finance and personnel. C refers to minority UK co-productions, Foreign (non-US) films in which there is a small UK involvement in finance and personnel. 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.
Upper bound

For our higher estimate, we relax the above assumptions to the following:

1) As with the central estimate, where the-numbers, BFI and UKFC data contain no information on other co-producing countries, and the film is listed as a UK production, we assume that the UK holds 100% of the copyright and we allocate all production expenditure to the UK.

2) We alter the second assumption, so we split costs evenly among co-producing countries, but for cases where the film is listed as BFI Category A or B, we assume that 75% of IPRs are held in the UK.

3) For all Schedule 1 films, or films in BFI category C, D or E, not yet allocated, we use the tax criteria described in Box 1 to estimate GFCF. That is, for films released prior to 2007 we allocate 70% of production costs to GFCF, and 25% for those released after 2007. We recognise that UK expenditure shares do not translate to ownership shares so we do not apply the tax criteria in our low or central estimates.

4) We alter assumption 4), so where either the UKFC or BFI list the UK as a (co-)producer, but the-numbers.com lists a country other than the UK as a sole producer, we apply a factor of 25%.

5) We remove the restriction on non-English language films.

Lower bound

1) As with the central estimate, where the-numbers, BFI and UKFC data contain no information on other co-producing countries, and the film is listed as a UK production, we assume that the UK holds 100% of the copyright and we allocate all production expenditure to the UK.

2) For co-productions we evenly split GFCF according to the number of co-producing countries e.g. if the UK is one of four co-producing countries, we allocate 25% of costs to UK GFCF.

3) For films not yet allocated, for those listed as BFI Category A or B, we assume that UK input to production does not necessarily translate to asset ownership, and allocate a minority 10% share to UK GFCF. We make no assumption of ownership for films categorised by the BFI as C, D or E.

4) To ensure that we do not overcount investment, for films where either the UKFC or BFI list the UK as a (co-)producer, but the-numbers.com lists a country other than the UK as a sole producer, we exclude all such films from estimates of UK GFCF.

5) As with the central estimate, for non-English language films that are UK-certified we assume that the UK was a minority partner, and apply a factor of 10% to estimate UK GFCF.
Additionally we produce a fourth series based on the time distributed production budgets for all UK-certified films, with no adjustment for the ownership of property rights (i.e. 100% of production costs for all UK-certified films in our dataset), and a fifth series which is a non-time distributed series of expenditure on all UK-certified films (i.e. total expenditure allocated to year of release). These two series are primarily produced for comparison purposes, and provide a check to ensure that our microdata is in line with the aggregate estimates produced by alternative sources.

Figures 11 and 12 compare data from the UKFC 2009 Statistical Yearbook with estimates from our own dataset. In Figure 11 we compare a non time distributed series for expenditure implied by our microdata (solid line labelled “UK_total_exp”) with a UKFC series for the production budgets of all UK-certified films. As can be seen they track each other fairly well although there is a discrepancy near the endpoints. In Figure 12 we compare the time-distributed series on budgets from our dataset (solid line labelled “Exp_spread_across_prod_period”) with the UKFC series on UK spend. Although the series compared are not 100% like-for-like, taken together the resemblance implies that our dataset is a fairly accurate reflection of aggregate UK film production over the period.

Figure 5: UKFC aggregates .vs. the-numbers microdata
Note to figure: Data for the dotted line taken from Figure 16.2 of the UK Film Council Statistical Yearbook and represents the total spend on UK-certified films, not limited to the UK. This is compared with total expenditure for films in our dataset (solid line: UK_total_exp).
Source: Own calculations and UK Film Council

Figure 6: UKFC aggregates vs. the-numbers microdata

Note to figure: Data for the dashed line taken from Figure 17.2 of the UK Film Council Statistical Yearbook, 2009, and represents all film production spending that took place in the UK, but not constrained to UK-certified films. It therefore excludes the expenditure that took place in say, a co-producing country. However, the reason that the values implied by the dashed line are on occasion higher than those of the dotted line in Figure 11, is that it includes expenditure on the production of films that either did not apply for, or meet the requirements, for UK certification (see Box 1). The series is compared with the time-distributed series for total production costs of UK-certified films in our datasets.
Source: own calculations and the-numbers.com.

Figure 13 presents Film GFCF as included in the National Accounts alongside our three final estimates: central, upper-bound and lower-bound. Our preferred estimate is the central estimate, which suggests that official estimates understate GFCF by a factor of eight in 2009. The upper-bound suggests the understatement could be as high as a factor of ten in 2009. Note however that even our lower-bound, produced using quite conservative assumptions, implies that official GFCF is underestimated by a factor of around seven in 2009. Note that these data are based on production costs, $\Sigma P(X)X$, that is there has been no estimation of the monopolists mark-up so it is implicitly assumed that $\mu=1$. The estimates are also consistent with our speculative discussion on UK production data earlier in the report.
8.1.1. Alternative method of estimating $\Sigma P(X)$, based on ASHE

Although the dataset described above is used as our preferred estimate, an alternative source for calculating upstream input costs is available to us. A much used method in measuring GFCF for other intangible assets is to use the wages for occupations involved in asset creation (Haskel et al, 2009). So for instance, in the case of own-account organisational investment, this involves collecting data on the wages of managers and using an estimate of the proportion of their time that, on average, is spent on improving the organisation of business processes. A similar method is used for software in the National Accounts, although that method also involves the allocation of overheads to software-creation. We explore here whether, at least for certain asset types, a similar method can be used to estimate GFCF in artistic originals, using data for relevant creative occupations.
The main data source is the Annual Survey of Hours and Earnings (ASHE). The ASHE is a business survey sent out to employers, based on a random sample of the National Insurance numbers of employees. As well as limited companies, it is sent to partnerships and sole proprietors, so in theory should also provide information on freelance and self-employed workers that have set up their own small companies. A possible alternative is the Labour Force Survey (LFS), a household survey that asks respondents for information on occupation, industry and pay. In theory this could provide a cross-check on the data from ASHE. However, there are limitations to the use of the LFS in this way. Firstly there is no stratification of respondents by either industry or occupation. Secondly the LFS does not record responses on the income of the self-employed,\(^{30}\) and so its use would require the imputation of data on gross pay using the responses of employees. If for any reason the characteristics of employees and the self-employed in that field differed, the final estimate would be biased. In the context of this project it turned out that these issues were insurmountable, and so we use ASHE as our sole source.

Before we identify occupations involved in the creation of motion picture originals, by inspecting the Standard Occupational Classification (SOC), it is worth remembering exactly what we are trying to measure. ASHE gives us data on income by industry and occupation, not capital income that flows to the owners of originals. Therefore we are not seeking to generate an estimate of \(P(R)R\) or \(P(N)N\), instead we are looking to measure upstream labour input costs, \(\sum P(L)L\), which we can use to inform an estimate on total upstream input costs, \(\sum P(X)X\). Table 6 provides a summary of the occupations that we consider to be involved in the upstream production of film.

---

\(^{30}\) The reason is conceptual as well as practical. The income of the self-employed includes a return for both labour and capital. In the National Accounts this is referred to as Mixed Income. At an aggregate level Mixed Income can be split using data on operating surplus and compensation of employees. However, splitting at the person-level would be much more complex and it is likely that many self-employed workers would not even recognise such a distinction within their income. In any case, LFS data on the incomes of the self-employed is not available, and Mixed Income in the National Accounts is estimated using administrative data from HMRC. Imputing pay for the self-employed based on that of employees of the same occupation would not be appropriate if it is likely that they have significantly different characteristics. In the case of occupations involved in artistic creation this seems likely, and employment status likely reflects the market and negotiating power of the artist and their relationship with funders.
Table 6: Film, Occupations involved in asset creation

<table>
<thead>
<tr>
<th>Asset</th>
<th>SOC2000</th>
<th>Additional note:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Film</strong></td>
<td>3411: Artists</td>
<td>Only those in the film industry (SIC 92.1)</td>
</tr>
<tr>
<td></td>
<td>3412: Authors, writers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3413: Actors, entertainers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3414: Dancers and choreographers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3416: Arts officers, producers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and directors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3432: Broadcasting associate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>professionals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3434: Photographers and audio-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>visual equipment operators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2121-9, 3111-9, 5241-9: Engineers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8141: Scaffolders, stagers,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>riggers</td>
<td></td>
</tr>
</tbody>
</table>

Note to table: We ensure that no occupations already used in the calculation of investment for other intangible assets are used, including managers. Workers recorded in industries dominated by the public sector (defined as Public Admin & Defence (L), Education (M) and Health (N)) are also excluded so our final estimates are reflective of our definition of the market sector (A-K & OP).

To ensure no double counting with any other types of artistic original or knowledge asset, we only include those workers recorded in the film industry. As can be inferred from Table 6, the main data issues are:

- a lack of fine detail in both the industrial and occupational classification, resulting in the inability to distinguish between assets e.g. freelance script-writers that work in either film, or television, or possibly both; or between and scriptwriters and other types of writers recorded in ‘Artistic & Literary Creation’
- a lack of time-use information associated with labour input in creative occupations e.g. how much of labour input goes toward asset creation (investment) and how goes towards the production of intermediate goods
- a limited dataset that only extends back to 1997
Data on wages do not provide us with estimates of upstream input costs since labour is not the only cost in artistic creation. We scale up the data by allocating overheads, based on the published breakdown of intermediate purchases at detailed industry-level as recorded by the ABI. Following a similar methodology to that used by the ONS for the capitalisation of own-account software (Chamberlin et al, 2007), we calculate non-labour costs as follows:

Non-labour costs of asset creation$^{31} =
\begin{align*}
\text{Total Purchases of Goods and Services} \\
- \text{Purchases of goods for resale without further processing} \\
- \text{Purchases of energy and water products for own consumption} \\
- \text{Purchases of Road Transport Services} \\
- \text{Purchases of Computer Services} \\
- \text{Purchases of Advertising and Marketing Services} \\
- \text{Purchases of Telecommunications services} \\
- \text{Commercial insurance premiums paid} \\
+ \text{Total Taxes, Duties and Levies Paid} \\
- \text{Total stocks and work in progress at end of year}
\end{align*}

Purchases of goods for resale without further processing are deducted as by definition they are not used as an input to the asset creation. Purchases of Road Transport Services are deducted because we also assume that these are, in the main, not an input to asset production. Purchases of Computer Services are likely an input to creation, but software is an already capitalised asset, therefore we deduct these purchases to avoid double-counting. We deduct Advertising and Marketing Services, firstly because they are not an input to the production itself, more to the distribution of the asset, and secondly because branding is capitalised as a separate asset in the intangibles framework, and so again we wish to avoid double-counting. We also deduct Purchases of Telecommunications Services and the payment of Commercial Insurance premiums for conservatism, since they are likely a considerable proportion of any other production that is not UK film asset creation. In addition we add on paid taxes and we deduct the value of stocks and works-in-progress at the end of the year. The reasoning for the deduction of stocks is that we assume that these are largely inventories of unused intermediate

$^{31}$ The ONS methodology is based on a view of the inputs to production of own-account software. The composition of deductions is therefore slightly different since we are considering the production of film originals. Additionally, the ONS adjust for consumption of fixed capital or depreciation. Data on depreciation at a detailed industry-level are no longer published as part of the ABI release and therefore we are unable to use them to adjust our overhead factors. However, any impact on the final estimate would have been limited.
goods. To account for remaining input costs, we use these data described to derive a ratio of other costs to employment costs, which we use as a factor, $\gamma$.

$$\Sigma P(X)X = \gamma(wN)$$

For the industry ‘Motion Picture and Video Production’ (SIC 92.11) our average estimate (2001-07) of the ratio of non-employment costs to employment costs, derived from published ABI data, is 2.28. Adding one to account for labour costs gives us an estimate for $\gamma$ of 3.28. Unfortunately we do not have any information on time-use in this industry in order to adjust our resulting estimate of $\Sigma P(X)X$, presented in Figure 14. It is for this reason that we expect this series to be an overestimate of UK GFCF in this asset type, and more reflective of UK-located production, rather than UK-owned asset creation.

Figure 14 shows the resulting estimates. Data for 2008 is around £500m. This exceeds the estimate for the ONS but is closer to our estimate based on the production budgets of UK-owned films. Note that a time-use assumption of 50% would result in estimates close to those from our preferred source.

Figure 8: Film Originals ($PxX$ using data on labour input from ASHE and the ABI), CP (£mn)

Source: Our calculations, based on ASHE

8.2. PrR, Downstream Rental Payments. Film
Royalty payments and licence fees flow to the owners of asset rights (IPRs) from downstream users. A relatively complete dataset on these rentals, along with information on whether they are one-off, intermediate or long-term payments would allow an estimation of investment as the NPV of the stream of royalties. At present there is no access to data on the rental payments made by users and distributed to the owners of UK Film Originals. In the case of Film, relevant payments would include those for cinema projection, DVD production, television broadcasting, and merchandise, among others.

8.3. \( P(N)N \), Upstream Output. Film

As explained and shown in Figure 5, data structured to the SIC does not match the upstream/downstream distinction used in our model. Therefore we feel that estimates based on industry aggregates are inferior to those from our data on the universe of UK films, but industry data are readily available from the ABI. The following text provides further insight into the structure of industries involved in asset creation, a description of what industry data relate to, and discussion of some issues presented by the use of industry aggregates. Additional data is also provided in Appendix 2.

In practice, data for the film industry are broken down into data on production, distribution (studios) and projection (cinemas). In a sense, the upstream is actually made up of both Production (SIC 92.11) and Distribution (SIC 92.12). The former carries out production in return for a payment from the owner of the final asset, usually the studio located in the Distribution industry. At the end of production, the production company hands over the final asset to the studio, along with the associated rights to commercialise the asset and receive revenues from the downstream industries. In effect the studio is outsourcing production activity. Therefore the innovator is the studio, since it is they who fund and own the final original. In practice the production company will sometimes be a subsidiary of the studio. Thus on the face of it, it might seem possible to treat the output of the production industry as an estimate of \( \Sigma P(X)X \), and output of the distribution industry as an estimate of \( P(N)N \) (plus some costs for advertising and distribution). The output of cinemas and the rest of the downstream, including DVD production, TV broadcasting etc., is \( P(Y)Y \).

Figure 15 charts gross output for both the Distribution and Production industry. As can be seen they do have a similar profile, but revenues are significantly higher in distribution, as we would expect, since they should reflect their market power as owners of IPRs. The chart also includes an approximation of \( \mu \), implied by the data on the revenues of production and distribution.
Figure 9: Output of the Film Industry, ABI, (CP £ms)

The implied series for $\mu$ is volatile, which is understandable since we would expect each singular film original to differ greatly in commercial value. On average, the value for $\mu$ between 1992 and 2007 is 2.26, supporting our point that whether or not one feels an estimate for $\mu$ should be implicit in the final estimates, its impact is important and it is currently treated inconsistently in both the OECD recommendations and the practices of National Statistical Institutes (NSIs). We should note that we consider this to be a poor approximation of $\mu$, since the ABI data includes UK-located production of foreign assets (exports) and data on revenues are inconsistent in the sense that they are a mix of royalties, asset purchases and fees.

There are significant drawbacks to using aggregate industry data in this way. The industry structure is actually more complicated than the above description makes out, and is basically...
divided into two components. The major studios (e.g. Disney, Fox, Paramount etc.) have in place long-term deals with production companies. In some cases the production companies are wholly owned by the studio. In others they are technically independent, but are often located on studio premises and work under the direction of the studio, which in turn funds all of their production and owns all final asset rights. The production company is incentivised with bonuses if financial targets are met. Contracts with studios and the relative independence of the production companies vary case-by-case. For example, one industry practice is for the production company to have an agreement with the studio where the latter acquires the rights to distribute the movie to cinemas and DVD producers, and the production company retains the television licensing rights. This can be thought of as the studio acquiring the rights in the short to medium term, but the production company retaining the long-term asset rights. Since the majority of revenue is earned soon after release, the studio effectively acquires the majority of asset rights. The upshot of this is that it is hard to distinguish between production and distribution using data from the SIC, and that some revenues in the production industry will also be derived from the commercialisation of owned originals, since long-term rights are often retained in that industry.

The other part of the industry consists of independent production companies. These firms produce films either with their own funds, through conventional borrowing or by engaging with outside investors. They then seek to sell the final asset to studios, again with the studio acquiring the right to distribute to cinemas and on DVD, and the production company usually retaining all other rights. Some independent production companies are large but the majority tend to be small, private companies that make relatively low-budget movies, distributed either by specialist divisions of major studios or independent distributors.

So, in practice, the studio owns the majority of asset rights, but often not all of them. As well as the production company, the writer of the screenplay, or the director and/or lead actors(s), may also be granted some percentage of rights. Likewise the author of the literary original if the production is based on an already copyright protected work. Such arrangements are private and differ case-by-case.

No information on the sources of revenue for either the production or distribution industry are published by ONS. In some cases the production company may be an in-house unit within

---

32 We are grateful to Bruce Nash of the-numbers.com for supplying us with valuable insights into the structure of the film industry.
33 The distributor pays for marketing and distribution, and typically receives a fee of around 30% of all cinema and video revenues.
the studio and in others it may be a subsidiary, alternatively it may be a wholly independent firm. This raises a variety of classification issues. For instance, an in-house unit within a large studio may be classed as a separate reporting unit within Film Production. Alternatively it may be part of the same reporting unit as the studio, and be allocated to Distribution.\textsuperscript{34} The production company may also generate revenues from the production of television programmes or commercials.

The significant amount of international trade that takes place in film production introduces further complications when interpreting industry aggregates. Trade is particularly important in the context of Film where countries compete using various tax/subsidy incentives. Production revenues are generated from at least three sources:\textsuperscript{35}

\begin{itemize}
  \item[i)] UK-located production of UK-owned assets
  \item[ii)] Non-UK located production of UK-owned asset
  \item[iii)] UK-located production of foreign-owned assets
\end{itemize}

Only i) and ii) are part to UK GFCF, and only i) and iii) are present in UK industry data. The third term, iii) is an export, since the asset rights are not held in the UK. This is analogous to a vehicle produced in the UK but purchased as an investment good by a foreign firm. Additionally, note that ii) is an import, but crucially is an import of asset rights, and is therefore part of GFCF.

Due to the complexity of the industry and the lack of suitable industry data available, we have chosen not to present any estimates based on industry aggregates in the main body of this report. Industry data on output, inputs and international trade are presented in Appendix 2, along with an approximation of GFCF designed to illustrate the type of industry data that is available along with its limitations.

\textit{Alternative estimates of UK film production industry}

Current estimates of UK GFCF in Film Originals are based on a sample of UK production. To provide some comparison, Figure 16 charts the total production costs or budgets of all UK-certified films, as defined by the UK Film Council (UKFC, 2009). As discussed previously (see Box 1), this does not necessarily mean UK-owned films and so does not refer to just UK investment, but rather to the total investment in originals including that by other funders or co-producing countries. As can be seen, from 2006 to 2008, production costs for

\textsuperscript{34}See Hellebrandt and Davies (2008) for a fuller description of classification issues that arise from the distinction between reporting and local units.

\textsuperscript{35}As mentioned, in practice since the production company often retains some asset rights they also derive revenues from those (usually licence fees for TV broadcast).
UK-certified feature films (both Schedule 1 and co-productions) were around £0.8-1bn. The figure of approximately £30m in the National Accounts implies that just 0.002% of the costs of UK-certified film originals represented UK investment. A more informed estimate requires more knowledge on the production costs of films that are owned by UK organisations and foreign organisations respectively.

Figure 10: Total Expenditure on UK-classified (not necessarily UK-owned) film

Note to figure: The above chart is taken from the UKFC Statistical Yearbook, 2009 (Figure 16.2). It refers to production budgets for Schedule 1 films, and total investment for co-productions. More information on the definition for Schedule 1 films is provided in Box 1.

Source: UK Film Council

Figure 17 is taken from the same report but this time charts UK spend, closer but still not equivalent to what we are attempting to estimate. It shows that between 2006 and 2008, UK spend on the production of Film Originals was around £600-800m. Although this series will certainly include films where the UK owns zero, or a minority, of the rights to the final asset, it also indicates the scale of investment that is potentially missing from the official data. Subtraction of UK production to which the UK does not own asset rights (exports) would yield an approximate estimate of UK investment.

Looking the composition of Figure 18, an approximate estimate of UK investment could be derived using the data on ‘Domestic’ productions and some proportion of co-productions. Using data for 2008 in this way would yield an estimate of around £200m. Such a figure may be a more appropriate proxy for investment in the National Accounts.
Table 7 below presents expenditure shares for non-exclusive production types in 2008. As can be seen, approximately 64% of expenditure went on inward investment productions, suggesting that in 2008, 36% of UK expenditure went on films that were largely financed and controlled from the UK. Applying such a factor to the figure of £1bn in Figure 17, would provide an estimate of UK investment of approximately £360m, twelve times greater than the estimate currently used in the National Accounts.

Table 7: UK expenditure shares (%), 2008
Inward Investment films 63.7%
Domestic UK productions 87.4%
Co-productions (other than inward) 44.8%

Note to table: The above data are from the UK Film Council, Statistical Yearbook, 2009 (Table 17.10).

8.4. P(Y)Y, Downstream Output. Film

As shown in the discussion of ONS methods for Books and Music, it is possible to derive a measure of capital income using data on downstream revenues with an additional assumption on the proportion of those revenues that flow back to the asset owner in the upstream. As noted, this is not conceptually equivalent to a measure of investment, although it can be shown to approximate investment if we invoke some strong assumptions.

In practice, estimating downstream revenues is extremely difficult since it requires detailed data at both the industry and product level. For instance, in the case of Film, first it would require data on the full streams of all revenues, including those earned from DVDs, TV broadcasting and merchandise, but not where they refer to TV programmes, sports or music. It should also not refer to films owned by non-UK organisations. In our dataset we do have partial information on box office revenues, and a small amount of data on North American DVD sales revenues. However, this is only a small component of the true downstream and we only have these observations for a limited number of UK films.

We also have the following information, provided to us by the-numbers.com. First, studios typically receive 50-60% of domestic (US) cinema revenues. Secondly, domestic (US) video revenues tend to roughly equal domestic (US) cinema revenues, and again approximately half return to the studio. Thirdly, TV, merchandising and other revenues are typically around 25% of cinema revenues. Finally after taking account of overheads, taxes etc., studio revenues approximately equal the production budget plus advertising costs, with a small loss usually reported by the studio for most films.

Therefore we did consider using our partial estimates of downstream revenues to back out investment, making the following assumptions. First, that the creation of film originals is in steady-state. That is capital deepening is constant with the additional restriction that there is a uniform life-length and depreciation rate across individual originals. Second, North American DVD revenues are approximately equal to US revenues. Third, 50% of DVD revenues are equal to 50% of Box Office revenues. Fourth, that the above approximations apply to international revenues and not just the US. Fifth, application of a factor of 1.25
would account for television, merchandising and other revenues. It turned out that our initial estimates based on this method were very similar to those based on production budgets. This is likely due to our use of box office and DVD revenues to impute data on budgets where they are missing, and the incomplete nature of the data on downstream revenues. Therefore we did not proceed with this method.

9. TV & Radio Originals

9.1. $\Sigma P(X)X$, Upstream Input Costs. TV & Radio

The ONS methodology for estimating GFCF in broadcasting originals is a cost-based approach. The following re-estimation builds on the ONS method and improves the data using industry sources.

The following information is based on discussions held with the BBC and data contained in separate OFCOM reports on the Public Service Broadcasters (PSBs) and the Communications Industry. Virtually all UK investment in the creation of originals is undertaken by the PSBs. The major non-PSB broadcaster is Sky, however data on investments made by Sky in UK stock productions are not available from OFCOM. Despite broadcasting approximately 400 channels, Sky investments in UK originals are considered to be relatively small at around £100m\(^3\) once sports and rights to other flow programmes are excluded. Instead their model is based on either repeats or licensed imports, with the majority of Sky expenditure on stock programmes made up of rentals for the rights to broadcast a show for set period or number of broadcasts. It is correct to record such expenditure as intermediate consumption for the user (in this example Sky), and capital income for the owner of the asset (say, a US network), just as for a cinema that pays a rental to project a film for x months. The difficulty arises when, say Sky, pays for the rights to broadcast for, say, 5 years. In that case it could be argued that Sky has made an investment in the licence to use, using OECD terminology. Accounting for this in practice would require detailed data on the timing, value and volume of such payments by broadcasters. Such data are simply unavailable.

---

\(^3\) Source: Our discussions with the BBC, and a Lecture by BBC Director General, Mark Thompson, given at the Edinburgh International Television Festival. Text available at: http://www.guardian.co.uk/media/2010/aug/27/mark-thompson-mactaggart-full-text
Of the PSBs, the Channel 4 model is based entirely on commissions and acquisitions, with no in-house production. ITV broadcast a mix of own-account and purchased 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, and has a similar model to that of Sky.

The independent TV production sector is basically split into two parts, with the industry structure similar to the film production sector. The first includes the large independent production companies, sometimes termed ‘super-indies’, who generate most of the value of the independent sector, although not necessarily the majority of commissioned hours broadcast. The second part is made up of smaller, more niche, companies that tend to specialise according to production genre (factual, drama, children’s etc.). For commissioned programmes, funding is usually provided by the broadcaster(s) in exchange for broadcasting rights in the short to medium-term. Long-term asset rights often remain with the production company, as in the film industry, although arrangements and the split of rights vary for each agreement/production.37

Figure 18 contains estimates of costs incurred by the UK PSBs in the creation of stock programmes, whether they originate in-house or are commissioned to the UK independent sector, based on OFCOM38 PSB or CMR reports. The data are based on programming spend by genre and extend back to 1998. In line with recommendations by OECD/Eurostat we limit GFCF to include only spend on stock programmes, which we define to include ‘Arts and Classical Music’, ‘Religion’, ‘Education’, ‘Factual’, ‘Drama/soap’, ‘Entertainment’ and ‘Children’s’, thereby excluding ‘News, current affairs and weather’ and ‘Sport’. Since we count ‘Film’ as a separate asset, we exclude data for that genre too.

Since the data only refer to the television output of the main PSBs, that is BBC, ITV, Channel 4 and Channel 5, we make additional adjustments to account for BBC radio stock programmes and S4C. For BBC radio, we use OFCOM estimates of BBC radio spend back to 2000 and data on the share of BBC broadcast hours in 2009/10 by genre. Multiplying spend by the share of broadcast hours that are of stock programmes, gives us an estimate of BBC expenditure on the creation radio stock originals of around £153m in 2009. Since our

---

37 We are grateful to Shaun Day of the BBC for the above information.
38 We are grateful to Steve Gettings of OFCOM for his assistance and provision of data.
radio estimates only go back as 2000 we extend them 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. There will be further inaccuracy if the production costs for radio vary widely by genre. For S4C we have estimates of spend on Welsh language output, back to 2004. We extend these back to 1998 using the mean growth rate of expenditure in 2004-9.

Figure 18 shows our estimates based on data from OFCOM to be similar to those produced by the ONS, especially for years prior to 2004.

Figure 12: UK investment in TV & Radio Originals (ΣPₓX), CP £mns

![Graph showing investment in TV & Radio Originals](image)

Source: Solid lack line is the ONS estimate as recorded in the National Accounts (for details see section 1.1). Dotted black line is an implied ONS estimate after removing the monopolists mark-up, μ. Solid red line is our estimate, based on data published by OFCOM.

We consider our estimates to be potentially more accurate representation of investment in broadcasting originals than those recorded in the National Accounts, but recognise our data still include a number of imperfections. First, estimates for Radio are based on 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. Second, the coverage of multi-channel platforms is inadequate. Whilst the data do include the
costs of BBC Digital, we have been unable to include any data for Sky or other such providers. Third, some proportion of rights for commissioned programmes remain with the production company. Therefore there is some incentive for the production company to invest additional resources in creation, alongside that provided by the funder. Our data makes no allowance for this. Fourth, one of the inputs to upstream production is conventional physical capital such as sets, studios, cameras and the like. Estimates should be adjusted for capital compensation and depreciation to account for this, but we have been unable to acquire any such data. Fifth, some sports broadcasts are clearly long-lived. In practice it is virtually impossible to allow for this using a cost-based approach. It may be that it is possible to account for sports using a revenues based approach, that is based on payments of P(R)R, from say DVD sales. This will be given consideration in any future work undertaken.

9.1.1. Alternative method of estimating $\Sigma P_x X$, based on ASHE

Although our preferred estimates are those based on the OFCOM data, an alternative estimate can be produced using the data on gross pay by both occupation and industry, available in the ASHE microdata, adjusted for overheads using information from the ABI. In the case of Television & Radio, we use the following list of occupations.

**Table 8: TV & Radio, Occupations involved in asset creation**

<table>
<thead>
<tr>
<th>Asset</th>
<th>SOC2000</th>
<th>Additional note:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TV &amp; Radio</strong></td>
<td>3411: Artists</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3412: Authors, writers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3413: Actors, entertainers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3414: Dancers and choreographers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3416: Arts officers, producers and directors</td>
<td>Only those in the TV &amp; Radio industry (SIC 92.2)</td>
</tr>
<tr>
<td></td>
<td>3432: Broadcasting associate professionals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3434: Photographers and audio-visual equipment operators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2121-9, 3111-9, 5241-9: Engineers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8141: Scaffolders, stagers, riggers</td>
<td></td>
</tr>
</tbody>
</table>

Note to table: We ensure that no occupations already used in the calculation of investment in other intangible assets are used, including managers. Workers recorded in industries dominated by the public sector (Public Admin & Defence (L), Education (M) and Health (N)) are also excluded so our final estimates are reflective of our definition of the market sector. Note that we define the MS as A-K & OP, including the BBC which resides in section O. Therefore our exclusion of LMN does not affect the inclusion of the BBC.
The methodology used is the same as that used for Film, and the same data issues apply. To avoid double-counting we ensure that we only include those workers in the TV & Radio industry, thereby excluding all workers already counted.

Using data from the ABI our estimate of the average ratio of non-employment costs to employment costs from 1999-2007 is 2.78, giving a final estimate for $\gamma$ of 3.78. Again we have no information on industry or occupational time-use, and so expect the resulting estimates to be an over-estimate of GFCF. Indeed as Figure 19 shows, estimated GFCF of £4.2bn in 2008 is much greater than the £2.8bn recorded in the National Accounts and our estimate of £2.2bn based on data from OFCOM, for the same year. However, note that this estimate does not include any adjustment to allow for the removal of flow programmes (time-use), meaning it is consistent with around 50% of expenditure being on the creation of stock programmes, with the remaining 50% spent on flow programmes.

**Figure 13: TV & Radio Originals (PxX using data on labour input from ASHE and the ABI), CP £mns**

![Graph showing TV & Radio Originals](image)

Source: Our estimates based on ASHE

9.2. P(R)R, Downstream Rental Payments. TV & Radio, B.2

Conceptually these data would include royalties and licence fees that accrue to those who hold ownership rights for TV & Radio stock originals. Note it does not include the rental payments made by TV and Radio broadcasters for say the broadcast of music originals, which are distributed to musicians and recording companies.
Application of this method is less suitable in the case of TV & Radio originals since so much activity is both created and used in-house, meaning the majority of rental payments are implied internal transfers for the use of in-house artistic stock.

9.3. P(N)N, Upstream Output. TV & Radio

We have no accurate data on the revenues of the upstream producers of television and radio originals. The only data available are those for the entire television and radio industry, as shown in Figure 20. That is the output of the upstream but also much of the downstream. A breakdown of industry revenues is not available from the ONS. Using data for the entire industry would result in significant double-counting. For instance, if we consider production commissioned to the independent sector, counting both the revenues received by the independent production company, on top of those received by the funder (broadcasting company) is inappropriate.

Figure 14: Output of the TV & Radio industry, ABI, (CP £mns)

Source: ABI published aggregates.
Note to figure: The component split (television and radio) for 1995-6 are disclosive, and so not presented here.
Conceptually, just as for Film, it is necessary to identify the residency of the owner of the final original, although it is our perception that in the case of TV & Radio, production is more likely to be performed in the country that funds/owns the final asset.

Figure 21 presents data on international trade in television, sourced from the FTV survey. Although the FTV release does not publish separate data on royalties or production fees for television, the Pink Book (Balance of Payments) does publish a total for the film, television and radio industries, allowing us to derive a separate figure for TV & Radio

**Figure 15: International Trade in the UK TV & Radio Industry (£mns)**

![Graph showing international trade in the UK TV & Radio Industry](image)

Source: ONS FTV release, published.

Since we are unable to split data for Television and Radio activities into data for the upstream and downstream, we are unable to distinguish between output and intermediate consumption in the producing and using sectors respectively. There is also no distinction between stock and flow programmes in the output data. As with Film, the definitions and composition of data on exports and imports are inappropriate to use in a derivation of GFCF.

**9.4. P(Y)Y, Downstream Output. TV & Radio**
As discussed in the context of other assets, estimating such a series would require information on the revenues of the downstream users of assets, that is, those that rent from the capital stock of final originals, such as the television and radio stations/networks. In practice, they may be genuinely renting capital services from the stock of originals and paying royalties for those services, or they may be renting from their own in-house stock.

With no breakdown of revenues and with industry data being closer to P(G)G, we are unable to derive a measure of P(Y)Y. To do so accurately would also require detailed data on DVD revenues, merchandise, advertising etc., but only for UK productions that meet SNA capitalisation criteria (stock programmes with a life of over one year). Even with such data, we would also need to know more about the relationship between P(R)R and P(Y)Y for this particular asset.

10. Literary Originals: Books

10.1 ΣP(X)X, Upstream Input Costs (ASHE). Books

In the case of Books or Literary Originals the only data on input costs that we are aware of are those from the ASHE and ABI. Therefore we use the same method as that described previously, using data for the following list of occupations:

Table 9: Books, Occupations involved in asset creation

<table>
<thead>
<tr>
<th>Asset</th>
<th>SOC2000</th>
<th>Additional note:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Books</td>
<td>3411: Artists</td>
<td>Only those in the Book Publishing industry (SIC 22.11) or Bookbinding (SIC 22.23)</td>
</tr>
<tr>
<td></td>
<td>3412: Authors, writers</td>
<td>All those not already allocated to Film or TV</td>
</tr>
<tr>
<td></td>
<td>3431: Journalists, newspaper and periodical editors</td>
<td>All those outside news agencies or news publishing</td>
</tr>
<tr>
<td></td>
<td>3416: Arts officers, producers and directors</td>
<td>Only those in the Book Publishing industry (SIC 22.11) or Bookbinding (SIC 22.23)</td>
</tr>
<tr>
<td></td>
<td>3432: Broadcasting associate professionals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3434: Photographers and audio-visual equipment operators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5421: Originators, compositors and print preparers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5422: Printers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5423: Bookbinders and print finishers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5424: Screen printers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3122: Draughtspersons</td>
<td></td>
</tr>
</tbody>
</table>
Note to table: we ensure that no occupations already used in the calculation of investment in other intangible assets are used, including managers. Workers recorded in industries dominated by the public sector (Public Admin & Defence (L), Education (M) and Health (N)) are also excluded so our final estimates are reflective of the market sector.

To avoid double-counting we only keep those support staff (printers etc.) recorded in the book publishing industry, thereby excluding those in textiles and other non-relevant industries. Similarly we only include draughtspersons (including cartographers) recorded in the book publishing industry.

ABI data for the Book Publishing Industry (SIC 22.11) implies an estimate for $\gamma$ of 2.46. With no information on industry or occupational time-use, and therefore the proportion of workers output that is investment and consumption goods respectively, the resulting estimates may be an over-estimate of GFCF in literary originals. On the other hand, if authors are inadequately sampled in ASHE, the result may be an under-estimate of GFCF. It is because of these limitations that our preferred approach for literary originals would be estimates based on the royalties distributed by Collecting Societies adjusted to account for returns to artistic capital for publishers. Unfortunately these data did not become available to use and so our final estimates are instead based on ASHE.

Figure 16: Literary Originals i.e. Books (P_X using data on labour input from ASHE and the ABI)

Source: Our estimates based on ASHE

Royalty payments that accrue to the owners of literary originals are collected by numerous Collecting Societies. We agree with the recommendations of both Eurostat and the OECD and feel that such data is the most appropriate source for estimating investment in literary originals. The main reason is that we do not seek to measure all expenditure on creating copyrighted material, much of which has little value, does not have a long service life and will often never be published or commercialised. Rather we wish to measure investment in assets that meet the SNA capitalisation criteria and generate a stream of income to the owner(s) of the asset. Data from the Collecting Societies is preferable as it allows measurement of precisely those revenues we are interested in, and restricts the sample to only those authors that have commercialised their IP, by definition. We would also need to supplement that data with estimates of the profits earned from artistic capital by publishers, including those earned from the publication of long-lived periodicals including academic journals.

It is worth saying a little more about the industry and its arrangements for the distribution of royalties. 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 to the publishing company. The payment (advance) made by the publishing company is some portion of \( P(N)N \) in our framework. That is, they have purchased some component of asset rights. Therefore, in the context of the book industry, although it would appear that the author is the creator, there is actually joint ownership of the final asset in the upstream sector.

The usual arrangement is that the author will receive an up-front advance based on a percentage of anticipated revenues. The publisher then has the right to extract revenues through wholesale distribution and other means. Royalties are normally calculated as some percentage of the wholesale price, and usually split between the publisher and author, with the split depending on the negotiating power of each party. Generally, royalties are only paid to the author after the advance has been recovered by the publisher. There is considerable variation in the type of royalty agreements reached and contracts usually specify a schedule of revenues for specific sales media, also usually agreed on an individual basis and sometimes depending on the genre of the book. It is worth noting that the business model for textbooks differs slightly, and the rights tend to be owned 100% by publishers. The reason appears to

---

39 A fairly common practice is to determine the percentage based on the number of sales achieved i.e. the percentage received by the author increases after the book reaches milestones in the number of sales. Royalties for foreign sales are also typically subject to a different schedule than those from domestic sales.
be that since such works are frequently revised, with new editions published, the publisher acquires the complete rights and changes are made by paid employees.40

Royalties for different types of rights are distributed through various collecting societies. Primary rights are the largest source of revenue for asset owners, that is, royalties from the sale of copies of the final asset (book sales). Additional royalties are paid for secondary rights, including fees for educational use (largely textbooks), photocopying, broadcasting (audio-visual) and public lending (libraries). Royalty payments for each of these rights are split between the owners of the asset (authors, co-authors, illustrators, publishers).

In the UK data on such royalties are available from: the Publishers Association which holds data on royalties for primary rights; the Authors’ Licensing and Collecting Society (ALCS) which holds data on royalties from secondary rights including educational and audio-visual fees; and the PLR office which holds data on royalties from public lending rights (libraries). Unfortunately legal and administrative barriers have prevented us from gaining access to these data in time for their inclusion in this report.


Little official data is available on the revenues earned by the owners of literary copyrights in the UK. We do have some data on the output of the book publishing industry, but since revenues are often split between at least two parties (author and publisher), industry data is of little use. Authors are typically freelance or self-employed, as a first or second job, and allocated in SIC 92.31 (‘Artistic and literary creation and interpretation’), alongside many other freelance workers involved in asset creation including musicians, actors, other types of writers among others. Publishers on the other hand, are a distinct sub-section within manufacturing in SIC 200341, and form part of the downstream as well as the upstream.

Figure 23 presents data on the gross output of each of these industries.

---

40 We are grateful to Rachel Soloveichik for discussions on the ownership and creation or artistic originals.
41 In the most recent industrial classification, SIC 2007, publishers are correctly removed from manufacture and print activity, and allocated to the Information & Communications industry. However, not all historical data have been converted to the new SIC at this point.
Figure 17: Output of the ‘Book industries’, (CP £mns)

Source: Published ABI aggregates. Note that ‘Artistic and Literary Creation’ includes a range of artists other than just authors.

Additionally, the Balance of Payments do not include distinct data on royalties for literary works. Instead they are aggregated with franchise rights, trademarks, patents and other forms of IP, as well as royalties for printed material, where the latter is not limited to just ‘books’. Difficulties distinguishing between output and input data in the upstream and downstream, and the lack of suitable data on international payments, means we are unable to present any estimate of GFCF based on an aggregate approach.


The intuition behind this approach is that downstream revenues provide information on the returns to artistic capital in the upstream. Accurate estimation of downstream revenues would require data on the distribution of books and other goods (film, television, merchandise etc.)
that rent from the stock of UK literary IP, excluding those goods that fall outside the
capitalisation criteria, where the owners (upstream) of rights are resident in the UK. Potential
downstream users do not only reside in the UK. Such detailed data at both the industry and
product level are simply unavailable.

Although the data does not accurately reflect true downstream revenues, the ONS do apply a
variant of this approach using data on UK book sales. As with Music, to estimate the value of
investment in books, the ONS multiply some estimate of sales of copies by an assumed
royalty rate. The main methodological issue is that UK book sales are not necessarily
reflective of the revenues generated by downstream users of UK IP. Even if they were, the
switch to forecasting in recent years has had implications.

One issue is that there are many possible sales figures. Figure 24 compares the sales
figure of the Publishers Association, and an aggregate from the ABI. The ABI are greater as
the turnover data will include income from all other sources as well as book sales themselves.

**Figure 18: Comparison of alternative series for Gross Output, CP (£mns)**

![Chart comparing alternative series for Gross Output, CP (£mns)](chart.png)

Note to figure: There is a methodological break in the data for the Publishers Association. Therefore
growth rates of the pre-2005 data have been used to extend the series back to 2001.
Source: ABI and Publishers Association

The following chart compares GFCF for literary originals produced by the ONS, with an
estimate produced using the same method but using the Publisher’s Association data for sales.
It shows that imputation of sales has resulted in an under-estimate of GFCF of around £77m
in 2009 i.e. £152m rather than £229m.
What is the appropriate royalty rate to multiply total sales? In the UK, for hardbacks, typical royalties are between 10-12.5%, with 15% for successful authors. For paperbacks, the typical range is 7.5-10%, increasing to 12.5% in exceptional cases. Some additional adjustment should also be made to account for the operating surplus from originals that accrues to publishers. Thus the diagram below uses 20% of Publishers Association Sales data and suggests an upward revision of ONS GFCF numbers.

Figure 19: Re-estimation of ONS GFCF using data from Publishers Association

Notes to table: lowest line is ONS data. Middle line is an alternative estimate with ONS sales replaced by sales data from the Publishers Association. Dotted red line is based on 20% of sales, using data from the Publishers Association.

11. Musical Originals

11.1. \( \Sigma P(X)X \), Upstream Input Costs (ASHE). Music
To estimate upstream input costs for Music we have again made use of the ASHE dataset which provides occupation-level data on the income of musicians. To account for remaining input costs we derive a ratio of other costs to employment costs, which we use as a factor, $\gamma$, and estimate a mean $\gamma$ of 3.16 from 1997 to 2007.

One of the main issues with this method is that part of estimated wages is the income generated from the use of the stock of originals e.g. live performances etc. That is, some part of the measure will be the labour costs to asset creation, and another part will be the return to musicians from the ownership of assets. Therefore for conceptual reasons our preferred method is that based on the discounted revenue streams received by the owners of the final original. Since we have encountered obstacles in accessing such data, our final estimates are instead based on ASHE. Table 10 sets out the occupations we use to estimate upstream labour costs in the production of music originals.

Table 10: Music, Occupations involved in asset creation

<table>
<thead>
<tr>
<th>Asset</th>
<th>SOC2000 Additional note:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Music</td>
<td>3415: Musicians</td>
</tr>
<tr>
<td></td>
<td>3416: Arts officers, producers and directors</td>
</tr>
<tr>
<td></td>
<td>3432: Broadcasting associate professionals</td>
</tr>
<tr>
<td></td>
<td>3434: Photographers and audio-visual equipment operators</td>
</tr>
<tr>
<td></td>
<td>2121-9, 3111-9, 5241-9: Engineers Only those in Sound Publishing (SIC 22.14) or Re-production of Sound Recordings (SIC 22.31)</td>
</tr>
</tbody>
</table>

Note to table: we ensure that no occupations already used in the calculation of investment in other intangible assets are used, including managers. Workers recorded in industries dominated by the public sector (Public Admin & Defence (L), Education (M) and Health (N)) are also excluded so our final estimates are reflective of the market sector.

To try and ensure that we capture labour costs in the creation of originals, we only use data for workers recorded in ‘Sound Publishing’ (22.14) or ‘Re-production of Sound Recordings’ (22.31). Estimates based on the wages of those workers, adjusted to account for additional overheads are presented below in Figure 26.

Figure 20: Music Originals (PxX using data on labour input from ASHE and the ABI)

An alternative to using data on production costs is to use data on the discounted revenues or capital income received by the asset creators or owners. Arrangements for royalties are similar to those that exist in the Book Publishing industry. That is there is joint ownership of the asset in the upstream. For instance, the ownership of the rights to lyrics are split between the songwriter and the publisher. Royalty payments for the use of alternative rights are distributed by different collecting societies.

In the UK, the Performing Rights Society (PRS) collects royalties for performing and mechanical rights, and PPL (formerly known as Phonographic Performance Limited) collects royalties for broadcasting and other audio-visual rights. In the case of audio-visual rights, payments are subject to a standardised industry split, with 50% received the artist and recording company respectively.

We wish to measure investment in recorded originals, that is the annual output of the upstream music sector. However, an annual sum of royalty payments is equivalent to the compensation earned by all vintages of music originals, regardless of the year(s) the original(s) was created. A true measure of investment would require allocation of royalties to each individual asset in a full longitudinal analysis, with each royalty correctly discounted according to the timing of the payment and the vintage of the individual asset. Unfortunately due to legal and administrative barriers, these data have not been made available to us in time for their inclusion in this report. However as already alluded to, provided we employ some
fairly restrictive (and likely unrealistic in the context of music) assumptions it is possible to derive an estimate of \( P(N)N \) based on the aggregate cross-sectional value of \( P(R)R \).

According to a standard PIM, the stock of artistic originals at different points in discrete time is:

\[
R_t = N_t + (1-\delta)R_{t-1} \\
R_{t-1} = N_{t-1} + (1-\delta)R_{t-2} \\
\text{Etc...}
\]

Where \( R \) is the real stock, \( N \) is real investment (GFCF) and \( \delta \) is the rate of decay in appropriable revenues (depreciation or ‘Consumption of Fixed Capital’ in National Accounts terminology).

Substitution yields:

\[
R_t = N_t + (1-\delta)N_{t-1}+ (1-\delta)^2N_{t-2}+ (1-\delta)^3N_{t-3}+ ....
\]

Under the assumption of ‘golden rule’ steady-state conditions, real investment grows at a constant rate (\( g \))

\[
N_t = (1+g)N_{t-1}
\]

\[
g = \Delta N / N
\]

Applying the golden rule condition to the expanded PIM yields:

\[
R_t = N_t + [(1-\delta)/(1+g)]N_t + [(1-\delta)/(1+g)]^2N_{t-1}+ [(1-\delta)/(1+g)]^3N_{t-2}+ ....
\]

Which reduces to

\[
R_t = N_t \{1/[(1-\delta)/(1+g)]\}
\]

And

\[
R_t = N_t [(1+g)/(\delta+g)]
\]

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

\[
P_t^R = P_t^N (\rho^N + \delta^R)
\]

Where \( P_t^N \) is the price of a unit of newly-produced finished original (an investment or asset price), \( P_t^R \) the price of renting a unit of the same original, \( \rho^N \) is the real rate of return in the music upstream sector and taxes are ignored. Multiplying both sides by \( R \), and then both multiplying and dividing the right-hand side by \( N \):
\[ P^g_R = P^N_N(\rho+\delta)R/N \]

Substituting in our expression for \( R/N \),

\[ P^g_R = P^N_N(\rho+\delta) \left[ \frac{1+g}{(\delta+g)} \right] \]

Therefore provided we assume that the production of music originals is in golden-rule steady-state, where growth in gross investment is equal to growth in net (of depreciation) investment, and the life-length and implied depreciation rates for all individual assets are equal, then the value of investment can be estimated using the cross-sectional sum of royalties with some adjustments for: the real rate of return to music originals; the growth of real investment; and the estimated depreciation rate. Of course for an accurate measure of depreciation, we would still need to conduct an analysis of the royalties that flow to individual assets using the microdata held by the Collecting Societies. For now we make use of the rates developed by the BEA (Soloveichik, 2010).

Note, that as described above, for music, literature and images, Eurostat and OECD recommend application of the following formula (in our notation):

\[ P(N)N_j = \Sigma P(R)R_j^*(1+g_{R_j}^{R_j}-r_j) \]

where:
- \( P(N)N_j \) is the present value of originals produced in year \( j \),
- \( \Sigma P(R)R_j \) is the cross-sectional annual sum of royalties,
- \( g_{R_j} \) is the annual growth rate of royalty payments, and
- \( r_j \) is an appropriate risk-free discount rate.

The Eurostat Taskforce recommendation is that estimates for growth in royalties \( (g^R) \) and the discount rate \( (r) \) should be either annual or moving averages (up to 5 years), and produced independently.

For 2008/9, we have data on aggregate royalties for music assets, kindly provided by the PRS.\(^{42}\) The following chart presents a breakdown of all revenues earned by UK music originals in 2009. Note the estimates for recording sales and live performance are not 100% accurate since they reflect revenues earned in the UK by world artists, rather than world

\(^{42}\) We are extremely grateful to Will Page and Chris Carey of the PRS for making this data available to us and for providing valuable insights into the structure of the music industry.
revenues earned by UK artists. Since the UK is considered a net exporter in music, it is likely that data adjusted for international trade would result in higher estimates.

**Figure 21: Breakdown of capital income from music originals, P(R)R, 2009**

![Breakdown of capital income from music originals, P(R)R, 2009](image)

Source: PRS for music
Note to figure: *adjusted for potential double-counting, overseas payments and collecting society commissions; **may conceptually be more appropriate to treat as revenue from branded capital, rather than from artistic originals.

Therefore we can build on ONS estimates by including the additional capital compensation earned by UK music originals, including those received by the upstream partners of musicians, namely record labels and publishers. Let us apply the relationship between P(N)N and ΣP(R)R, as set out above. In 2009, aggregating across revenues distributed by PRS and PPL for mechanical rights, performance rights as well as licensing and synchronisation revenues, with each adjusted to allow for payments sent to overseas artists and commissions taken by the relevant Societies, the total cross-section of royalty payments was approximately £650m. Our estimate of the growth rate is based on our ASHE series (1997-2008), at 3%. We estimate a geometric rate of depreciation rate based on Soloveichik (2010) and the rate used in the ONS VICS at 13.33% (Long, Turvey and Wallis, 2010). For the real rate of return
we use an estimate of 10%. Application of this method yields an estimate of investment of £931m.

We consider this estimate to represent a lower bound because the data do not fully account for all the compensation earned by artistic originals. First they do not fully account for revenues earned from sales of recordings, since PRS payments for mechanical rights only go to Songwriters. With the assistance of PRS we have derived an estimate of total compensation for mechanical rights and adjusted our final estimate accordingly. This income is split between the record label, artists, songwriters and publisher who each own a share of some of the rights. Further income is earned from live performance, with a typical industry arrangement being that the performers earn some percentage or all of ticket revenues, with the booking fee used to pay for remaining inputs. All of this income accrues to the artists and songwriters.

Including estimates for recorded sales and live performance in our estimate of total capital compensation yields an estimate of \(\Sigma P(R)R\) of £1,835m, and \(P(N)N\) of £2,701m. We consider these data our central estimate using this method. It is worth noting that conceptually the income earned from live performance is probably closer to ‘Mixed Income’ rather than pure capital compensation. That is, it includes a return for both capital and labour. Splitting the figure using an approximate ratio of ‘Compensation of Employees’ to ‘Gross Operating Surplus’ would result in an estimate of approximately £1,487m for \(\Sigma P(R)R\) and £2,189 for \(P(N)N\). However, in the National Accounts, the convention is to include Mixed Income within Gross Operating Surplus.

Finally we consider a higher bound of investment using this method. As we have already discussed, the upstream in music includes a number of agents with some share of ownership to (some) asset rights. These include the record label, artists, songwriters and publishers. The investment made by the record label is in the form of funding asset creation (through an advance) and building the reputation or brand of the artists and songwriter. The created brand is also used to generate upstream revenues which we consider here in our higher bound.\(^{43}\) Including such revenues in the valuation of investment yields an estimate of £2,833m for \(P(N)N\). Although we would argue that such revenues are a return to an asset created in the upstream music sector, brands are not considered to be assets in the SNA framework. For this reason we count them in our higher bound but exclude them from the central estimate, which is designed to be consistent with the SNA.

\(^{43}\) Note, we are referring to payments for the use of the brand or image of the artists, and not to payments for the use of music in advertisements which are already counted.
Figure 22: Approximation based on cross-sectional aggregate of Music Royalties

![Approximation based on cross-sectional aggregate of Music Royalties](image)

Source: own calculations.

Of course this calculation has relied heavily on the strong assumptions we have made by invoking steady-state conditions. It is also worth noting that data on sales royalties are based on UK sales or recordings; ideally they would be based on worldwide sales of UK recordings but such data are not available. Since the UK is one of the few countries that is a net exporter of music, we do not feel that the use of UK sales introduces any upward bias to the estimate. Therefore although figures derived from this method should not be seen as robust estimates of investment in music originals, they are useful for indicating the scale of investment that is potentially missing in the official data, and for supporting our view that the ASHE does not provide a representative estimate of the value of asset creation by musicians. A more informed estimate requires the use of royalties paid to individual assets over their lifetime in a longitudinal study. We hope that such data will be available in the near future.

**11.3. P(N)N, Upstream Output. Music**

The industry classification for music industry does not easily fit the upstream/downstream distinction in our framework. The music industry is essentially made up of four activities:

1) Recording
2) Songwriting and publishers
3) Live performance
4) Artist management
As usual the industry structure is complicated. Whilst initially it may seem that the innovators, located in the upstream, are the artists and songwriters, the important issue is who owns the final asset. In practice, ownership is split between the artist(s), record label, songwriter(s) and publisher, but the split of IPRs varies in individual agreements and by specific right (e.g. mechanical, performance, synchronisation etc.). In general, it seems that for less well-known acts, it is the record label that owns the majority of the asset rights, whilst larger acts retain a higher proportion due to their greater market power.

Figure 29 presents data for ‘Publishing of Sound Recordings’ (SIC 22.14), ‘Re-production of sound recording’ (SIC 22.31) and a combined aggregate for the two. We use the latter as our definition of the music industry although note that numerous musicians and artists will be recorded in Artistic and Literary Creation (SIC 92.31) alongside writers, authors and other creators of artistic assets.

**Figure 23: Output of the ‘Music industries’, (CP £mns), ABI**

Source: ABI published aggregates

**11.4. P(Y)Y, Downstream Output. Music**

Estimating a series for the downstream revenues for users of music originals would require information on the revenues of all users of UK music IP, that is those that rent from the capital stock of UK final originals, such as the television and radio stations/networks, merchandisers and organisers of live performances, including all those users that are located outside the UK. Additionally, this should include implied rentals of UK recording companies.
that are renting from their own in-house stock. Such detailed data are not available, however we do have industry data on sales from the British Phonographic Industry (BPI), a trade association for the British record industry, giving us an incomplete measure of \( P(Y)Y \), as shown below in Figure 30.

**Figure 24: Record Industry Revenues, BPI, CP (£mns)**

![Graph showing record industry revenues](image)

Source: BPI Statistical Handbook, 2010, collected in BPI surveys. Values are wholesale and so do not include VAT, and are net of returns. In this figure, other is defined to include Mobile income which includes ringtones, ringback tunes and music videos, Subscriptions, Ad-supported, and Other Digital Musical Content. Mobile Income prior to 2008 is included in the data for Online income.

As we have discussed, the official method for estimating asset creation in Music is to apply a factor \( (\lambda) \) to final downstream output and thereby estimate the component that represent royalty payments, leaving just that income that accrues to the owners of artistic assets. This is the basis of the official method used by the ONS, where a \( \lambda \) is applied to recording sales. Whilst conceptually annual capital income is not the same as investment, we have also shown that by invoking golden rule steady-state conditions and some strong assumptions on life-length and the mix of vintages in the capital stock, a measure of \( \lambda.P(Y)Y \) can be seen as a proxy for investment.

The data presented in Figure 31 below compare the two alternative sales series from the British Phonographic Industry (BPI) and the ABI respectively.

**Figure 25: Alternative series for Gross Output (Sales), Recordings, CP (£m)**

![Graph comparing alternative sales series](image)
Source: BPI data taken from their Statistical Handbook, with gross output defined as total income from sales of albums, singles, tracks, DVDs, subscriptions and other content, sold digitally or as physical formats. ABI data are for ‘Publishing of sound recordings’ and ‘Re-productions of sound recordings’, as defined by the SIC, combined.

There are two ways of interpreting the method of using a constant percentage of sales. The first is that the ONS is seeking to split output into respective components for the upstream (P(N)N) and downstream (P(Y)Y). The second is that the percentage is based on the royalty rate earned by the upstream, and that rate is applied to sales to derive some estimate of the annual capital income generated by music originals.

The method raises a number of issues. First, whilst application of the factor may generate an estimate of the annual cross-sectional sum of royalties, that is not the same as a discounted sum of lifetime revenues which accurately takes account of the vintage of assets in the UK stock. Second, the sales figure to which it is applied includes the sales of copies of non-UK assets. A more appropriate series would include sales of copies of all UK-owned originals sold worldwide, and exclude sales of copies of originals owned in the ‘Rest of the World’. This is important, especially if the UK has a positive trade balance in this industry. Third, the sale of copies is just one the downstream activities that use music originals. Others include live performance, merchandise, TV or Radio broadcast, sheet music and advertising. Fourth, the factor should take account of all royalties earned from music originals, by all (co-)owners
in the upstream, that is, artists, songwriters, publishers and record labels, not just the earnings of the songwriter for mechanical rights.

A potential way of improving the estimates in the National Accounts but maintaining a similar method would involve:

- replacing imputed estimates for sales with BPI data
- adjusting the royalty rate to account for the capital income earned by record labels, artists and publishers, since there is effectively joint ownership of the music original.
- estimating the implicit capital income earned from live performance, using a series on ticket revenues and a factor, \( \theta \)
- an adjustment for net exports

Through our work with ‘PRS for music’ we have access to detailed data on downstream sales of recordings and live performance, and various margins and components that apply to those revenues. To summarise, we estimate an improved measure of \( \lambda = 0.57 \), which implicitly includes the capital compensation earned by artists, songwriters, publishers and record labels. The high value of \( \lambda \) is a reflection of low share for intermediates, partly due to technical progress. We also estimate a provisional value of \( \theta = 0.4 \) which we apply to live performance revenues\(^{44}\).

The following chart applies this method and compares the ONS series with some alternatives that use improved estimates for component series’. The middle line is the ONS estimate of investment. The lower red line uses the same royalty rate, but an estimate of the trade value of sales as published by the BPI. The dotted red line removes various margins and costs from the BPI trade value to derive and estimate of \( \lambda = 0.57 \). It also adds in an estimate of the revenue earned from live performance, where \( \theta = 0.4 \).

**Figure 26: Alternative measures for GFCF when applying ONS method, CP (£m)**

\(^{44}\) We are grateful to Will Page and Chris Carey of PRS for providing us with these data. \( \theta = 0.4 \) is calculated by estimating the proportion of revenues that flow to artists from live performance. The aggregate figure for live revenues includes revenues from ‘at the event spend’ and all margins, which are removed. The remaining figure our estimate of capital compensation, which we use to derive \( \theta \). For recorded sales, the process is similar, with revenues adjusted to remove components such as retailer margins and costs for manufacture, distribution and marketing.
12. Miscellaneous Artwork

From our discussion of the Eurostat Taskforce report and their criteria for inclusion, as well as the development work by Soloveichik of the BEA, we know that any original that is covered by copyright, can be commercialised, has a service life of greater than one year and is not already recorded as an asset elsewhere in the National Accounts, can be counted as GFCF in artistic originals. Outside of the four assets already discussed, no other investments in artistic assets are used in the calculation of GFCF in the UK Accounts. This leaves a wide range of potential candidates for inclusion, such as photography/images, artwork, choreography and cartography, although in the case of the latter, it may be that these are already at least partly included in estimates for literary originals. The difficulty when
considering such asset types, where less data are typically available, is to ensure that what is being counted is the production of assets rather than intermediate goods.

12.1. Σ(P(X)X, Upstream Input Costs (ASHE). Miscellaneous Art

One method of estimating investment in this group of diverse assets is to estimate of the input costs to creation, using ASHE data on the relevant creative occupations. Additionally we have some detailed industry data from the ABI which can be used to generate a reasonable proxy for a factor, γ, to account for overheads.

Unfortunately we do not have information on the proportion of inputs that go into asset creation rather than final goods for consumption. To illustrate how this is a problem, consider choreography: of all artists, how many are involved in the creation of long-lived choreographed routines, and what percentage of their labour input is devoted to such creation compared with instruction or performance. We would speculate that instruction and performance takes up the majority of the time of most choreographers giving rise to potential over-estimation of asset creation using this method. It may be however that this is somewhat made up for if choreographers (or other artists) are not well represented in ASHE, which would cause an under-representation of N and therefore wN.

Table 11 below presents the list of occupations that we can identify from ASHE and consider to be involved in the creation of artistic originals not already counted elsewhere.

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

Note to table: we ensure that no occupations already used in the calculation of investment in other intangible assets are used, including managers. Workers recorded in industries dominated by the public sector (Public Admin & Defence (L), Education (M) and Health (N)) are also excluded so our final estimates are reflective of the market sector.
ABI data on employment and non-employment costs are available for ‘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 to the activities we are looking to estimate, they should provide a reasonable proxy for overheads in asset creation. Using data for 1999-2007 provides us with an average estimate for $\gamma$ of 2.87. Applying this factor to the data on wage-bills provides us with the results displayed in Figure 33.

**Figure 27: Miscellaneous Artwork (PxX using data on labour input from ASHE and the ABI). CP £mns**

Source: ONS, ASHE

**12.2. P(R)R, Downstream Rental Payments. Miscellaneous Art**

The best approach for estimating investment in such assets would be the use of data on royalty payments for their use, thus avoiding many of the conceptual and practical pitfalls that we have discussed so far. The use of royalties data would mean that:

- by definition ‘valuables’ would be excluded, since they are non-productive and held as stores of value. Royalties would only be paid for assets that are being actively used in production
- by definition, all estimates of investment would be copyright-protected
- only goods with a service life of longer than one year would be included. 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 our intent to make use of such data for this report, due to legal and data protection issues outside of our control, we have not been able to access this data in time for inclusion in this report. We would recommend that such sources be used in the future, including for official National Accounts estimates, where the exclusion of such assets ignores a significant amount of investment activity.

12.3. P(N)N, Upstream Output. Miscellaneous Art

Figure 34 contains gross output data for numerous industries relevant to this asset category. However, we have no data on international payments/receipts to adjust these series. Additionally, as mentioned in the context of literary originals, we need to be careful in terms of meeting the SNA capitalisation criteria. Taking the example of photography, revenues in the photography industry are largely going to comprise of payments for final consumption from Households, and payments for the intermediate consumption of short-lived goods. This issue applies to output in all other industries considered in the chart below.

Figure 28: Miscellaneous Art, Gross Output (CP £mns)
Note to figure: ONS published data, aggregated from the ABI. Data for: Photography (74.81); Live theatrical presentations (92.31/1); Other Artistic & Literary Creation (92.31/9) & Dance halls and Dance instructor services [excluding licensed clubs] (92.34/1). Other Artistic & Literary Creation includes the activities of a wide variety of artists from authors to painters to songwriters.

The above series do not include any data for museums or galleries. Consideration of such activity is highly problematic in a practical and conceptual sense. Additionally these organisations are largely outside of the market sector, which is what we are primarily interested in, and so we ignore them here.

Although the above chart tells us that these activities are significant in terms of output, we have little to no information on the proportion of output that is asset creation compared to what is intermediate or final consumption. This would require a large volume of detailed information on for instance: the value of copyrighted images with a long-service life compared to those with short service lives; or the amount of revenue earned from the rental of choreographed routines compared to that earned from recreational dance instruction. Such data are unavailable.

12.4. P(Y)Y, Downstream Output. Miscellaneous Art
For reasons discussed, estimation of upstream asset creation for these assets is difficult. Estimation of downstream revenues from the wide range of users, regardless of their residency or location, is even more problematic. Therefore no estimates for this measure are presented in this report.

13. Summary and Evaluation of Final Results: by Asset

Before presenting a summary of our final results, it is worth saying a little bit more on their features and any remaining shortcomings.

a) Film:
Our preferred estimates are based on the production costs of all UK films since 1991, with ownership shares calculated using microdata for each individual film from a custom-built dataset, in line with the sum of costs approach recommended by the Eurostat Taskforce and the OECD. Our measure is a step forward from the official estimates, which are currently based on just a small sample of UK-owned productions.

It could be argued that since we base our data on production costs, we do not take account of the upstream market power that arises from ownership of a unique and protected asset. To do so, would require extensive information on revenues, including that from DVD sales and rentals, merchandise, foreign translation, television broadcasting as well as the standard box office streams. Whilst we do have some partial information on those revenue streams, firstly they are too limited to produce reliable estimates, and secondly we already make use of them to impute data for production budgets for films where data on production costs are missing.

Estimates based on our preferred method are compared with estimates from alternative methods as well as the official ONS series in Table 12.

b) TV & Radio:
For this asset the sum of costs approach is recommended by the Eurostat Taskforce and the OECD, and we too use it as our preferred method. However, we still feel that there may still be some potential undercount of investment in TV & Radio originals.

First, there is some international collaboration in the production of stock originals for TV and Radio. Consider the hypothetical but realistic example of a commissioned production created in the UK independent sector, where the funding is provided by a UK PSB and, say, a US television network. In return for the provision of funding, the UK PSB receives the rights to broadcast the original in the UK for x years or N broadcasts. Likewise, the US network
receives similar rights for broadcast in the US. However, the independent production company retains the rights to commercialise the asset in all other international markets, as well as longer-term rights (for DVDs etc.) in the UK and the US. By only counting the funds provided by the UK PSB, we are missing additional investments (revenues) made in the independent sector for (from) the right to exploit the underlying asset in the medium- to long-term.

Second, our estimates are built from the costs of specific genres. In reality producers of UK originals (stock programmes) will rent from their own capital stock (both tangible and intangible) during the production process. For example, from their stock of buildings where sets are located, or from the machinery and equipment used in production. Therefore the final estimates should include some element of capital compensation, \(P(K)K\) as a component of \(\Sigma P(X)X\), to allow for this. Our data, based on reports produced by OFCOM, do not include this element.

Third, we have shown that the decision on whether to estimate from the side of inputs or revenues has important implications for the final estimate. That is, data on revenues will implicitly include output generated from the monopoly power granted by the IPR. Data on costs will not. We are fairly ambivalent on the conceptual issue of whether the mark-up, \(\mu\), should be included in the final estimates.\(^{45}\) However, we do feel that it is important that the term is treated consistently, across asset categories and also across countries. At the moment this is not the case.

Fourth, estimates for TV & Radio are based on a definition of what constitutes a long-lived (stock) original. This excludes investment in rights to broadcast sports events, as it is considered that such rights have a relatively short service life. It is clear that broadcasts of certain events do have a much longer service life than just one year. However, there would appear to be an element of randomness, that is at least determined by the final results rather than the event itself, in which broadcasts have a long service life. Since our estimates are based on costs and it would certainly not be correct to include the costs for all sports productions, we follow the convention and exclude sports rights for practical reasons.\(^{46}\) As well as sports, other types of ‘flow’ programmes also appear to have some longevity, hence the clip archives maintained and used by broadcasters. However, again, whist conceptually

\(^{45}\) Based on current conventions and the measurement of R&D on a costs basis, an assumption that \(\mu=1\) appears sensible.

\(^{46}\) It may be possible to generate estimates for TV & Radio based on revenues rather than costs. In this case it would be possible to use revenues earned from sports genre DVDs in the estimation.
these should be included, accurate measurement would be impractical. Likewise, it may be that there is longevity in more radio productions than we have considered.

Fifth, our data do not include estimates for multi-channel satellite and cable broadcasters, being based on official OFCOM data: data on investments in the creation of UK stock originals by these platforms are difficult to obtain information from.

Estimates based on our preferred method are compared with estimates from alternative methods as well as the official ONS series in Table 12.

c) Books:
The approach recommended by the Eurostat Taskforce and the OECD is that based on the NPV of future receipts from users of the asset/IPR. It is also our preferred method in the case of Literary Originals.

Unfortunately due to events beyond our control we were unable to gain access to UK microdata on royalties in time for the completion of this report. Accurate estimation would have required data on the full stream of revenues in terms of the types of rights and for the complete time-series. Limited data would be of little use i.e. estimation of the value of based solely on primary rights would be misleading and the basis of the methodology relies on a full revenue stream correctly discounted. Likewise, use of data for a limited sample of years would not allow for accurate accumulation of revenues or analysis of revenue schedules.

Estimates based on our preferred method are compared with estimates from alternative methods as well as the official ONS series in Table 12.

d) Music:
The approach recommended by the Eurostat Taskforce is that based on the NPV of future receipts. It is also our preferred method in the case of Music Originals.

Unfortunately due to events beyond our control we were unable to gain access to UK royalties data in time for the completion of this report. Accurate estimation would have required data on the full stream of revenues for the same reasons given above for books originals.

We have however estimated an approximation of the asset value created in 2009 in a steady-state model. Modelling investment in long-lived music as if in steady-state appears particularly inappropriate in light of the current industry conditions and dynamics. This
exercise was carried out to demonstrate the potential order of a measure based on revenues and should not be considered a representative estimate of UK investment in Music Originals.

Estimates based on our preferred method are compared with estimates from alternative methods as well as the official ONS series in Table 12.

e) Miscellaneous Artwork:
Due to the range of potential goods that could be included in this category, and the lack of data availability, we consider our estimate to be an undercount of asset creation in this area.

Summary
Estimates based on our preferred method are compared with estimates from alternative methods as well as the official ONS series in Table 12.

Table 12: GFCF by asset and method, CP estimates for 2007

<table>
<thead>
<tr>
<th>Method</th>
<th>A. Film</th>
<th>B. TV &amp; Radio</th>
<th>C. Books</th>
<th>D. Music</th>
<th>E. Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) ΣP(X)X</td>
<td>£183m</td>
<td>£2,297m</td>
<td>£846m</td>
<td>£209m</td>
<td>£718m</td>
</tr>
<tr>
<td>(2) ΣP(R)R(t)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) ΣP(R)R(x)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) λ.P(Y)Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) P(N)N</td>
<td>£890m</td>
<td>£1,992m</td>
<td></td>
<td>£251m</td>
<td></td>
</tr>
<tr>
<td>(6) Official ONS estimate</td>
<td>£34m</td>
<td>£2,598m</td>
<td>£147m</td>
<td>£159m</td>
<td>-</td>
</tr>
</tbody>
</table>
Table 13: GFCF by asset, comparison with US and official UK estimates, 2002

<table>
<thead>
<tr>
<th>Asset</th>
<th>US ($bn) (Soloveichik)</th>
<th>Official ONS estimates</th>
<th>New estimates for UK (£bn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>$65.1bn</td>
<td>£2.14bn</td>
<td>£3.78bn</td>
</tr>
<tr>
<td>% of GDP</td>
<td>0.62%</td>
<td>0.20%</td>
<td>0.35%</td>
</tr>
<tr>
<td>(1) Movies</td>
<td>$9.8bn</td>
<td>£0.02bn</td>
<td>£0.16bn</td>
</tr>
<tr>
<td>% of Artistic Originals</td>
<td>15.10%</td>
<td>0.94%</td>
<td>4.34%</td>
</tr>
<tr>
<td>% of GDP</td>
<td>0.09%</td>
<td>0.00%</td>
<td>0.01%</td>
</tr>
<tr>
<td>(2) Music</td>
<td>$7.6bn</td>
<td>£0.13bn</td>
<td>£0.17bn</td>
</tr>
<tr>
<td>% of Artistic Originals</td>
<td>11.70%</td>
<td>6.07%</td>
<td>4.60%</td>
</tr>
<tr>
<td>% of GDP</td>
<td>0.11%</td>
<td>0.01%</td>
<td>0.02%</td>
</tr>
<tr>
<td>(3) Books</td>
<td>$7.1bn</td>
<td>£0.21bn</td>
<td>1.01bn</td>
</tr>
<tr>
<td>% of Artistic Originals</td>
<td>10.90%</td>
<td>9.81%</td>
<td>26.72%</td>
</tr>
<tr>
<td>% of GDP</td>
<td>0.07%</td>
<td>0.02%</td>
<td>0.09%</td>
</tr>
<tr>
<td>(4) TV</td>
<td>$35.6bn</td>
<td>£1.78bn</td>
<td>£1.94bn</td>
</tr>
<tr>
<td>% of Artistic Originals</td>
<td>54.70%</td>
<td>83.17%</td>
<td>51.32%</td>
</tr>
<tr>
<td>% of GDP</td>
<td>0.34%</td>
<td>0.17%</td>
<td>0.18%</td>
</tr>
<tr>
<td>(5) Misc</td>
<td>$5bn</td>
<td>£0bn</td>
<td>£0.49bn</td>
</tr>
<tr>
<td>% of Artistic Originals</td>
<td>7.70%</td>
<td>0.00%</td>
<td>12.96%</td>
</tr>
<tr>
<td>% of GDP</td>
<td>0.05%</td>
<td>0.00%</td>
<td>0.05%</td>
</tr>
</tbody>
</table>

Note to table: Data for 2002 for comparison with US data, constructed on the same basis as Table 2.

New estimates for artistic originals are 0.35% of GDP in 2002. Looking at the data by asset category shows our results to be more in line with those from the US. It is worth noting that where data on production costs are not available, estimates in Soloveichik (2010) are based on revenues including for television, music and books. For instance, in the case of television, estimates were based on revenues for cable subscription and advertising. Therefore implicit in the US estimates is the mark-up for monopoly power in the innovation sector. In contrast all of our new estimates for the UK are based on either direct or indirect measures of upstream production costs, with no allowance for upstream market power. With this being the case, we would expect the relative UK shares to be lower than those for the US.

Bearing this in mind, two areas that still stand out are Film and Music. Although estimates for Film are still low relative to the US, we consider this to be a reflection of the role of Hollywood in worldwide Film production.

For Music Originals, our final estimate is just 0.02% of UK GDP in 2002. We think that this is likely due to our use of occupational data on wages from ASHE. Although sole traders, freelance workers and the self-employed are covered by ASHE, we do not believe they are covered as adequately as say employees in a more conventional industry. This is one of the reasons why we had intended to use data from the collecting societies as our preferred source.
for this asset. Unfortunately due to factors beyond our control we have been unable to make use of this data.

Of the remaining assets, data for Television is also considerably higher in the US. Two related factors come to mind here. First, the US estimates are based on revenue and therefore include additional rents earned by the upstream sector in the US. Second, in recent years the US television industry appears to have begun to acquire a similar status to the US film industry, and is generating revenues from big budget productions that it exports worldwide. This should be borne in mind when comparing US data with UK data that are based solely on costs of production. Finally, data for Books and Miscellaneous Art appear relatively in line with the US data.
14. Comparison with US estimates: Data and methodology

Throughout this report we have made extensive reference to the recent work of Soloveichik of the BEA. The following section compares our data and methodology to that used in Soloveichik (2010), and documents discussions between us, including practical and conceptual issues in the data and some checks on the robustness of the data used. Issues regarding depreciation are discussed in a later section, where we also make use of data kindly supplied to us by Soloveichik.

14.1. Film

Our preferred estimates are based on the production budgets for individual films. In estimates for the US, a similar approach was taken that also made use of data from IMDB.com, which as well as production budgets gives information on the production studio and country of ownership.

To provide a check on our data, Soloveichik has sent us data on joint UK/US production back to 1915 from her own dataset. Figure 35 compares current price UK investment in joint UK/US productions with our estimates, from 1991. Total UK expenditure from our own dataset, with no adjustment for ownership shares, is represented by the solid bold black line. After applying our assumptions on ownership shares we generate a central estimate and upper and lower bounds. The central estimate and upper bound are represented by the black unbroken line and the black dashed line respectively.

As can be seen, the series for US/UK co-productions is fairly consistently at around 40-60% of total expenditure on UK films. It also tracks our higher bound of UK investment fairly closely until the early 2000s, at which point it moves to a higher point than our assumed upper bound. This suggests that our estimation of film investment may be slightly too conservative. We believe this may be due to the following factors:

- our dataset is more likely to include real data for big budget movies. Lower budget movies are more likely to have been imputed using data in box office revenues, sometimes based on data for the US. If low budget British movies tend to do fairly poorly at the US Box Office, as seems likely, our imputed budgets may be too low. Additionally, it may be that low budget movies are not comprehensively covered in our dataset
- related to the first point, box office revenues from the UKFC and BFI are not as up-to-date as those from the-numbers.com. That is they are box office revenues as of 2003. This may have introduced a downward bias to some of our data for budgets
- our assumptions for co-productions are fairly conservative due to the lack of real information on funding and ownership shares. Since greater information on this is available from IMDB.com, the UK share of joint UK/US productions may be more accurately calculated.

Since it appears that significant improvements could be made to our dataset using data from IMDB.com, we plan to investigate this issue further in future work.

An additional implication of the data is that from 2003, almost all UK production was co-funded by the US. When considering this, it should be borne in mind that UK films with higher budgets tend to be high profile Hollywood movies, whilst sole UK productions tend to have smaller budgets. The latter are also typically less likely to be of a genre that includes expensive features and/or special effects.

**Figure 29: Comparison with BEA data on joint UK/US productions, CP £mns**

![Graph showing comparison between different UK/US productions data sources](image)

Source: Our estimates compared with Soloveichik data
Note to figure: BEA data refer to year of release rather than year of production. Our estimates are for the year of production. All data are nominal and expressed in £mns. BEA data were converted to sterling using an ONS series for the annual weighted average of the dollar/sterling exchange rate.

More generally, when comparing with the data for the US, we see that total UK production is around 4% that of US production (around $400m compared to $10bn in 2009). Initially this may appear small, but the position of Hollywood as a world centre for film production should
be borne in mind. Additionally, data sent to us by Soloveichik show that relative to the US, UK films only generate 3% of the DVD sales revenues generated by US films. For premium cable revenues the relative proportion is 4%. Similarly US television audiences on non-premium channels for UK movies are 3.5% of those for the US. This provides some support for our estimate of the relative size of the film production sector in each country, although note that these revenue comparisons do not take account of how well UK films export to the US.

As explained in the description of our methodology for estimating investment in Film, we aggregate production costs (budgets) across what we believe to be the entire universe of UK films, but for many of those films we have to impute production budgets based on box office revenues and the imputation may be introducing some bias into our final estimates. First, it is more likely that data are missing for lower budget films, and in turn it is more likely that lower budget films are sole UK productions. We are more likely to have data for higher budget films and these are more likely to consist of US/UK co-productions. Therefore our imputation of budgets for ‘smaller’ films will be based on trends for bigger budget productions.

Second, we think there may be some impact from failures or ‘flops’. Consider investments made in mineral exploration, where a mining firm purchases the right to explore 100 sites. Now it may turn out that 98 of those sites are unsuitable for extraction, and only 2 are actually mined. The revenues generated will greatly exceed the cost of the rights to explore those 2 sites. But the relevant costs are for all 100 sites, that is, the cost for failures, which have been built into expectations. So it is clear that the cost-based estimates should include costs for productions that did not reach the end of filming. Indeed, it should also include the cost of resources devoted to projects that did not even commence. At the moment this is not the case in our dataset. Additionally, as mentioned, we believe we may have a lack of data for lower budget movies. Sometimes such films are not even distributed to cinemas and go straight to DVD release. If such films are under-recorded in our dataset, as we believe may be the case, there will be some bias in our final estimates.

14.2. TV & Radio

For Television & Radio, we have used the production spend figures released by OFCOM in their annual reports on the UK PSBs and Communications industry. Unfortunately this only extends back to 1998. To extend the series back further we use the growth rates of the existing ONS data.
The BEA approach for this asset category was to base estimation on purchases of advertising and cable subscriptions. Therefore a crucial difference is that the US data should implicitly include some mark-up for the market power of the innovator. Such an approach would be more difficult to apply in the UK since the BBC is a publicly funded organisation that is not permitted to sell advertising or charge subscriptions for its broadcasts.

14.3. Books
For literary works US estimates are based on sales of books and also fiction magazines, and industry data is used alongside microdata on sales (by edition and week) purchased from Nielsen, to back out estimates of the total profits earned from each original.

It had been our intention to use data on the royalties received by authors as a basis for estimating UK investment in this asset type. Since ownership of originals is split between the author and publisher, those royalties would have needed to be grossed up to reflect the total capital compensation earned including that by the publisher. However, due to legal obstacles, data from the relevant collecting societies has not been made available to us in time for the writing of this report. Therefore instead our estimates are based on the incomes of authors and writers reported in ASHE. A potential area of future work would be to use similar data to that used in the US and/or that held by the Collecting Societies, the Publishers Association and the British Library, if and when it becomes available.

14.4. Music
For recording originals, US data is based on explicit and implicit royalties earned from music sales (including sheet music) and live performance. Historical data are estimated using data on the number of musicians taken from the US Census.

As with Books, it had been our intention to take a similar approach, based on the royalty revenues earned by musicians, grossed up to account for the ownership share of recording companies. However, again this data has not been made available to us due to legal and administrative issues. So again our estimates are based on the incomes of musicians reported in ASHE. In the future we would like to triangulate our estimates with those generated by the data on royalty revenues, held by the Collecting Societies. In the meantime we have produced estimates for the most recent years based on a cross-sectional sum of annual revenues and royalties. Although this relies on numerous strong assumptions that likely do

47 This is more relevant to data for earlier years when books tended to be serialised in magazine publications.
not apply to the UK music industry in reality, it does indicate that our estimates based on ASHE remain very conservative.

14.5. Miscellaneous Artwork
In both this report and the work by Soloveichik, this category is used a catch-all to cover other originals not already included among the primary asset types. Therefore the composition of the category is slightly different in each country. In the BEA estimates, it includes theatrical play scripts, commercial photography, greeting cards, fine art reproduction and radio soap operas. In this report we consider photography, art and choreography, which we estimate using occupational income data from ASHE. Of the categories used in the US not included in this report: we have been unable to source any suitable data on theatrical play scripts; the BBC is the only significant producer of radio stock programmes in the UK so those data are included in our estimates for TV & Radio; we consider greeting cards to fall under ‘Design’, a separate asset type in the intangibles framework.

15. UK Capital Stock of Artistic Originals
We now have a new dataset for market sector investment in artistic originals from 1990. In the following section we use our new central estimates of GFCF to construct a capital stock for artistic originals in the UK market sector, where the market sector is defined as sections A-K & OP according to SIC2003. Since the starting values for the capital stock require a longer back-series for GFCF, we backcast the series using growth rates of GFCF in originals from the National Accounts. In the case of film, we extend the series using the data on joint US/UK production presented earlier.\(^48\) Of course this assumes that UK investment grew at a similar rate to UK investment in US/UK co-productions, which may not be the case. Finally we deflate our investment data and construct estimates of the capital stock and compare them with those implied by official data recorded in the National Accounts.

15.1. Deflation

Since we need to construct real measures of the capital stock, we first need to deflate our investment data to estimate real GFCF in originals. For some assets, transactions data are available, for instance, commissioned or acquired broadcasting originals. However, since each original is by definition a unique asset, separating price and volume is challenging, particularly if the quality of originals has changed over time. Before reviewing what options are available, it is worth returning to the framework to confirm exactly what we wish to measure.

The first point to make is that we know the equilibrium relationship between downstream revenues and upstream creation can be summarised as in equation (2) and repeated below:

\[
P(N)N = \sum P(R)R/(1+r)^t
\]

This states that the asset value of the good must equal the discounted rental payments from the users of the good. However, it is important that data on P(R)R, and therefore P(R), are reflective of true rentals. That is, payments for rights to use for less than one year with no transfer of economic ownership. Payments for ownership and/or payments for multiple years represent a component of P(N)N, from which a rental must be backed out. When estimating prices it is important not to confuse P(R)R with P(N)N or some hybrid of the two. We need to be aware that the price paid for the use of originals (the rental price) is not the same as the price of the asset. The relationship between the asset price and the rental price is given by the user cost relation:

\(^{48}\) Although this data go back as far as 1915, our series for the dollar/sterling exchange rate only goes back as far as 1945, and our value-added deflator as far as 1971. Therefore we use 1971 as our initial value.
P(R) = P(N) (ρ^N + δ_R)

Where ρ^N is the real rate of return in the N (upstream) sector and δ_R the rate of depreciation for the relevant type of capital or artistic original.

To derive a measure of real GFCF we need to measure P(N), the asset price. If this is not available we can instead estimate the rental price and transform that into an asset price using the user cost relationship defined above. The issue we face is that little data on asset transactions exist, since much of it is produced on own-account and used in the same organisation. Some limited information on prices for use are available, but that is not the same as the price of investment. Ideally we need the latter to convert our data for nominal GFCF to real volume measures. So what options are available to us?

One is to use the implied investment price indices in the ONS data on investment in artistic originals. However, we know little on how those data are constructed and whether they accurately reflect P(N). A second option would have been to use estimates implied by revenue schedules in data from the Collecting Societies, but this option is not available to us for now. This would give estimates of P(R), which could be converted to P(N) with the user costs relation.

A third would be to develop an input costs deflator for specific assets. This is common in areas where little data exist on market transactions, such as own-account software investment. There are two possibilities. One would be to weight together indices for various upstream inputs including labour, capital and materials, where the weights are based on upstream expenditure shares. As second would be to develop an index using just the wages of occupations that work in asset creation, or use a more general measure based on the Average Earnings Index (AEI). Since around 55-65% of value-added flows to labour (depending on how capital is defined) this basically assumes that upstream asset prices are driven by the price of upstream labour. In theory the wage index should also include some estimate or assumption for labour productivity. In practice, this would mean a mismeasurement in price changes equal to the error in the productivity assumption, plus an error from the missing price contributions of other factor and intermediate inputs.

A fourth option would be to use the deflators developed by the BEA in their recent developmental work (Soloveichik, 2010), where the assumption would be that the marketplace for artistic originals is open and internationally competitive, which would appear
reasonable. The type of price index used by Soloveichik varies by asset. In the case of music, it is based on the earnings of musicians, as in the third option described above.

A fifth option is to use an implied GDP deflator, and assume that general prices also reflect the price of originals (Haskel et al, 2009). Finally a sixth option is to use consumer price indices for re-productions or copies of the relevant asset types.

The OECD recommend that in cases where GFCF is measured as the NPV of royalty payments, then the data on rentals can be decomposed into price and volume. For estimates based on alternative methods, such as upstream input costs, the OECD suggest either the use of consumer price indices for copies of originals, or a measure based on the input prices for factors and goods used in the production of originals.

To say a little more about the sixth option, a common misconception is that rental prices are observed in the sale of copies of originals. That is, that rental prices can be observed in prices of cinema tickets, books, CDs, etc. But as the framework makes clear this is $P(Y)$, not $P(R)$. Now it may be that $P(R)$ makes an important contribution to $P(Y)$, but so will the prices paid to labour, physical capital and other forms of knowledge capital used in the downstream sector. Additionally $P(Y)$ will be affected by total factor productivity in the downstream sector. In some cases it will be possible to make use of some information or assumption on the industry or asset in question. For instance, in the film industry, the rental fee paid by the cinemas is usually around 30% of revenues from ticket sales (Soloveichik, 2010). So:

$$P(R)R = \lambda P(Y)Y$$

Where $\lambda$ is some constant proportion. But note that the relationship is between revenues, not prices. To calculate the relationship between prices we need some information on R, that is, the real stock of artistic originals, for which we need a price index to calculate. So there is a problem of circularity. Also note here that $P(Y)$ refers to revenues from cinema ticket sales, not cinemas, since the latter would include revenues from food and all other goods and services provided. Also note that the true downstream is not just cinemas and instead includes DVDs, TV licensing etc.

So it is not conceptually correct to assume that the price of copies changes at the same rate as the price of the underlying asset, since the price of copies is determined by the price of factor

Likewise $P(R)$ is partly determined by TFP in the upstream sector. For further information see Corrado, Goodridge and Haskel (2010).
or intermediate inputs and technological progress in the downstream, whilst the price of assets is determined by the same factors but in the upstream. That is, the evolution of the price of say CDs reflects innovation and productivity in the manufacture and publishing of CDs, rather than productivity in the creation of the underlying knowledge (the music) itself.

As an aside, potential exceptions to this include services such as Netflix, which provides customers with downloads of movies for a fee. The difference is that in the case of Netflix, there are far less factor and intermediate costs than in other parts of the downstream. For instance, they do not require buildings to project films, or to display DVDs for sale or rental. Therefore, since we would expect \( P(X)X^Y \) to be much smaller, \( P(R)R \) will be a much larger component of \( P(Y)Y \). So although conceptually it would still be incorrect to use the price of Netflix download, in a practical sense it could be used as a proxy if it is considered that output prices are largely driven by rentals for film originals. The issue with using data for Netflix, or similar services for other assets, is that they are based on new technologies and capabilities, so the length of any time-series would be extremely limited.

Figure 36 shows retail price indices for i) Copies of Music Originals: CDs etc. ii) Copies of Books and Newspapers and iii) BBC Licence Fee, and emphasises the conceptual point made above. Compare the RPI for Books and Music. As can be seen, the price index for copies of Books, an ‘old technology’ has been growing consistently throughout the period presented. In contrast, the price index for music formats grew much more slowly and started to decline from 1998, reflecting improved technologies in the downstream production of copies, falling prices in ICT capital and materials, and possibly falling prices for rental of originals. Only the latter technical progress in the creation of music or literary works, the rest relate only to downstream activity.

Figure 30: ONS Retail Price Indices (1990=1)
As we keep emphasising that downstream rental prices reflect upstream asset prices, which in turn reflect input prices and technical progress in the upstream, it is worth highlighting what we think we already know about the contributions of these. Corrado, Goodridge and Haskel (2010) show the price of knowledge investments to have fallen in the context of UK R&D, with the hypothesis being that the emergence of the internet and other communications technologies has made the conduct of upstream research much cheaper. It seems reasonable to suggest that such technologies have had a similar impact in the production of artistic originals, for example in the case of books/scripts, where surely the upstream productivity of formulating ideas, developing those ideas through research, communication with up and downstream participants, and collaboration has improved. Speculatively, it might be expected that the price of artistic originals has risen less fast than the price of all goods and services in general.

Another option considered was to use the deflators currently used for artistic originals in the UK National Accounts. Figure 37 shows three deflators implied by current and constant price ONS GFCF data for artistic originals, alongside the value-added deflator used for artistic originals and other knowledge assets in constructing the NESTA Innovation Index. As can be seen, official data suggests prices for artistic originals rising significantly faster than goods and services in the wider economy. This goes against the view that the price of knowledge is rising less fast than those for final goods, or even declining, due to the revolutions that have occurred in the communication and sharing of knowledge since the emergence of the internet. (Corrado, Goodridge and Haskel, 2010).
Figure 31: Deflators for Copyright GFCF

We have argued that a deflator based on the price of copies does not reflect the price of the asset, and that instead it reflects input prices and productivity in the production of the copy itself. We also consider the ONS deflator to be rising too fast in light of our previous work. Therefore, as in previous work, we use an implied price index for aggregate value-added as our preferred deflator.

15.2. Depreciation

In order to construct the capital stock we need some estimates of depreciation rates, ideally by asset type. Following Corrado, Hulten and Sichel (2006) the rate used for artistic originals in the NESTA project and other UK work on Intangible Assets was 20%. The rate used in the ONS Volume Index of Capital Services (VICS) is 13.33% (Long et al, 2010).

Returning to the recommendations of the Eurostat Taskforce, their report suggested that depreciation rates ought to be fast in the early years, and that life-lengths should be set at between 5-10 years. Two possible functions mentioned were:

- Linear rate, with suitable Winfrey retirement function
- Geometric rate, with at least a double-declining balance
Note that a life-length of just five to ten years implies a very high geometric rate of depreciation. Such assumptions on lifespan in part go against work by the BEA, discussed below, as well as copyright law itself, since the latter typically assigns property rights of 70 years after death to authors, and 50 years after performance to performers.

It could be argued that since many artistic originals are failures or 'flops', then a high depreciation rate should be used to reflect this. Instead it is more helpful to consider the rate as a weighted function, where the weights depend on sales or rentals of copies or versions. Consider the case of motion picture productions, since a flop generates very little sales revenue then its theoretical weight is small. However, a Disney film (which is typically very long lasting e.g. Snow White) would receive a much higher weight and would continue to generate revenue for many years, contributing to the weighted service life of the asset category.

To estimate depreciation rates, Soloveichik (2010) has used data on revenue payments to various artistic assets following release. In the case of movies for example, these would be box office and subsequent revenues via DVD and TV. Note that payments to artists are not the entire revenues since ownership is frequently shared (e.g. with publishers say). The following chart displays depreciation rates for various types of artistic originals, as calculated in Soloveichik (2010).

Figure 32: Depreciation rates used in BEA developmental estimates (Soloveichik, 2010)

---

50 We are grateful to Rachel Soloveichik of the BEA for sharing this data with us and for valuable comments and advice.
The data show that life-lengths vary considerably depending on the specific asset type measured. First looking at the series for Movies, the data show the depreciation rate to be higher in the initial years after release. This reflects the profile of box office revenues, which were used in the estimation, since movies generate the majority of their revenue through cinemas in the first year after their release. After this point the rate of depreciation slows and settles at a fairly constant rate, reflecting the longevity of revenues generated through release on DVD and television. The average annual change, calculated in natural logs, in the index for movies is 5% p.a. The average change over the first twenty years is 6% p.a.. This is considerably slower than the rate of 20% used in the intangibles framework, suggesting a larger stock and contribution from theatrical movies than previously estimated. To reflect the long life-lengths of movies, but to allow for faster depreciation in the earlier years, we shall apply a rate of 7.5%.

In the case of television, Soloveichik estimates separate depreciation schedules for fiction and non-fiction. The data show that fiction (that is drama and such like) depreciates at a much slower rate than non-fiction. The reason is that non-fiction includes formats such as current affairs and documentary type television, where we would expect much shorter service lives. For example, a programme covering the recent financial crisis produced in say 2008, would depreciate quickly and may be out-of-date by say 2010. The average rate for fiction is the same as that for movies, at 5% p.a., although the profile differs. Over the first twenty years, the average annual change is 9% p.a.. To allow for faster depreciation in the earlier years, and
for conservatism, we shall apply a geometric rate of 10% to fiction, considerably slower than the rate of 20% currently used for all artistic originals. For non-fiction, the rate of depreciation is much higher, with an implied life-length of just 12 years, resulting in an average rate of decline of 41% over that period. This will also be our chosen rate.

Turning to Books, the Soloveichik data show a faster decline in the early years than either movies or fictional television, and a total life-length of 34 years. The average rate of decline over those years is 15% p.a., and 17% p.a. for the first twenty years. This suggests that the rate currently used, 20%, is reasonable, and we shall continue to use that rate in the case of Books.

For Music Originals, the initial profile is similar to that of Books, but slows in later years, implying a life-length of greater than 50 years. The average rate of decline over 50 years is 13% p.a., almost identical to the rate used in the construction of VICS (ref), and is 11% p.a. over the first twenty years. Therefore for music we shall adopt the rate of 13.33% p.a. used by ONS.

The remainder of the rates presented are smaller categories considered to fall under the generic term 'Miscellaneous Artwork'. Although the profiles differ somewhat, the average rate of decline for 'Fine Art Reproductions', 'Theatrical Play Scripts' and 'Commercial Stock Photography' are all around 10% p.a.. Since we consider Art, Photography and Choreography under our definition of Miscellaneous Art, we shall also use a rate of 10% for this category.

Additionally Soloveichik has calculated depreciation rates for 'Greeting Card Design' and 'Wallpaper Design'. Since Design is a separate asset in the intangibles framework we don't consider those asset types here, but note that the estimates of 15% and 42% p.a., for Greeting Cards and Wallpaper respectively, compare with 33% p.a used for Design in the UK dataset.

As Figure 38 shows, the US estimates do not match a true geometric profile, however when geometric rates are applied the impact on US capital stocks is limited (Soloveichik, 2010). Since geometric rates have useful, elegant properties when used in growth-accounting analysis, we shall apply those rather than the exact rates implied in Solveichik (2010). Additionally we feel that since copies of originals are internationally traded, and often produced, across borders, then US rates should be relatively applicable to the UK, particularly for the 4 major categories (Movies, TV, Books and Music). The following table summarises the depreciation rates for each component of artistic originals used for this report and
compares them with rates used in previous work on intangibles (Haskel et al, 2009) and those used by the ONS.

Table 14: Depreciation rates, by asset

<table>
<thead>
<tr>
<th>Depreciation rate (δ)</th>
<th>Intangibles (e.g., NESTA)</th>
<th>ONS (VICS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movies</td>
<td>7.50%</td>
<td>20%</td>
</tr>
<tr>
<td>TV: non-fiction</td>
<td>41%</td>
<td>20%</td>
</tr>
<tr>
<td>TV: fiction</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Music</td>
<td>13.33%</td>
<td>20%</td>
</tr>
<tr>
<td>Books</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Miscellaneous Art</td>
<td>10%</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Note to table: Estimates for miscellaneous artwork are not included in official estimates of GFCF in artistic originals.

15.3. Calculation of Capital Stocks

As laid out in our theoretical framework, the upstream sector produces finished knowledge (in this case, artistic originals), denoted $P(N)N$. The downstream sector produces consumption and physical investment goods, with one of the inputs being rental from the stock of finished knowledge produced in the upstream. The stock of finished knowledge can be represented in a perpetual inventory model (PIM), as shown in equation (3) and repeated below for convenience:

$$R_t = R_{t-1}(1-\delta) + N_t$$

Where $N_t$ is real upstream output in the current period, $R$ is the accumulated stock of originals and $\delta$ is the geometric rate of depreciation.

For this report we were required to produce estimates of investment, by asset category, back to 1990. However, since knowledge assets depreciate relatively quickly, then to construct reasonable estimates of the capital stock we require investment data for a longer time-series. Therefore we extend our estimates using the profile of existing estimates already recorded in the National Accounts. We consider the results to be a reasonable approximation of GFCF in earlier years. For film we extend the series further using data sent to us by Soloveichik on joint UK/US production, implicitly assuming that co-productions with the US are a fairly constant proportion of total UK production.

To convert our estimates of GFCF from nominal to real values, for reasons already discussed we use an implied deflator for market sector output. Note that when comparing implied level
of the capital stock we use the same GVA deflator in the construction of our own estimates and those for the ONS. Finally we apply geometric depreciation rates for each asset category as discussed in the previous section. The following charts present estimates of the UK capital stock for each asset category based on the data in this report. Each estimate is compared with the stock implied by official ONS data. Note, since ONS do not produce estimate for ‘Miscellaneous Art’ we have no data to extend our series. Neither do we have capital stock estimates with which to compare.

Figure 33: Real Capital Stock: Film, £mns, real

Figure 34: Real Capital Stock: TV & Radio, £mns, real

Source: Our estimates, based on our new data on investment, and compared with estimates based on ONS investment and depreciation rates.
Note to figure: The price index (value-added) used is based in 2005. ONS stocks constructed using official data for Film Originals and a depreciation rate of 13.33%. We apply a depreciation rate of 7.5% for our estimate. Initial value for ONS estimate is 1986. Initial value for our estimate is 1971.
Source: Our estimates, based on our new data on investment, and compared with estimates based on ONS investment and depreciation rates.

Note to figure: The price index (value-added) used is based in 2005. ONS stocks constructed using official data for TV & Radio Originals and a depreciation rate of 13.33%. We apply a depreciation rate of 10% for fiction and 41% for non-fiction in our estimate. Initial value for each estimate is 1986.

**Figure 35: Real Capital Stock: Music, £mns, real**

Source: Our estimates, based on our new data on investment, and compared with estimates based on ONS investment and depreciation rates.

Note to figure: The price index (value-added) used is based in 2005. Each constructed using a depreciation rate of 13.33%. Initial value for each estimate is 1986.

**Figure 36: Real Capital Stock: Books, £mns, real**
The data show that underestimation of GFCF has considerable implications for the measured stock of artistic originals, as does a lack of consideration of alternative depreciation rates for different types of artistic assets. The impact in film and books is particularly notable. For film, the higher estimates are due to a number of factors. First, our estimates for nominal GFCF are considerably higher, because ONS estimates are only based on just a sample of UK productions. Second, since ONS data for Film begin in 1986, the ONS data implicitly assumes that the stock of UK Film Originals prior to 1986 was zero. Third, the ONS stock is based on a geometric depreciation rate of 13.33% p.a. compared to a rate of 7.5% p.a. for our estimate (Long et al, 2010). For Books, the difference is driven by our estimates of nominal GFCF being much higher than those used by the ONS. Our assumed rate of depreciation is in fact higher (20% p.a. compared to the 13.33% p.a. used by ONS).

Overall, when comparing the aggregate stock over these four asset types, we find that in 2008 our data suggest that ONS series’ our lower than our capital stock of artistic originals by approximately £3.5bn, or 21%.
16. Conclusion

This report has contributed to the measurement of the UK creative sector and the creation of long-lived artistic original assets protected by copyright. The main outputs are improved estimates of UK investment from 1990-2008 and estimates of the total stock of artistic originals where we also consider the role of depreciation and prices.

We find that official UK estimates are considerably lower than those for the US on both an absolute and relative basis. In particular the UK seems to record very little investment in Film relative to the US. Therefore we examine official data and methods and evaluate them in light of our conceptual framework and the recommendations of international bodies such as Eurostat and the OECD. We then re-estimate UK investment in artistic originals using a variety of methods. Using our preferred method for each asset type we show that in 2008, official UK data in the National Accounts estimated investment to be lower by 36%. Similarly, in 2008, we show the real stock of artistic originals to have been underestimated by approximately 21%. This has considerable implications for the contribution of artistic (and more widely, knowledge) capital deepening in a growth accounting context, which we shall explore in the accompanying report: ‘The Role of Intellectual Property Rights in the UK Market Sector’ (Goodridge and Haskel, 2011).

Note that his project has focused on investment in copyright protected assets, where assets are defined to have primary artistic intent and a service life of at least one year. Another potential research area is spend on copyright, or more broadly IPRs, that is not restricted to investment. For example, we have shown that only a proportion of UK spend on film is on the creation of UK-owned assets. Similarly a large chunk of spend in broadcasting is on the production of sports and news programming, excluded from our asset definition. In literary works, spend on copyright protected goods includes news, magazines and other intermediate goods, whilst in music it also includes jingles and the like. We may consider these other forms of expenditure in future work.

We regard this piece of work as a step forward in the measurement of UK artistic asset creation and the contribution of the ‘creative industries’. We stress that for some asset types our estimates should be regarded as preliminary only, and that further work is required. In the case of Music, Books and Miscellaneous Art, accurate estimation requires a longitudinal analysis of the income earned by assets over their lifetime. We had hoped to include such estimates in this report, but legal and administrative complications have prevented us from doing so. We anticipate an update to our estimates sometime in the near future, should such data become available.
References


BFI (2003), Producing the Goods? UK Film Production 1991-2001


BPI (2010), BPI Statistical Handbook

Cambridge Econometrics (2005), The Economic Impact of the UK Screen Industries


Channel Four Television Corporation (2009), Report and Financial Statements 2009

Corrado, C., Goodridge, P. and Haskel, J. (2010), Constructing a Price Deflator for R&D: Calculating the Price of Knowledge Investments as a Residual, Working Paper


Eurostat (2003), Report of the Taskforce on Entertainment, Literary and Artistic Originals, 1st Meeting of the GNI Committee, 5th-6th November 2003

Eurostat (2003), State-of-play on Entertainment, Literary and Artistic Originals, 2nd Meeting of the GNI Committee, 25th-26th March 2004


Galindo-Rueda, F., Haskel, J. and Pesole, A. (2010), How much does the UK employ, spend and invest in design?

Haskel, J., Clayton, T., Goodridge, P., and Pesole, A. (2009), Innovation, knowledge spending and productivity growth in the UK

Hellebrandt and Davies (2008), Some issues with enterprise-level industry classification: insights from the Business Structure Database, Vitual Microdata Laboratory Data Brief, No. 5 Spring, ONS, Newport.


OECD (2006), National Accounts of OECD countries. Volume II, Detailed tables

OECD (2010), Handbook on Deriving Capital Measures of Intellectual Property Products

OFCOM (2010), Public Service Broadcasting: Annual Report 2010

OFCOM (2010), Communications Market Report, 2010

ONS (1998), National Accounts concepts, sources and methods
ONS (2002). IoS Documentation, available at:
http://www.statistics.gov.uk/iosmethodology

ONS (2009), International Transactions of the UK film and television industries, Press Release

Oxford Economics (2010), The Economic Impact of the UK film Industry


Soloveichik, R. (2009), Music as a Capital Asset, Working Paper

Soloveichik, R. (2009), Theatrical Movies as a Capital Asset, Working Paper


UK Film Council (2009), Statistical Yearbook, 2009


Appendix 1: Investment in ‘Valuables’

The term ‘Artistic Originals’ immediately leads one to think of the creation of fine art. But Eurostat explicitly recommend the exclusion of such items, because of the presence of ‘valuables’ elsewhere within in the Accounts. The following section outlines why we feel that such exclusion is unnecessary when considering GFCF in Artistic Originals.

The fourth criterion suggested by the Eurostat Taskforce refers to a transaction item already recorded 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:

\[ GCF = GFCF + \Delta \text{inventories} + \Delta \text{valuables} \]

Net expenditures on valuables are recorded as a specific form of investment since they are expenditures on items to be held as stores of value, for appreciation and also for diversification. However, they are not recorded as fixed investment (GFCF) since they are not an input to production. Therefore 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. The following chart presents a current price aggregate series for changes in valuables as recorded in the Input-Output tables. The data only refer to the following product types: ‘Motor Vehicles’, ‘Furniture’, ‘Jewellery and related products’ and ‘Retail Distribution. As can be seen, the values are typically relatively small, but are volatile, presumably because such assets tend to be held rather than frequently bought or sold.

Figure A1.1: Input-Output, Acquisitions less disposables of valuables, CP £mns

119
Note to figure: The above series is taken from the Input-Output Tables. It applies to all industries and the products within are: Motor Vehicles, Furniture, Jewellery and related products and Retail Distribution.

A chain volume measure (CVM) for insurance and pension funds is also shown below. As can be seen zero values are common. We have been unable to locate any other CVM series. It is not clear whether this is the only CVM series produced or whether there is also a higher aggregate available.

Figure A1.2: Chain Volume Measure, Acquisitions less disposal of valuables, (£mns, real)
Eurostat has taken the view that product types that are included in ‘valuables’ should be excluded from artistic originals. The following discussion examines whether this is the correct treatment. According to the OECD (OECD, 2006):

“Valuables are produced assets that are not used primarily for production or consumption, that are expected to appreciate or at least not to decline in real value, that do not deteriorate over time under normal conditions and that are acquired and held primarily as stores of value”.

The SNA (System of National Accounts, 2008) states that valuables include, but are not restricted to: precious metals and stones, antiques and other art objects. However, not all such items should be recorded - the intent is to capture investment in alternatives to financial assets (transaction margins are also included). This can include investment by Households. So:

- **Precious metals and stones**: should be treated as valuables when they are not being held for sale or used as an input to production, and are not held as monetary gold or a financial asset
- **Antiques and other art**: should be treated as valuables when they are not held for sale. Therefore in principle this means museum exhibits should be classed as ‘valuables’
- **Other**: could include collections of stamps, coins, china, books, jewellery
However, just because an asset is later bought and held for its inherent value, that does not necessarily mean we should not count the original investment as GFCF in artistic originals, or if we are measuring from the revenues side, the income earned by the asset before it was sold. For instance, if an insurance company (or in principle a household or any other organisation) purchases the asset from the original artist, then that should be treated as negative capital formation for the artist (or original owner) and positive capital formation for the purchaser. At no point has the investment been counted twice.

Note that the SNA allows for the inclusion of book collections within ‘valuables’ even though these will already have been capitalised as literary originals. This is important: the ‘valuable’ in this example is a collection of copies. The purchaser has not bought the right to future revenues from the exploitation of the IPR. For example, say that an investor has decided to purchase a copy of the very first print of a new original, because they expect it to either maintain its value in the long-term, or to achieve a capital gain. The purchase does not mean that we should exclude the investment made by the author and publisher in the creation of that original. Likewise for a piece of fine art, the purchase does not mean that we should exclude the revenues earned (in the upstream, paid by the downstream) from copies of the image in the valuation of the original investment.

In estimating GFCF in artistic originals, we are seeking to measure investment in assets that are part of the productive capital stock. That is assets that can be exploited by the owner to generate value-added. But still the above point remains. 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 GCF for the new owner. If the asset is not sold for this purpose, then it remains positive GFCF for the innovator (the new owner), and part of the productive capital stock. Based on the above reasoning and the composition of the series itself including the product types and industries for which they are included, the potential for double-counting between ‘artistic originals’ and ‘valuables’ seems limited, and the Taskforce recommendation appears somewhat flawed.

Appendix 2: Additional data according to the SIC

1. Film: A proxy of GFCF based on industry aggregates

51 Note again the conceptual difference between investment in productive capital (GFCF) and investment in monetary alternatives (GCF).
Using the framework set out in Figure 4, the following charts present data for the aggregates of various components that need to be considered when estimating GFCF in Film Originals.

In SIC(2003), “Motion picture and Video Activities” (SIC 92.1) is made up of three components: a) production b) distribution and c) projection, where distribution refers to the licensing of projection and broadcasting rights by studios. The output data needs to be adjusted for international trade to reflect UK asset creation. Therefore the following charts present data on international payments and receipts in the film industry. The data is a mix of asset sales and licence payments and is taken from the Film and Television (FTV)\textsuperscript{52} survey, an input to the National Accounts. The data show exports from the UK film industry of £1.0bn, and a positive trade balance of £0.13bn in 2007. Exports and imports are made up of two components: 1) Royalties 2) Production payments.

**Figure A2.1: International Trade: Royalties vs. Production (£mns)**

Note to figure: Data are from the ONS Film & Television Survey. Data does not include payment for “other services”, defined to include merchandise, and management and agency fees. Transactions data are a mix of licence payments and outright sales, although a split is available for years 2005-6. UK branches and subsidiaries of foreign enterprises are included, but foreign subsidiaries of UK enterprises are not. UK profits from foreign subsidiaries are included within “Investment Income” in the Balance of Payments. Payments/receipts include both outright sales and rental fees.

As can be seen, although trade in Royalties in 2008 was larger than trade in production, in general the UK’s positive trade balance has been largely due to fees for production.

\textsuperscript{52} Since 2008, the FTV survey has been incorporated into International Trade in Services (ITIS)
However, there is an issue with the data termed ‘royalties’ in that it is composed of both outright purchases/sales, \(P(N)N\), as well as rental payments, \(P(R)R\). We do have some data for 2005-6 that split royalties into sales and rentals. Unfortunately the split in each year is very different.

**Table A2.1: Royalties, Rentals .vs. Asset Sales**

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>X: Royalties</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rentals</td>
<td>54%</td>
<td>75%</td>
</tr>
<tr>
<td>Asset sales</td>
<td>46%</td>
<td>25%</td>
</tr>
<tr>
<td><strong>M: Royalties</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rentals</td>
<td>69%</td>
<td>95%</td>
</tr>
<tr>
<td>Asset purchases</td>
<td>31%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Note to table: this split is only published in the 2005 and 2006 releases, and it seems that it may no longer be collected by ONS.

The FTV release also splits the UK data into those for UK subsidiaries of US companies and other UK firms. These data are shown below. As can be seen, the split is volatile but since 2004 much of the growth in the UK trade balance has come from increased net payments to UK subsidiaries of major US companies.

**Figure A2.2: International Trade: UK subsidiaries .vs. Other (£mns)**

Note to figure: The export split for 2005 is disclosive. Therefore 2005 data presented above is imputed as a straight line between 2004 and 2006. Export data for 2008 are also disclosive and not presented here. Data does not include payment for “other services”, defined to include merchandise, and management and agency fees. Some data on international payments and receipts for ‘other
services’ are available, however the data for imports are generally disclosive so we are unable to present them here. Transactions data are a mix of licence payments and outright sales, although a split is available for years 2005-6. UK branches and subsidiaries of foreign enterprises are included, but foreign subsidiaries of UK enterprises are not. UK profits from foreign subsidiaries can be found under “Investment Income” in the Balance of Payments. Payments/receipts include both outright sales and rental fees.

As we have outlined in our discussion of the industry structure, the innovative sector in film actually consists of two industries: production and distribution. In order to derive an estimate of the upstream, it is certainly not correct to simply sum them together, since the revenues of the production industry are largely made up of the production fees received from the distributor. Therefore we shall consider just the distribution industry, since that is where the majority of asset rights are held. Note that output in the distribution industry is partly made up of the same costs that exist in the production industry (paid for by the budget provided by the studio), plus additional costs for advertising, marketing and other overheads, plus additional revenues that are due to the innovators market power as the owner of a unique asset.

In calculating a very rough proxy for GFCF based on industry aggregates we first take ABI\textsuperscript{53} data on the gross output of ‘Motion Picture Distribution’ (SIC 92.12). We then adjust this using data on international trade, sourced from the FTV survey.\textsuperscript{54} That is, we add on imports and subtract exports (for each we use the sum of production fees and royalties). Note it is not correct to treat the data on exports and imports in this way since production fees and royalties ought to be treated differently. Within royalties there are data on asset purchases and genuine rentals, but we have little information on the proportional split. Since we are using the data for the Distribution industry, we also subtract intermediate consumption, which will also include other forms of knowledge investments already capitalised in our wider intangibles framework, as well as additional costs and overheads. Finally we subtract the change in inventories or stocks. Since the data are based on revenues, any estimate will implicitly include a mark-up, where $\mu > 1$.

\textbf{Figure A2.3: Derived GFCF in Film Originals, CP £m (PnN)}

\textsuperscript{53} For years prior to the introduction of the ABI (pre-1995), data are from the Service Trades Sector Review.
\textsuperscript{54} Trade receipts and payments split into fees for production and royalties are only available from 1998. Therefore we used the average share in 1998-2000 to backcast each series.
An interesting feature of the series is the strong growth from 2004 that is sustained until 2006. Unfortunately the ONS are unable to provide us with any information on a breakdown of industry revenues to allow us to better understand the source of this, but we note that data from the UK Film Council, shown in Figure 16, also show a spike in UK-certified productions in 2004-5.

To re-iterate, there are a number of issues with the underlying data:

- the FTV trade data is a mix of outright fees, asset transactions, and rentals. A split is available for both 2005 and 2006, but the composition of payments differs greatly in each year and so does not provide suitable information to use in any assumption to split the data
- we have not been able to find suitable data on production subsidies or tax breaks to subtract from industry output. This could be significant in the case of Film. National Accounts series are for taxes less subsidies at the aggregate level and the underlying component series do not appear to be available.
- the output data implicitly includes capital compensation, which should be adjusted for consumption of fixed capital (depreciation)
- it is possible that there is some element of double-counting, for instance as one example, ‘special effects output’ may already be counted in software GFCF

Due to these data issues, we consider this series to be an inaccurate approximation of GFCF in Film Originals, and for both conceptual and practical reasons do not consider it suitable to present as a final estimate in the main body of this report. We re-iterate that there are many practical and conceptual barriers to accurately estimating GFCF in this way. Therefore data

Source: Derived from macro aggregates from the ABI, Service Trades Sector Review, and FTV Survey.
are presented largely to just illustrate what industry data are available and we do not attach a great deal of weight to the result.

2. Film: Estimates of Aggregate Output according to the Input-Output tables and DCMS

As discussed in the main report, one potential way of estimating the output of the upstream is to collate measures of aggregate sector output and estimate a factor which would allow the data to be split into components for the innovative sector and the final goods sector.

Data for aggregate film output, \( P(G)G \), are available in an ONS analysis of the creative sector based on the I-O tables (Mahajan, 2006). As we have already stated, there are serious drawbacks in the use of such data to value ‘creative output’ and it is even less useful when estimating investment in artistic assets. Additionally note that the output measures presented here are gross value-added.

Figure A2.4: Output of the ‘Film Industry’, \( P(G)G \), CP GVA (£mns)

The data show that, according to the ONS, in 2004 ‘Films’ represented £3.3 billion of output (GVA), but we re-iterate that this also includes parts of the final goods, or downstream, sector, such as projection and video re-production. The inclusion of both production and distribution also means that there is some double-counting of the upstream. It also, of course, includes the production costs and revenues for assets that are not UK-owned (exports). This
is the reason why we, in concordance with Eurostat and OECD, advocate an approach based on the input costs of the innovators.

The DCMS recognise that not all output in a ‘creative industry’ is necessarily ‘creative output’, and so exclude a proportion of output considered non-creative. Therefore the estimates produced by DCMS are lower than those from ONS although the exclusion is not sufficient, and nor does it attempt, to remove all downstream activity. Since DCMS estimates for film also include photography, they are not presented here due to differences in classification. Provided the output of the photography industry was removed from the data, it would be possible to attempt to remove the remainder of downstream film output, using some factor. However, with no information on the size of such a factor, and bearing in mind that a reasonable estimation would pose many problems already discussed with regard to identification of products and asset ownership, we are unable to apply this approach to Film.

3. TV & Radio: A proxy of GFCF based on industry aggregates

As noted in the main body of the report, there are number of limiting factors to the aggregate data. The following chart presents data for the television industry largely for illustrative purposes to show what data is available. Adjusting ABI data on the output and inputs of the Television and Radio Industry using trade data from the FTV, results in an estimate of GFCF in TV & Radio Originals of £1,991m in 2007, compared to the estimate of £2,632 currently recorded in the National Accounts.

Figure A2.5: Derived GFCF in TV & Radio Originals, CP £m (PnN)

4. TV & Radio: Estimates of Aggregate Output according to the Input-Output tables and DCMS
Data published in the I-O analysis of the creative sector (Mahajan, 2006) shows that in 2004, GVA in the radio and television industries was approximately £8.9bn. Such measures will be familiar to those interested in measures of ‘creative output’ but for reasons already explained, such measures are not suitable for use as measures of investment due to inherent double-counting.

Figure A2.6: Output of the ‘TV & Radio Industry’, CP GVA (£mns)

The DCMS correctly recognise that a measure of the output of the television and radio industries is not a valid measure of ‘creative output’ in those industries. Therefore they adjust the output data to remove what they consider to be non-creative output, resulting in estimates presented below.

Figure A2.7: $\alpha.P(G)G$: ‘TV & Radio Industry’, DCMS (£mns)
With no information on the construction of $\alpha$ and the adjustments used by DCMS we are unable to judge the quality of the results. It should be noted that to fit into our framework, any estimate of $\alpha$ should be done separately for the TV and Radio industries. In the case of Radio, the revenues of most radio stations would be generated from the rental of music originals. That is, radio stations are also a significant downstream user of the upstream music sector. Additionally, the activity of presenters on these stations does not meet the capitalisation criteria, and the same is true of talk radio stations. Therefore the $\alpha$ for the radio industry would likely be extremely small, whilst that for the television industry would be larger. Also note that the conceptual reasoning behind the adjustment factor used by DCMS, and the factor in our framework, is different. DCMS is not attempting to derive an estimate of ‘upstream output’ in its analyses.

5. **Books: Estimates of Aggregate Output according to the Input-Output tables and DCMS**

Data published in the I-O analysis of the creative sector (Mahajan, 2006) shows that the Publishing industry recorded output of approximately £10bn in 2004, although the industry definition used includes a range of activity that is not asset creation, including the publication of goods with short services lives such as news. Additionally the data refers to both the innovative and downstream sectors.

**Figure 37: Output of the ‘Publishing Industry’, CP (£mns)**
Adjusted estimates produced by DCMS are very similar to those in the I-O analysis, implying a very high value for $\alpha$, although as mentioned the adjustment made by the DCMS is not to back out the value of upstream output.

6. Music: Derived GFCF in Music Originals, CP £m, P(N)N

The following chart adjusts ABI output for the music industry using international trade in royalty payments in the UK Balance of Payments. We use data on exports and imports of ‘Other Audio-visual fees’ which we assume to be largely made up of payments for the rights to use UK music originals.\(^{55}\) Since the sound publishing industry also includes a significant part of the using sector, we assume intermediate consumption refers to the downstream and subtract it from GFCF. For the same reasons discussed in the context of Film and Television, these estimates have been produced largely for illustrative purposes and we do not consider them adequate to measure investment in artistic originals.

---

\(^{55}\) Audio-visual fees will also apply to other asset categories such as literary works but we have no information on the types of assets to which the fees apply.
7. Music: Estimates of Aggregate Output according to the Input-Output tables and DCMS

Data published in the I-O analysis of the creative sector (Mahajan, 2006) do not present data solely for Music. Instead the data are combined with Photography and other forms of artistic creation termed ‘The Arts’. Therefore the data includes elements of both the upstream and downstream of music creation, as well as data for the upstream and downstream of other asset categories, and production of goods outside the definition of artistic originals.

The DCMS also publish a series on the output of music industries, adjusted to remove what they consider to be non-creative output. However, as with the I-O analysis, the industry is defined more broadly than just music to include the ‘visual and performing arts’.

8. Miscellaneous Art: Estimates of Aggregate Output according to the Input-Output tables and DCMS

Since our definition for this category is a diverse group of specific assets, an estimate of aggregate industry output from either the ONS I-O or the DCMS analyses is unavailable to us. In the case of the I-O analysis, photography and ‘the arts’ are aggregated into the output measure for ‘Music and The Arts’, whilst in DCMS publications, photography is aggregated into ‘Video, Film and Photography’ whilst the ‘Miscellaneous’ category is largely made up of data for antiques. Output data are available from the ABI however, and have already been presented in Figure 34.