PRODUCTIVITY AND THE ARTS, HERITAGE AND MUSEUMS SECTORS

A report for DCMS

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Executive Summary

Productivity in the UK has flatlined for the past decade. This is a major concern for policy makers since productivity is a key determinant of living standards. Major government initiatives, not least the Industrial Strategy, which has put forward a detailed plan for improving UK productivity, have sought to address the issue.

Against this backdrop, the Department for Digital, Culture, Media and Sports (DCMS) is keen to understand how its interventions in the arts, heritage and museums (AHM) sectors can bring about productivity improvements, not only in these sectors but also in the rest of the economy.

There is a large volume of existing research focused on the contributions to GVA but few make little or no reference to the quantum of any productivity impacts.[1] From a public sector perspective, as outlined in the government's Green Book, understanding productivity is important as it ensures that spending and reforms by government are 'additional' rather than simply displacing other spending.[2]

Evidence of the effects of these sectors on productivity does exist, but what is less clear is how strong and comprehensive this evidence is and where the gaps lie. This report looks to address this knowledge gap by critically reviewing the existing literature on the links between AHM and productivity. In particular, we are looking to better understand the drivers of productivity *within* AHM and the impact of AHM on productivity in other sectors.

In an ideal world, the productivity impacts of AHM interventions could be boiled down to a single number. More specifically, DCMS would be able to quantify the overall productivity impact of its interventions – for each £X spent, DCMS would be able to estimate a Y% change in productivity.

In practice though, there are several difficulties in estimating such aggregate statistics starting with the very measurement of productivity, which presents challenges in all sectors but particularly in AHM. The problem is that commonly used measures of productivity may not, in AHM, capture increases in the efficiency with which inputs are turned into outputs. Traditional measures of productivity, which use gross value added (GVA) and/or gross domestic product (GDP) as their measure of output, may not accurately reflect the quality and quantity of AHM outputs, for instance, where services are provided free of charge or where there are considerable externalities.

While these issues present a challenge in quantifying an aggregate productivity impact, they do not imply that there is not one. AHM organisations, like all others, *will* be run more or less efficiently, and AHM interventions *will* impact on the productivity of AHM and the sectors around them.

[1] Studies on the local economic impact of culture were reviewed by DCMS. https://www.gov.uk/government/publications/the-role-of-culture-sport-and-heritage-in-place-shaping

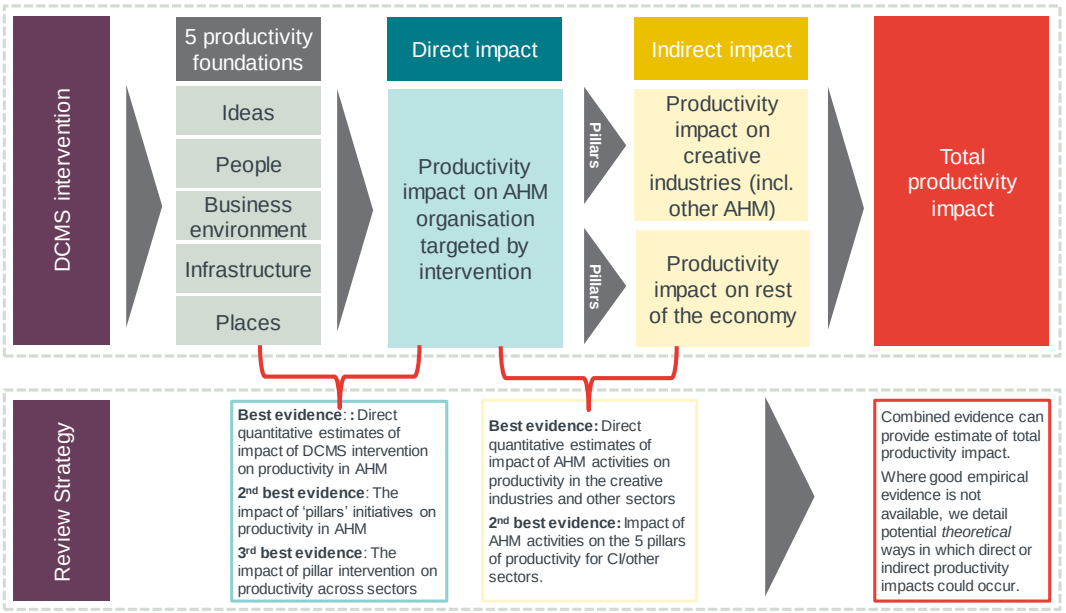
[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf

In this report we begin to unpack how productivity improvements can occur. The objective of the study was: **to better understand how interventions in AHM can increase productivity within the sector and across the economy**.

We developed a framework to better understand the variety of ways in which AHM interventions can impact productivity

In collaboration with DCMS, we developed a conceptual framework setting out how these productivity impacts could occur in theory. We then tested this framework through a series of interviews with sector experts and conducted a Rapid Evidence Assessment (REA)[3] to gauge the strength of different linkages empirically. Given that the AHM sectors are very different in nature, we examined each separately where possible.

Figure 1 How AHM affects productivity



Source: Frontier Economics illustration

Note: Though not explicitly illustrated above, it is important to note that a DCMS intervention could have a positive indirect productivity impact, even if there is no direct impact.
By focusing on evidence of the different types of impacts, we did not directly review the literature examining the impact of interventions on the foundations (for instance, we did not look at studies assessing the effect of a DCMS intervention on skills).

In our framework, we distinguished between direct impacts (on the organisations targeted by the interventions) and indirect ones (on other organisations in the creative industries and the wider economy).

- **Direct impact.** The first and most obvious impact of interventions will be on the AHM organisations directly targeted. For example, a programme to enhance the skills of those working in the AHM sectors is likely to enable them to create more or better outputs; one might imagine a digital training programme would

[3] A Rapid Evidence Assessment is a commonly used methodology to guide a literature review around a particular topic or area. Our full methodology is discussed in Section 4.

allow museum workers to work more efficiently and/or increase the reach of their work to online audiences.

- **Indirect impact on the wider creative industries.**[4] An intervention will not have an impact only on the organisation targeted. In this case, publicly funded AHM organisations are deeply intertwined with other private organisations within the wider creative industries (to which the AHM sectors belong). Publicly funded AHM employees who receive digital training are quite likely, at some point, to take their skills to other firms in the creative industries where they can share their learnings. Furthermore, the mere existence of a publicly funded institution may also contribute to productivity elsewhere, by providing a key resource for the development of new ideas.
- **Indirect impact on the rest of the economy.** We distinguish indirect impacts on the creative economy from those on the rest of the economy as one might reasonably assume the two to be different. While impacts on the creative industries may be most obvious and most significant, AHM organisations are often at the centre of public life and provide highly valued amenities for businesses and individuals alike. As such, AHM organisations can help attract firms and workers to local areas, contributing to the development of dynamic economic clusters, with potential knock-on benefits for the productivity of local firms.

In addition to this distinction between the types of impacts, we sought to better understand the potential channels of impact – the mechanisms linking interventions to productivity – using the government's '5 foundations of productivity' framework. These foundations can be thought of as the areas which, when invested in, can boost productivity:

1. **Ideas**. Innovation is key to improving productivity in an advanced economy. The UK's ability to innovate depends on developing and deploying new ideas.
2. **People**. Investing in the skills and experience of the workforce means that existing and new businesses can more easily find the talent they need to succeed.
3. **Infrastructure**. Modern and accessible infrastructure is vital in a well-functioning economy.
4. **Business Environment**. A strong business environment boosts collaboration and incentivises people to grow businesses in the UK.
5. **Places**. When done well, investments to increase productivity can help address regional disparities by promoting economic development across the country.

By focusing on the ways in which investments in AHM sectors can impact each of these foundations, we can better understand *how* an intervention can drive productivity improvements. We identified some of these key channels from our literature review.

[4] For a definition of the creative industries see https://www.gov.uk/government/publications/creative-industries-mapping-documents-2001

The literature suggests there are clear ways in which AHM can boost productivity in the wider economy

While we did not find any studies estimating the effect of AHM *specifically* on productivity, there is a large body of literature suggesting that the wider creative industries, of which AHM sectors are a critical part, have a positive spillover effect on economy-wide productivity.

Most recently, Boix-Domenech and Soler-Marco (2017) found that, when controlling for multiple determinants of productivity, a doubling in the proportion of the workforce employed in the creative industries within a region was associated with a 4% increase in aggregate labour productivity.[5]

If it is difficult for such macro-studies to reliably identify causal effects (or their magnitude), evidence of a positive relationship across multiple studies suggests that an effect is plausible. In this study, we aim to better understand how AHM may be contributing to such a positive effect. The evidence we found on the impact of AHM on the productivity foundations suggests several mechanisms.

Perhaps the best evidence available is on the impact of AHM organisations on the **Business Environment** foundation – an increase in the prevalence of cultural facilities acts as a pull-factor for businesses in the creative industries and also in the wider economy as they are more likely to attract individuals who attach a premium on the outputs of AHM.

In turn, these new firms contribute to increasing the overall density of businesses, creating a dynamic economic cluster which can generate agglomeration economies (i.e. local-level economies of scale), boosting the overall productivity of the firms within it. Creative industry firms are likely to benefit most directly from proximity to AHM organisations as they provide them with an accessible source of knowledge and new ideas. In addition to theoretical and case-study evidence, we also identified some quantitative evidence. While these estimates should not be taken as precise estimates of causal effects, they do provide further support for the theoretical linkage outlined above.

In a UK context, and at the local authority level, Graves et al. (2016) found that, even after controlling for a variety of factors, an increase in both the density of heritage assets (measured with a location quotient) and in the number of cultural events were both associated with an increase in the number of firms per capita and an increase in the density of creative industry firms (also measured with a location quotient).[6]

Cerisola (2018) also explored the impact of heritage at the local level in Italy and found that an increase in heritage density (measured with a location quotient) was associated with an increase in the creative intensity (measured by the share of

[5] They obtained this finding by comparing 250 regions of 24 EU countries in 2008 and using a Bayesian Spatial Autoregressive model to regress labour productivity in 2008 (log) on a variety of determinants including creative industry employment.

[6] Location quotients measure the ratio of a variable's local density (e.g. number of heritage sites per capita in local authority area), relative to the national average density (e.g. number of heritage sites per capita nationally). As the methodology has limitations, we do not report exact coefficients here though they can be found in Sections 6 and 7.

creative occupations) of both the creative industries and research sectors, even after controlling for a variety of other drivers (GDP per capita, education, etc).[7]

Notably, AHM organisations can provide this 'pull' function across different local areas. Through this mechanism, we found evidence that AHM organisations can play a key role in local regeneration strategies. In other words, they can contribute to the **Place** foundation. There are many case-study examples of this (e.g. Tate Modern on the Southbank, Turner Contemporary in Margate or the Hepworth gallery in Wakefield).

Stradling the **People** and **Business Environment** foundations**,** we also found evidence that a 'denser' cultural environment can attract highly skilled workers.

In a robust study of Swedish neighbourhoods (ca.1,000 people) between 2000 and 2010, Backman and Nilsson (2018) found that a one-unit increase in heritage sites per capita resulted in an increase in approximately 50 more high-skilled individuals in the short term (2001-2006) and 80 in the long term (2001-2010).

Publicly supported AHM organisations are also likely to contribute significantly to the **People** foundation, the UK economy's human capital, through skills spillovers. Many individuals within AHM will often take their skills and knowledge to firms outside AHM.

In a survey of arts professionals, Albert et al. (2013) found that 81% of those working in commercial theatre had either worked or trained in publicly funded arts. In other words, human capital often flows from government-funded organisations to privately funded ones within AHM, and further to other organisations in the wider creative industries.

In addition, Bakshi, Freeman and Higgs (2013) found that more creative specialists (including AHM workers such as artists, arts officers, arts producers and arts directors) worked outside the creative industries rather than inside them in the UK (roughly 54% in 2013). In other words, 'creative industry' skills are central to many jobs across the economy and a key contributor to many industries' human capital. Those skills are likely to have significant spillover benefits for productivity in other sectors.

There is a substantial body of case studies illustrating that publicly funded AHM organisations are often a source of radical, path-breaking innovations that are re-applied or expanded upon in other organisations, thereby contributing to the **Ideas** foundation.

Like early-stage investments in start-ups, investments in AHM can often be high risk. But while many will 'fail', in the sense that they will not recoup their costs, others will go on to achieve spectacular success. An often-noted example here is *War Horse*. £50,000 was spent on experimental workshops at the National Theatre Studio for *War Horse*, and its first production cost around £500,000. However, it

[7] Where heritage density is 'tangible heritage sites per klm^2' and artistic/scientific creativity are defined as proportion of working age local residents who are engaged in creative occupations/tasks within the artistic, sports and entertainment sector/or the scientific, technical and research sectors. Again, precise estimates are reported in Sections 6 and 7, though these should be interpreted with caution.

has now been seen by over 5.5 million people worldwide and earned the National Theatre a surplus of £12 million.[8]

In sum, there is a range of evidence suggesting AHM organisations have a positive effect on many of the foundations of productivity in the economy, and as one would expect, the evidence is richer for the creative industries. It is also for the creative industries that the evidence of a positive effect on economic performance is strongest. While we did not identify productivity evidence, we did find some evidence on wages.

For the wider creative industries, Lee (2014) found that, within a travel to work area (TTWA), a doubling of creative industries employment was associated with a 4.7% increase in the wage level in other sectors. Bakhshi et al. (2014) found that, within a TTWA, a unit increase in the location quotient of cultural venues per capita was associated with a 9.9% increase in the wages of people employed in cultural occupations and a 7.1% increase in the wages of people employed in a creative occupation, even after controlling for other determinants of wages.[9]

For the rest of the economy, the wage evidence is, so far, inconclusive. While some papers found a positive effect on wages (e.g. Noonan, 2013), others either failed to find any effect (e.g. Boualam, 2014) or even found a negative one (Bakhshi et al., 2014).

One possible explanation is simply that the effect of AHM is too small, relative to other determinants, to be picked out in these economy-wide studies (in contrast to the wider creative industries ones). Another is that the effect of AHM on wages could go in both directions. While there could be a positive productivity effect, there could also be a negative 'amenity' effect whereby individuals are willing to sacrifice some wages in exchange for desirable cultural amenities. Evidence more directly focused on productivity could help improve our understanding.

The strength and availability of the evidence varies considerably and further research could help plug some of these gaps.

We reviewed 50 papers as part of the REA. The papers touched on many of the channels and impact types identified in our framework, with the majority focused on indirect impacts. While the key findings have been summarised above, Figure 2 summarises the availability of evidence across each impact and linkage.

[8] https://www.artscouncil.org.uk/sites/default/files/CIF_Arts_and_Growth.pdf

[9] The study focused on urban TTWA only. These areas typically included 100,000 people. If a location quotient is originally 1, then a one-unit increase (to 2) would mean that a local area's density would have increased from the national average to double the national average.

Figure 2 Availability and strength of the evidence

Linkage	Ideas	People	Business Environment	Infrastructure	Places
Evidence on how the 5 pillars drive productivity in AHM	In general, we found few papers focusing on productivity *within* AHM. While there is some literature looking at the relative efficiency of different AHM organisations (e.g. museums), we did not find any clear evidence on the drivers of productivity in AHM, and therefore cannot provide empirical support for the relative importance of a pillar, relative to another. Instead, we outline how each of the pillars could, ***in theory***, impact on productivity within AHM.				
Evidence on how the AHM sectors impact on 5 pillars in the creative industries	Medium amount of evidence. Indirect quantitative evidence. Medium quality qualitative papers.	Medium amount of evidence. Medium quality quantitative papers. Medium quality qualitative papers.	High amount of evidence. Medium quality quantitative and qualitative papers.	Low amount of evidence*	Low amount of evidence
Evidence on how the AHM sectors impact on 5 pillars in the rest of the economy	Med-Low amount of evidence. Little quantitative evidence. Medium quality qualitative papers.	High amount of evidence. Med-high quality quantitative papers.	High amount of evidence. Medium quality quantitative papers. Medium quality qualitative papers.		Medium amount of evidence. Medium quality qualitative papers.

Source: *Frontier Economics*

Note: ** Any papers focusing on the ways in which AHM institutions can make local areas' more attractive are included under Business Environment foundation, rather than infrastructure. (See Section 2.2 for details on how infrastructure is defined in the government's industrial strategy).*

The lack of evidence was most striking on direct impacts. We explore this in more detail in Section 5 but, in general, we found relatively little published evidence on productivity and its drivers within AHM. In part, this is likely a reflection of the fact that indirect impacts are probably more significant in terms of their overall impact on the economy; in part, it may also reflect the difficulty in measuring outputs in AHM.

While we were able to find some evidence on indirect impacts, as described above, there is a scarcity of quantitative research around the topic. Even where there is already evidence, few of the studies that reported these effects had robust methodologies.[10] In practice, this limits the extent to which they can be used elsewhere. In addition, there is a lack of quantitative studies directly focused on productivity, whether within AHM or with respect to the effect of AHM on the rest of the economy. This is, in part, because a large volume of existing research is focused on the contributions to GVA and makes little or no reference to the quantum of any productivity impacts. Furthermore, a large proportion of papers concentrate on the productivity impact of the whole creative industries rather than focusing on AHM specifically. Further work could usefully help plug these gaps.

Building on existing methodologies to study local-level AHM density, new econometric work can address this evidence gap by directly exploring the relationship between AHM density and firm-level productivity. This can be done using established econometric methodologies drawing on detailed firm-level datasets such as the Business Structure Database (BSD) and Financial Analysis Made Easy (FAME), which contain information on firm revenue, employment, location and productivity over multiple years. Provided the data is rich enough at

[10] Even within the subset of quantitative papers, very few papers were rated as SMS 3 or above – a common threshold for the plausible identification of causal effects. See Section 4.2 for further detail.

the local level, it may also be possible to limit the influence of unobserved heterogeneity.[11]

Another way to get closer to causal effects would be to compare business impacts before and after the introduction of an AHM institution (e.g. a one-off festival or a new site such as the Turner Contemporary in Margate), which could allow for better identification of the direction of causality between AHM and local business activity. Provided there is adequate data, a robust (SMS 3) difference-in-difference approach could be taken, drawing on the firm-level datasets outlined above. Alternatively, and if data is scarcer, it may also be useful to delve into examples in more detail. This could involve surveys of local businesses and a series of case studies to allow for a better understanding of the mechanisms of impact.

[11] One could, for instance, attempt to follow the methodology employed in Backman and Nilsson (2018), see https://link.springer.com/article/10.1007/s10824-016-9289-2

Acknowledgement

To produce this report, Frontier Economics relied on the expertise of many experts, within the arts, heritage and museum (AHM) sectors and in government and academia. First and foremost, Frontier would like to thank Harman Sagger and Mark Abram, as well as their DCMS colleagues, for their guidance throughout the project and their help in developing a productivity framework that was both appropriate to the government's needs and the particularities of the AHM sectors. In addition, Frontier would like to thank academic and sector experts Geoffrey Crosskicks (School of Advanced Studies), David Throsby (Macquarie University), Anna Jobson (University of the Arts), Tom Fleming (Tom Fleming Consulting), Samuel Jones (Tate), Hasan Bakhshi and John Davies (Nesta), Brenda Dorpalen and Adala Leeson (Historic England), and Oliver Stephenson, Andrew Mowlah and Peter Massey (ACE). We are grateful to each of these individuals for sharing their expertise and offering up some of their time to provide their thoughts and feedback on our framework and emerging findings.

1. Introduction

Productivity in the UK has flatlined for the past decade. This is a major concern for policy makers since productivity is a key determinant of living standards. Major government initiatives, not least the Industrial Strategy, which has put forward a detailed plan for improving UK productivity, have sought to address the issue.

Against this backdrop, it is essential for all government departments to better understand how their interventions can lead to productivity gains. Frontier Economics was commissioned by the Department for Digital, Culture, Media and Sports (DCMS) to carry out a study to better understand how investment in the arts, heritage and museums (AHM) sectors can lead to increased productivity. Evidence of the effects of these sectors on productivity does exist, but what is less clear is how strong and comprehensive this evidence is and where the gaps lie. This report looks to address this knowledge gap by critically reviewing the existing literature on the links between AHM and productivity.

This study aims to address the following key questions:

- What are the channels through which the AHM sectors can impact on productivity – both within and outside of these sectors?
- How do these mechanisms relate to the five foundations of productivity in the government's Industrial Strategy?
- What is the evidence base supporting the sectors' impact on productivity and the five foundations of productivity?

Our approach consisted of two broad phases.

1.1 Phase 1

Phase 1 was primarily 'conceptual' – aimed at thinking through how investment and activities in the AHM sectors could lead to productivity gains in the AHM sectors themselves as well as in the wider creative industries and the economy as a whole. To help guide our thinking, we interviewed several experts with relevant knowledge of the broader productivity literature and the existing sector-specific evidence.[12]

As part of this phase, we developed a theoretical framework for thinking about productivity in the AHM sectors, which is presented in section 3.2

1.2 Phase 2

In Phase 2, we carried out a Rapid Evidence Assessment (REA) to see which of the productivity channels identified in our conceptual framework had the strongest support in the existing literature.

The REA looked specifically for evidence across three types of impact:

- The direct productivity impact of public interventions on publicly supported AHM institutions.

[12] The experts interviewed are listed in the Acknowledgement.

- The indirect impact of interventions on productivity in the wider creative industries. In practice, we considered evidence of how direct increases in the productivity of publicly supported AHM institutions can 'spill over' to other organisations, and also more generally of how the mere existence and activities of publicly supported AHM organisations can drive productivity improvements in the creative industries.
- The indirect impact of interventions on productivity in the rest of economy. We proceeded as in the previous case but did not restrict ourselves to evidence related to those organisations with the most obvious links to AHM.

1.3 Structure of this report

This report sets out the results of our study. Section 2 provides further motivation for this study, Section 3 outlines our framework and the remaining sections describe our findings in more detail, first overall and then across the three impact types.

2. Why productivity matters

In this section we provide further motivation for this study. The 'productivity puzzle' is one of the most important challenges currently facing the UK economy and one the UK government has made it its priority to address. The arts, heritage and museums (AHM) sectors can play a key role in improving productivity, as we will outline in the rest of this report.

2.1 Why productivity is important

Productivity is a key measure of performance for any economy, and any sector within an economy. It measures output for a given level of input, i.e. productivity measures the efficiency with which inputs are used.

Productivity growth is key to improving economic prosperity in general and purchasing power in particular. As inputs to production become more productive, more output can be produced for the same volume of inputs. As a result, the quantity of goods and services available increases and/or the surplus to be shared between capital and labour increases. As labour becomes more productive, workers tend to be able to demand higher wages in exchange for their time – real wages rise as a result.[13] While increases in productivity may not automatically result in increases in living standards, especially in the short run, they are a necessary pre-condition to continued growth in living standards in the long run. As the famous US economist Paul Krugman once put it:

> 'Productivity isn't everything, but, in the long run, it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker.'[14]

Given how important productivity is for workers' incomes and prosperity, improving it is a key target for policy makers around the world. How productivity is measured is therefore of key importance. There are several productivity measures but the most widely used ones are:

- Labour productivity: this is usually measured as the value of output or gross value added (GVA) per worker or per hour worked. The latter is usually preferred to the former as it better captures the use of labour inputs.
- Total factor productivity (TFP): TFP (sometimes called multi-factor productivity (MFP)) is derived as the residual growth in output that cannot be explained by the rate of change in inputs of labour, capital and intermediate outputs. It is often interpreted as the contribution to economic growth made by factors such as technical and organisational innovation.

2.2 The UK's productivity performance

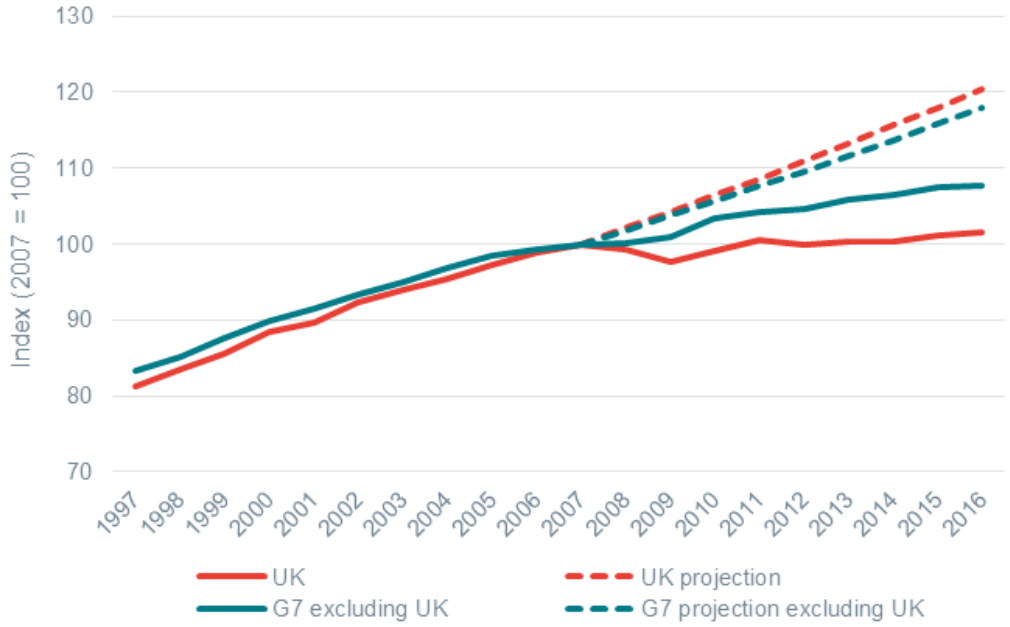
Recently, the UK has experienced a substantial slowing of productivity growth. Although this slowdown has affected several developed countries, the UK appears

[13] For example, the take-off of real wages in Britain and other countries in Western Europe in the 19th century was driven in large part by advances in technology which led to rapid increases in the productivity of labour. See, for example, Broadberry et al. (2015).

[14] Paul Krugman (1994).

to have suffered more than most. For example, Figure 3 shows how gross domestic product (GDP) per hour worked has evolved in the UK and the rest of the G7 since 1997. From 2007 onwards, productivity in both the UK and the rest of the G7 has diverged from its pre-crisis trend. However, this divergence has been more pronounced in the UK. The gap between the projection based on the UK's trend rate of productivity growth and the UK's actual performance was around 15.6% in 2016 compared to 8.7% in the rest of the G7. If UK productivity had continued to grow in line with past trends it would be around 20% higher now than it is.

Figure 3 GDP per hour worked, actual and projections, 1997-2016



Source: *Office for National Statistics (ONS), available at https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/internationalcomparisonsofproductivityfinalestimates/2016*

Note: *Constant prices used.*

On top of the UK's relatively poor productivity performance, the country has faced persistent regional inequalities in terms of both wages and productivity. For example, Figure 4 below shows the differences in labour productivity between different areas within the UK. In 2017, the average UK region outside London had 32% lower labour productivity than the capital, and in Northern Ireland this gap was as high as 37%. OECD data suggests that regional inequalities in the UK are both higher and growing more quickly than in most other OECD countries.[15]

[15] https://www.oecd.org/cfe/UNITED-KINGDOM-Regions-and-Cities-2018.pdf

Figure 4 Labour productivity across the UK, 2017

Source: *ONS, available at https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/regionalandsubregionalproductivityintheuk/february2019*

Note: *Labour productivity is measured as gross value added per hour worked. Regions are NUTS1 UK regions. Productivity is measured at current prices in 2017.*

2.3 The government's response

The 'productivity puzzle' described above has provoked commentary and discussion across developed economies. Partly in response to this puzzle, in 2017 the government launched its Industrial Strategy, setting out the medium-term challenges facing the UK economy and the government's proposed policies to meet those challenges.

The Industrial Strategy focuses heavily on boosting productivity, given the link between productivity and living standards. This is consistent with government policy more generally, which makes productivity the primary focus of economic policies. As outlined in the government's Green Book on evaluation, this is to ensure that spending and reforms by government are 'additional' rather than simply displacing other spending.[16]

The Industrial Strategy sets out the 5 foundations of productivity which will underpin UK productivity growth in the future.[17] Previous government publications[18] have defined productivity foundations in slightly different ways but the underlying fundamental drivers of productivity have not changed.

[16] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf

[17] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf

[18] See for example HM Treasury's 2006 publication 'Productivity in the UK 6: Progress and new evidence' available at: https://webarchive.nationalarchives.gov.uk/20070701105126/http://www.hm-treasury.gov.uk/media/6/B/bud06_productivity_513.pdf

These foundations can be thought of as the areas which, when invested in, can boost productivity throughout the economy. The government's Industrial Strategy includes a series of policies aimed at bolstering each of them, underlying their importance to driving productivity:

- **Ideas**. Innovation is key to improving productivity in an advanced economy. Innovation leads to new technologies and ways of working which can boost productivity. Innovations affect both the firms which are directly engaged in innovation and the wider economy through spillover effects. Innovations come in different forms, from the small tweak to a firm's production process (an incremental innovation) to the development of a new product that offers a step-change in capabilities compared to existing alternatives (a radical innovation such as the iPhone). These two types of innovations go hand in hand. The former is key to ensuring that new productivity-enhancing technologies can be adopted across industries, while the latter is necessary to ensure continued productivity gains can be sustained over the long term.[19] The UK's ability to innovate depends on developing and deploying new ideas. To encourage innovation, the government launched its Industrial Strategy Challenge Funds and increased the rate of the research and development (R&D) tax credit to 12%.
- **People**. The quantity and quality of labour available in an economy is an important determinant of productivity growth. Human capital complements physical capital – skills are needed to take advantage of investment in new technologies and organisational structures. Investing in the skills and experience of the workforce means that existing and new businesses are better able to utilise the capital they have and can more easily find the talent they need to succeed. Skills are therefore necessary to realise the productivity potential of existing technology. In addition, specialist skills are ultimately necessary to ensure the continued supply of new radical innovations (which often require the combination of different advanced skills to emerge). The government has recently focused its efforts on improving vocational skills (including apprenticeships), notably in STEM subjects and digital technologies.
- **Infrastructure**. Modern and accessible infrastructure is vital in a well-functioning economy. Infrastructure improves connectivity, which influences how markets operate. For example, improvements in transport infrastructure reduce transport costs and improve accessibility, which directly lowers the cost of input factors driving increases in investment and trade.[20] The government has pledged increases in public investments in transport, housing and digital infrastructure.
- **Business environment**. A favourable business environment can attract foreign direct investment and stimulate new businesses to spring up and create new innovations. There are many factors that can have an impact on the

[19] The incremental/radical distinction was first proposed by Freeman et al. (1982).,

[20] In the government's Industrial Strategy, infrastructure appears to be mostly defined as those physical assets that help improve connectivity and accessibility (i.e. mostly communication and transport technology, but also housing). Under this definition of infrastructure, AHM assets and buildings are only likely to have an impact on the Infrastructure foundation in so far as they offer firms physical spaces in which to locate. With regard to the impact of AHM assets on a local area's overall attractiveness, evidence of this fits better under the Business Environment foundation, rather than the Infrastructure one.

business environment. Legal and regulatory frameworks will play a role, as will the absence/presence of barriers to entry (into markets). At a local level, a favourable business environment is often enabled by the presence of dynamic firms, highly skilled individuals and high-quality amenities (including physical infrastructure as mentioned above and, for example, high-quality leisure activities).[21] A local business environment with these characteristics will often generate agglomeration benefits for the firms within it, which will help boost their productivity. The government has put in place a number of 'Sector Deals' to drive productivity growth across the economy. A key focus of these deals is to encourage the development and expansion of local clusters in these sectors (e.g. London Tech City initiative).

- **Places**. As well as boosting economic performance and productivity overall, the government is concerned with ensuring that the economy is well balanced and that all regions of the UK perform well. Economic performance and productivity are currently skewed in favour of London and the South East, but various initiatives will seek to address regional disparities by promoting economic development across the country. The government is working in partnership with local areas to develop Local Industrial Strategies to ensure productivity growth is achieved across the UK.[22]

3. A framework for understanding the productivity impact of interventions in AHM

In this section, we set out a framework for thinking about the ways in which interventions in the AHM sectors can lead to productivity gains, both within the sectors and across the wider economy. First, we briefly describe some of the challenges inherent in fully identifying productivity impacts, before outlining our suggested approach.

3.1 Challenges in tracking the aggregate productivity impact of interventions in AHM

In an ideal world, the productivity impacts of AHM interventions could be boiled down to a single number. More specifically, DCMS would be able to quantify the overall productivity impact of its interventions – for each £X spent, DCMS would be able to estimate a Y% change in productivity.

In practice though, there are several difficulties in estimating such aggregate statistics starting with the very measurement of productivity, which presents challenges in all sectors but particularly in AHM. The problem is that the most

[21] As mentioned above, the positive contribution of AHM sites or buildings on the provision of local leisure amenities fits better under this Business Environment foundation than the Infrastructure one.

[22] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf

commonly used measures of productivity may not, in AHM, capture increases in the efficiency with which inputs are turned into outputs.

There are many ways to measure productivity. The UK's headline measure of labour productivity, produced by the Office for National Statistics, is:

GVA per hour worked = GVA/number of hours worked.[23]

This measure looks at the amount of output produced by a worker in a given amount of time, and therefore captures increases in the 'value' that each worker creates. Other measures of productivity try to take a more global view of the efficiency with which inputs are turned into outputs. Total factor productivity (TFP) is one example; this looks at the ratio of the value of aggregate outputs to the value of aggregate inputs.

While these different measures will have slightly different emphases, the objective remains the same: to estimate the efficiency with which an input(s) is used to produce an output(s). This should account for the quality as well as the quantity of the outputs produced, i.e. if the same inputs are used to produce the same quantity of outputs but these are, in some way, *better* than those that were previously produced, this should be reflected in the measure of productivity.

The problem is that, in the AHM sectors, these traditional measures of productivity may not meet this objective. Consistently capturing the quantity *and* quality of outputs is a pre-condition to estimating productivity. But doing this using a measure such as GVA presents two major problems for AHM. The first is that consistently measuring outputs in AHM is difficult as market prices for outputs are often unavailable. The second is that even when they are available, much of the value created by AHM outputs is not adequately captured by market valuations.

We briefly discuss each in turn:

- **Measuring AHM outputs.** Without a consistent measure of outputs, it is not possible to measure productivity. Typically, outputs are measured by their market price, and changes in it are assumed to reflect that the price can capture changes in quality. But many AHM sites, especially those that receive public support, are free to access so there is no readily available 'price'. This has been a long-standing issue in AHM and outputs can be measured in different ways (e.g. number of visitors, prices at comparable institutions, etc). We discuss these further in Section 5. Still, the absence of market prices makes comparing outputs, and therefore productivity, difficult both within AHM and between it and other sectors.
- **Capturing non-market benefits.** Even for those AHM outputs that have a market price (e.g. a play), it is not clear that this price will adequately reflect the quality, or value, of these outputs. The issue is twofold:
  - AHM outputs will have a use value (the value that individuals derive from consuming these outputs: e.g. attending a theatre performance) and a non-use value (the value individuals assign to something even if they do not use it: e.g. the presence of a building with historic significance or a museum).

[23] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/bulletins/labourproductivity/januarytomarch2019

For most goods and services, prices will typically reflect the use value, but because many AHM outputs do not have a price (e.g. free museums, heritage sites), it is often hard to infer their use value directly. However, even when they do (e.g. a theatre performance), the price may not necessarily reflect the non-use value.

- Quite apart from the individual values that individuals derive from AHM, there are likely to be significant positive externalities at play – benefits to third parties who are not directly involved in the consumption of AHM goods and services. Again, this is a familiar problem with output measures such as GVA – they do not capture positive or negative *externalities* (see Box 1). An example often used is that of a sector that produces substantial GVA but also causes severe damage to the environment. This damage is a negative externality as it is not captured in the GVA measure and the sector may appear more productive than it would be if the depletion of 'natural capital' were also included. In AHM, the issue is similar but in reverse. There is evidence that participating in AHM activities can have positive impacts on people's health, with obvious knock-on benefits for the UK's health system (Crossick and Kaszynska 2016).These benefits are not reflected in the price of the ticket people pay. In other words, there are likely to be positive externalities to the outputs produced by AHM which are not captured by using a GVA measure of output.

There are several studies which have looked at the use and non-use value and externalities associated with AHM. See, for example, the work by Bakhsi et al. (2015)[24] commissioned by the Arts and Humanities Research Council, which examined the value to individuals and society of the Natural History Museum and Tate Liverpool. The study used contingent valuation and wellbeing valuation to measure the value to society of these institutions and provided plausible estimates (e.g. £6.65 use value and £2.78 non-use value for visitors to the Natural History Museum). Other work includes Lawton et al. (2018),[25] which used contingent valuation analysis to examine the use and non-use value of historic sites and their cathedrals, and the work by Fujiwara et al. (2018)[26] for DCMS, which used similar techniques to look at the value of four museums (Great North Museum Newcastle, World Museum Liverpool, National Railway Museum York, Ashmolean Museum Oxford).

[24] The study is available at: https://ahrc.ukri.org/documents/project-reports-and-reviews/measuringeconomicvalue/ This report was co-funded by the AHRC's Cultural Value Project and the Department for Culture, Media and Sport.

[25] Available at: https://www.nesta.org.uk/report/economic-value-heritage/

[26] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/745780/The_Economic_Value_of_Culture_-_A_Benefit_Transfer_Study_-_Final_report.pdf

BOX 1: CROSSCUTTING PRODUCTIVITY MEASUREMENT ISSUES

Measures of output should, in principle, be adjusted to take account of externalities (positive or negative). If such an adjustment is not made, there is a risk that measures of economic output are biased and ignore the value of reducing negative externalities, such as pollution, or indeed the costs of increasing them. Measures of productivity growth that ignore wider impacts overstate the 'social benefits' of production (Ball et al., 2005).[27]

Various initiatives have been put in place to build on and improve productivity measurement going forward. One area which has received significant attention for example is natural capital (NC) – the elements of nature which directly or indirectly produce value to people[28] (e.g. ecosystems, land, minerals, air, etc). Current productivity measures generally do not recognise NC as an input into the production process, which can lead to bias in productivity measurement – for example, if economic growth comes at the expense of natural resources being depleted at a fast rate, traditional measures may overestimate productivity growth.

One manifestation of the trend to improve productivity measurement is the focus in the '25 Year Plan to Improve the Environment'[29] on properly measuring NC: if NC is depleted as part of the production process, that needs to be included in the cost of production. That ensures only production that adds value takes place, as intended in a market economy.

NC accounting has been a part of what the Office for National Statistics (ONS) does and the goal is for NC accounts to be incorporated into UK Environmental Accounts by 2020.

DCMS is looking to pursue a similar approach in the context of AHM, anchored around the concept of 'cultural capital'.

These issues highlight the significant pitfalls in attempting to use any of the traditional measures of productivity and relying on market prices. But while these issues present a challenge in quantifying an aggregate productivity impact, they do not imply that there is not one. AHM organisations, like all others, will be run more or less efficiently, and AHM interventions will have an impact on both the productivity of AHM sectors and those around them. The issue is that synthesising this into one aggregate number is especially challenging here.

Still, this is an objective worth aiming for. In this report, we aim to provide the building blocks for doing this by detailing *how* productivity improvements can occur: to better understand what drives them and where they are likely to occur. To help organise the evidence, we developed a framework to outline how these productivity impacts could occur in theory. This is described in the next section.

27 https://pdfs.semanticscholar.org/5a4f/8c843ff7161c539eb538f68d32b4708fe086.pdf

28 http://researchbriefings.files.parliament.uk/documents/POST-PN-0542/POST-PN-0542.pdf

29 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25- year-environment-plan.pdf

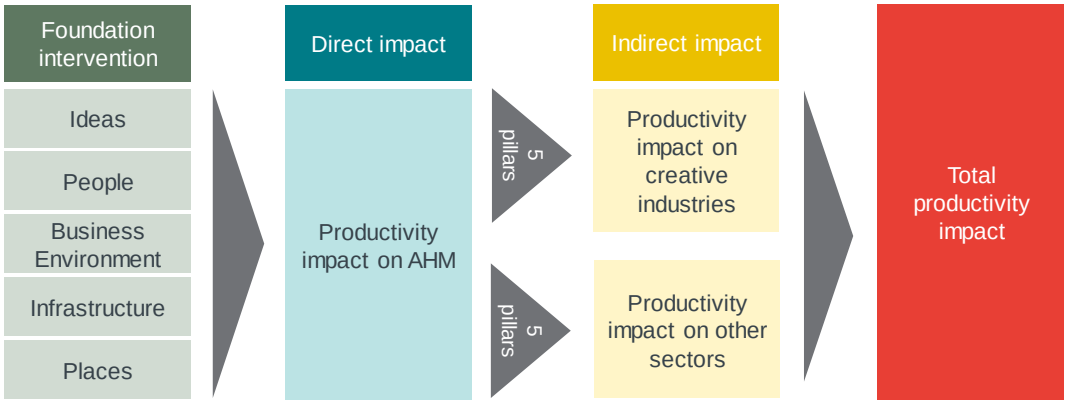
3.2 Our approach

To estimate the productivity impact of any intervention first requires understanding who will be affected and the channel through which the impact occurs.

- **Organisations impacted.** All governments interventions will not solely have an impact on the organisation/individuals targeted; they will have an impact on the wider economy too. An intervention aimed at improving employee skills will not solely have an impact on them. Trained employees are likely to share their newfound skills with others, or to use them to develop new, more efficient processes. If either happens, their organisation may reap substantially more productivity benefits than those directly resulting from the employees working more efficiently. These 'spillover' benefits are often substantial. For certain types of interventions, they may be where most of the productivity benefits are. For instance, funding for a new road may have no productivity impact on the construction firm that receives the funding, but it is likely to have a substantial effect on those firms who use the new road. Capturing these 'indirect' impacts is therefore essential.
- **Channels of impact.** As described above, productivity is a measure of how efficiently inputs are used to produce outputs. To be able to attribute a change in its level to an intervention, it is essential to understand the mechanism through which the two are linked. In the case of a skills intervention, this is straightforward (a more skilled worker will often work faster/better) but in other cases, such as road building, it may be less so. Specifying the channel is particularly helpful for indirect spillover impacts. In the case of a new road, estimating the productivity impact on firms will first require estimating the potential time savings resulting from the construction of the new road. Once this is done, it will then be possible to estimate the effect of these time savings on firm productivity. In other words, identifying the channel is often a necessary intermediate step to the calculation of an overall productivity estimate.

To fully unpack the productivity impact of AHM interventions, it will therefore be necessary to do both. Figure 5 below outlines the framework we developed to do this.

Figure 5 Framework for understanding the productivity impacts of interventions in the AHM sectors



Source: Frontier Economics illustration

Note: Though not explicitly illustrated above, it is important to note that a DCMS intervention could have a positive indirect productivity impact, even if there is no direct impact, as described below.

In Section 2 above, we described the government's 5 foundations of productivity. These provide a helpful categorisation for thinking about the potential channels of impact, the mechanisms linking interventions to productivity. By focusing on the ways in which investment in the AHM sectors can have an impact on each of these foundations, we can understand *how* an intervention can drive productivity improvements.

In addition, we distinguished three types of productivity impacts, based on who is affected:

- **Direct impact.** The first and most obvious impact of interventions will be on the AHM organisations directly targeted. For example, a programme to enhance the skills of those working in the AHM sectors is likely to enable them to create more or better outputs. One might imagine a digital training programme would allow museum workers to work more efficiently, and/or increase the reach of their work to online audiences, which can in turn lead to the outputs of the AHM organisation being used more widely (which can in turn spark innovation).
- **Indirect impact on creative industries.** As described above, an intervention will not only have an impact on the organisation targeted. In this case, publicly funded AHM organisations are deeply intertwined with other private organisations within the broader creative industries. Publicly funded AHM employees who receive digital training are quite likely, at some point, to take their skills to other firms in the creative industries, where they can share their learnings. Furthermore, as in the case of a new road, the mere existence of a publicly funded institution may contribute to productivity elsewhere. In other words, a positive indirect impact can occur even when there is no direct impact.
- **Indirect impact on the rest of the economy.** In our framework, we distinguished indirect impacts on the creative economy from those on the rest of the economy, as one might reasonably assume the two to be different. While impacts on the creative industries may be most obvious and most significant, AHM organisations are often at the centre of public life and may also play a role in increasing a locality's cultural capital, with potential knock-on benefits for the productivity of firms in the area.

Ultimately, the total productivity impact of an intervention in AHM will be equal to the sum of the impacts on these three types of organisations so it will be necessary to estimate impacts for each.

In sum, we looked for evidence across all three types of impact and attempted to better understand the extent to which interventions will impact on the drivers of productivity across all three, using the government's 5-foundation framework. In the ensuing sections, we outline our main findings, starting with an overview.

4. Overview of rapid evidence assessment

In this section, we describe our methodology for reviewing the evidence, and provide an overview of our findings across all types of impacts and channels.

4.1. Methodology

Our review of the evidence consisted of a Rapid Evidence Assessment (REA). This followed the best practices of the methodology as set out by Collins et al. (2015).[30] An REA attempts to examine a broad set of evidence regarding a topic and provides a critical evaluation of all compiled results. This allows for a better understanding of the quantity and quality of the evidence.

The protocol used for selecting and rating the relevance of studies for this REA was split into three sub-sections – one for evaluating quantitative papers, one for evaluating qualitative ones and one for evaluating existing reviews:

- For quantitative papers, we used the Maryland Scientific Methods Scale (SMS) – a framework that enables papers to be consistently differentiated with respect to the statistical robustness of their methodologies, and hence their internal validity.[31]
- Qualitative papers were differentiated based on the richness of information on the presented phenomenon, the level of detail in the descriptions for any proposed mechanisms and the robustness of criteria for selecting case studies.
- Furthermore, where papers were themselves reviews of prior work, they were rated based on their literature inclusion criteria and the methodological robustness of those papers. The external validity of all reviewed papers was assessed based on their recency and geographical relevance to the UK.

The external validity of all reviewed papers was then assessed based on their relevance to DCMS interventions in the AHM sectors – more recent papers focused on the UK were therefore more highly rated. The evidence collected and categorised according to these criteria was then synthesised based on how it related to the three impact types (direct, indirect to creative industries and indirect to rest of the economy) and channels (the 5 foundations of productivity). By focusing on evidence of the different types of impacts, we did not directly review the literature examining the impact of interventions on the foundations (for instance, we did not look at studies assessing the effect of a DCMS intervention on skills). This literature is likely to be quite intervention-specific and less focused on productivity, and it was therefore outside of the scope of this study. Should DCMS wish to estimate the overall productivity impact of one of its interventions, the findings from this literature review would therefore need to be combined with intervention-specific evidence.

4.2 Overall assessment of the availability and strength of the evidence

We reviewed 50 papers as part of the REA. Overall, these papers touched on many of the channels and impact types identified in our framework, with the majority focused on indirect impacts. Some of the papers focused on the arts, heritage and museums sectors separately, while others examined them in combination. In the

30 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/560521/Production_of_quick_scoping_reviews_and_rapid_evidence_assessments.pdf

31 Further detail on the SMS scale is available here: https://whatworksgrowth.org/resources/the-scientific-maryland-scale/

ensuing sections, we look more closely at the evidence across impact types and sub-sectors. We provide an overview of the evidence here.

As shown in Figure 6, the papers we reviewed were a mixture of theoretical and empirical papers, and the empirical ones were a mixture of qualitative case studies, quantitative papers and reviews. In general, the papers reviewed were of relatively low robustness, with limited ability to identify causal effects. It should be noted that the standard used to assess papers was quite high (e.g. for a quantitative paper to be rated as a 3 on the SMS scale, it had to have devised a methodology that included a credible control group to identify the counterfactual) and it is relatively rare for policy-focused studies (whether in AHM or elsewhere) to meet this threshold. Still, the relative dearth of SMS 3 or above papers suggests there is scope for future quantitative work rated SMS 3 or above to add to the existing body of evidence.

Figure 6 Nature and robustness of the studies reviewed

	Total	Low	Medium	High
Qualitative	20*	3	14	2
Quantitative	22*	14**	5	2
Reviews	7	1	4-6	0-2

Source: *Frontier assessment*

Note: ** Two papers (one qualitative, one quantitative) were more theoretical in nature so did not fit neatly under the criteria outlined above and were therefore not classified under low, medium or high.*
*** Of these 14 papers, 7 were rated SMS 2. In other words, they attempted to control for many factors so offer robust results on association between variables considered, but their methodology did not allow for credible identification of causal effects.*

The relative abundance and quality of the evidence available with respect to each foundation of productivity is shown in Figure 7.

Figure 7 Productivity impacts of the AHM sector

Linkage	Ideas	People	Business Environment	Infrastructure	Places
Evidence on how the 5 pillars drive productivity in AHM	In general, we found few papers focusing on productivity *within* AHM. While there is some literature looking at the relative efficiency of different AHM organisations (e.g. museums), we did not find any clear evidence on the drivers of productivity in AHM, and therefore cannot provide empirical support for the relative importance of a pillar, relative to another. Instead, we outline how each of the pillars could, ***in theory***, impact on productivity within AHM.				
Evidence on how the AHM sectors impact on 5 pillars in the creative industries	Medium amount of evidence. Indirect quantitative evidence. Medium quality qualitative papers.	Medium amount of evidence. Medium quality quantitative papers. Medium quality qualitative papers.	High amount of evidence. Medium quality quantitative and qualitative papers.	Low amount of evidence*	Low amount of evidence
Evidence on how the AHM sectors impact on 5 pillars in the rest of the economy	Med-Low amount of evidence. Little quantitative evidence. Medium quality qualitative papers.	High amount of evidence. Med-high quality quantitative papers.	High amount of evidence. Medium quality quantitative papers. Medium quality qualitative papers.		Medium amount of evidence. Medium quality qualitative papers.

Source: *Frontier Economics*

Note: ** Any discussion of ways in which AHM sites can make local areas more attractive would be included under Business Environment foundation. (See Section 2.2 for details on how infrastructure is defined in industrial strategy).*

Please note that our RAG (red, amber, green) scale is somewhat relative. Links being tagged in green does not necessarily imply that externally valid quantitative estimates were available, only that there is some robust evidence, and relatively more than for other links.

Overall, and as one might expect, the evidence was more complete for some productivity channels than for others. In the same way that an intervention aimed to bolster higher education will primarily impact on the People foundation, one might expect interventions in AHM to have a much larger impact on some drivers than on others. The relative weight of the evidence is, in and of itself, an indication of how we might expect productivity to be impacted.

Still, there is a scarcity of robust quantitative research. This is, in part, because the focus of the review was on the relationship between AHM sectors and productivity rather than on AHM and output. Indeed, there was a large volume of research focusing on the contributions to GVA (and other economic indicators such as employment) but which made no reference to quantum productivity impacts. Furthermore, a large proportion of papers concentrated on the productivity impact of the whole creative industries, rather than focusing on AHM specifically.

The lack of evidence was most striking on direct impacts. We explore this in more detail in Section 5 but, in general, we found relatively little evidence on productivity within AHM and its drivers. In part, this is likely a reflection of the fact that indirect impacts are probably more significant in terms of their overall impact on the economy. It may also reflect the difficulty in measuring outputs in AHM.

In the next three sections, we explore the evidence base in more detail, starting first with direct impacts, before moving on to indirect impacts on the creative industries and the rest of the economy.

5. Direct impacts – the effect of interventions on productivity in the AHM organisations targeted

We found few studies which described the ways in which interventions help increase productivity in the AHM organisations targeted. While there is evidence on the impact of different interventions on the different foundations (e.g. of a DCMS intervention on skills), what is missing is evidence of how these foundations then have an impact on the productivity of AHM organisations (e.g. how, and to what extent, different types of skills boost AHM productivity). Even looking more broadly at evidence on the drivers of productivity within AHM, the evidence is quite sparse.[32] As a result, the focus of this section is instead on:

- detailing how the 5 foundations could drive productivity within AHM *in theory*; and
- further exploring the reasons why productivity evidence is lacking.

5.1 Applying the 5 foundations to AHM organisations

In many ways, the actual underlying factors that drive productivity within the AHM sectors are likely to be the same as those that drive productivity in other sectors. Better-skilled workers are likely to be more productive, regardless of the sector

[32] Though we did not consider here the literature on the drivers of productivity in the wider creative industries, this is discussed further in Section 7.

they work in. Similarly, new ideas can contribute to producing better outputs anywhere. This underlying commonality is exactly why the 5 foundations framework is helpful across all sectors.

Still, there are differences, both in the relative importance of different foundations and in the ways in which they can be improved, e.g. the type of skills that should be promoted, that are worth expanding upon. We attempt to bring these out for each of the foundations:

- **Ideas.** Continued innovation is arguably an even more pressing imperative in AHM than in other sectors. While most industries can, even in the short term, increase inputs to increase outputs, the supply of physical inputs is often quite fixed for AHM organisations. As a result, radical innovation is often needed to ensure the continued growth in outputs. This is true, for obvious reasons, for heritage sites and is also partly true for museums and the arts where, for any organisation or site, there is often a limit to the total number of exhibitions or plays that can be put on. To continually attract visitors, AHM organisations must constantly re-invent their offering; if Shakespeare's plays have been put on for centuries, theatres are constantly finding new and creative ways to tell his stories.[33] When it comes to incremental innovation, one obvious source of continued productivity improvements for the sector lies in the further adoption of digital technologies. Digital technologies have the potential to allow AHM institutions to significantly expand their reach, even as their physical footprint stays the same. The British Library and the Natural History Museum are both in the process of digitising their collections, allowing them (and their audiences) to access their treasure troves of information far more efficiently than before.[34]
- **People.** Investment in human capital will bring increases in productivity. The productivity return on these investments is likely to be especially high in areas where there is a relative shortage of trained individuals. Some of the skills required in AHM sectors are quite unique, for example those required to restore heritage sites or damaged works of art and are therefore likely to be in short supply. But further improvements in productivity are also likely to come from an increase in the breadth of skills available in AHM. Across all sectors, it is typically the combination of soft and hard skills that tends to have the most significant impact on wages (Balcar, 2016) and there is no reason to expect AHM to be any different. Improving the soft skills of AHM workers is likely to directly improve the experience of AHM consumers and therefore increase productivity. Similarly, with hard skills, further enhancing the digital skills of those in the sector could help accelerate the adoption of digital technologies, and therefore incremental innovation. Radical innovations typically also require breadth and depth of knowledge.[35] For instance, Tate Modern's compelling architectural design, which plays a key role in attracting visitors, relies on

[33] As for instance, the Bridge Theatre recently did with *A Midsummer Night's Dream*, https://www.timeout.com/london/theatre/a-midsummer-nights-dream-review-1

[34] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/673938/Strategic_review_of_DCMS-sponsored_museums.pdf

[35] The combination of artistic and scientific 'creativity' (defined as the proportion of working age local residents who are engaged in creative occupations/tasks within the artistic, sports and entertainment, scientific and technical sectors sectors) is associated with local development, see Cerisola (2019). https://doi.org/10.1007/s10824-018-9328-2

entirely new brick-laying techniques and required the combination of artistic, construction and digital modelling techniques.[36] Encouragingly, AHM institutions are increasingly focusing on developing the breadth of skills of their workers, especially their leaders.[37]

- **Business Environment.** Close proximity between AHM sites is likely to generate substantial spillover benefits. In the arts especially, workers will often work for many different organisations, and proximity is likely to facilitate skills and idea exchanges, ultimately boosting productivity. The same is true for collaborations between museums. While proximity may facilitate collaboration, it can also heighten competition and the creative destruction that comes from enhanced competition. Increased competition can help identify the best ideas more quickly and allow them to scale. There are also likely to be productivity benefits resulting from co-location simply as a result of the pull-factor this creates for visitors. Co-location may allow AHM organisations to benefit from economies of scale across the local area. Organisations in the cluster may need to invest less to attract visitors if they are part of a larger grouping/event, which is partly how events such as the Edinburgh Festival Fringe or the UK City of Culture can help boost the productivity of participating organisations. Whatever the mechanism – collaboration, competition or economies of scales – one UK-based study offered some support to the agglomeration benefits hypothesis, suggesting that a one-unit increase in local cultural density was associated with a £1 increase in wages for those working in the cultural sector.[38]
- **Infrastructure**. While AHM sites can provide useful infrastructure for other firms, the type of infrastructure that can help boost the productivity performance of AHM is similar to that which will boost productivity elsewhere. Quicker, more accessible and more reliable infrastructure will have similar effects in AHM as elsewhere. In addition, improvements to the physical spaces that AHM organisations occupy can, intuitively, help boost overall productivity. Again, one example is the extent to which AHM sites are digitally connected. Often, new AHM infrastructure can enable new types of innovations, as the Tate Modern Turbine Hall did for modern art installations, or the new Bridge Theatre's highly customisable theatre space.
- **Places.** As described previously, place is not really a driver of productivity but rather a way for the government to emphasise the importance of achieving higher productivity across the country. And, as we discuss in the sections on indirect impact, AHM organisations can play a key role in local regeneration. Within publicly funded AHM organisations though, the point is perhaps simply to ensure that funds are appropriately distributed between AHM organisations, and special attention is given to those in less wealthy areas.

[36] This was detailed by Samuel Jones to the Frontier team, see also: https://uk.ramboll.com/projects/ruk/tate-modern-brick-facade

[37] See the discussion of the Mendoza (2017) report in Section 6 (Museums). Another example would be the Clore Leadership Programme https://www.cloreleadership.org/resources.

[38] Where cultural sector was defined using SIC codes and included performing arts, libraries, archives, museums and other cultural activities, see Bakhshi et al. (2014).

5.2 Further challenges in measuring AHM outputs

In Section 3, we explained why the traditional measures of productivity may fail to properly capture the quality and quantity of AHM outputs. Here, we outline a further set of issues that arise from estimating the productivity of AHM organisations, even if alternatives to GVA are used to measure outputs.

AHM organisations can and do use a variety of output measures to describe their impact. Many will identify the number of visitors as a key measure of output, while others will look at the overall income collected, not just through sales but also donations. While these measures can be tracked across time and organisations, the former is unlikely to capture the quality of the experience, while the latter ignores the fact that many AHM sites are provided free of charge precisely to increase their reach/output.

Fundamentally, many AHM outputs are not easy to define quantitatively. For example, heritage sites exist primarily to preserve the history of the area or the country, and to ensure continued access of the public to sites of significance. In situations such as this, the key output is preservation. Similarly, an arts organisation's primary objective may be to make people *think*, to give its audiences an avenue and space for personal reflection. As a result, the quality of its outputs should be assessed on this basis, though this is unlikely to be easy.

Still, AHM organisations do attempt to develop more quality-weighted measures of output. They assess audience satisfaction through surveys and feedback forms. They might also track engagement of different kinds – with businesses, educational institutions or the local community. In many ways, these attempts to 'quality adjust' outputs mimic those that have been developed for tracking productivity in the public sector, as the ONS now does on a yearly basis.[39] The issue is that, in practice, the multiplicity of outputs, and the differences in how these quality adjustments are made, means that robust comparisons of productivity across the whole sector and across time are difficult.

In this respect, the contingent valuations literature (recent examples of which are provided in Section 3) has the potential to provide the sector with a standardised aggregated measure of output. These studies would need to be done consistently and regularly in order to provide a consistent basis to track productivity changes (and their drivers).

Another possible approach attempts to aggregate these different measures of outputs into a single efficiency ranking. This literature focuses on applying data envelope analysis (DEA) to sub-sectors of AHM (especially museums and libraries).[40][41] These studies can shed light on the relative efficiency of the organisations considered. However, their relevance beyond the set of firms and

[39] Though even there, still only half of public expenditure outputs are quality-adjusted. See https://www.ons.gov.uk/economy/economicoutputandproductivity/publicservicesproductivity/articles/publicservicesproductivityestimatestotalpublicservices/2016

[40] Crucially, DEA is a non-parametric approach in the sense that it lets 'the data decide' how to weight and combine different outputs into a single efficiency measure.

[41] For a recent example we reviewed, see del Barrio-Tellado and Herrero-Prieto (2019) https://doi.org/10.1007/s10824-019-09347-2

outputs examined is more limited, especially as these tend to vary from one study to another.

Another challenge, even in those segments of AHM where market prices are readily available, is the existence of lumpy, or 'superstar' effects. Like early-stage investments in start-ups, many new plays and exhibitions will 'fail', in the sense that they will have cost more to produce than they will have generated in new revenues. However, there will also be a few investments that will generate many times more in revenues than they cost.

Perhaps the most striking example is *War Horse*. Approximately £50,000 was spent on a series of experimental workshops at the National Theatre (NT) Studio for *War Horse*, and its first production at the NT in 2007 cost around £500,000. However, it has now been seen by over 5.5 million people worldwide and earned the NT a surplus of £12 million.[42] There are many other examples of this, both on a larger scale, e.g. *Matilda the Musical*, now a West End mainstay which originally premiered in Stratford upon Avon in 2010, and a smaller one, e.g. *Jerusalem*, a play that has now transferred across the Atlantic multiple times but originally premiered in London's Royal Court.[43] Examples such as these make measuring productivity on a project-by-project or even year-by-year basis difficult.

In sum, and even if we accept that traditional GVA-based measures of outputs are not adequate, the nature and type of outputs produced by AHM make the consistent measurement of productivity challenging and partly explain the relative lack of evidence in this area. And while a number of promising alternative approaches exist, a commonly agreed measure (or method) is still lacking.[44]

Of course, because something is difficult does not mean it should not be done. Understanding what drives differing levels of efficiency is especially important when funding is restricted, as it has been for many AHM institutions in the last ten years. We briefly describe ways in which the tracking of productivity in AHM could be improved in Section 8.

When it comes to estimating the overall productivity impact of an AHM intervention though, it is quite likely that the direct impact on the organisations targeted is, ultimately, likely to be a relatively smaller share of the total impact (compared to the indirect ones). In the same way that funding for the construction of a new road is likely to have a significantly larger productivity impact on the users of the road than the construction company hired to build it, the largest productivity impacts of AHM interventions are likely to be felt in the wider economy and in the broader creative industries. We explore these indirect impacts in more detail below.

[42] https://www.artscouncil.org.uk/sites/default/files/CIF_Arts_and_Growth.pdf

[43] See https://www.timminchin.com/matilda/ and https://royalcourttheatre.com/whats-on/jerusalem/

[44] A problem which is not unique to AHM, as detailed in Box 1.

6. Indirect impacts – the effect of interventions on productivity in the creative industries

Overview

Perhaps unsurprisingly, there is limited evidence that attempts to link AHM interventions directly to productivity in the wider creative industries. However, there is some more general literature looking at the relationship between the AHM sectors and the wider creative industries. Some of this literature explores the impact of AHM on the foundations of productivity and it is this literature that we focused on. The availability of evidence is summarised in Figure 8. The most prominent themes in the review of this transmission mechanism include:

- The fostering of ideas and innovative thinking within the sector, which then induce spillover effects to the wider creative industries;
- The people involved with the sector obtaining a range of transferable skills that can then be applied in a different part of the creative industries; and
- The co-location of AHM organisations with other creative industry firms helping to create positive cluster effects and agglomeration economies.

Figure 8 Impact of AHM on productivity in creative industries (by foundation)

<table>
<tr><th></th><th>Ideas</th><th>People</th><th>Business Environment</th><th>Infrastructure</th><th>Places</th></tr>
<tr><td>Arts</td><td>Low-Med amount of evidence. Indirect quant and qual evidence from papers under other pillars.</td><td>High amount of evidence. 2 quant and 2 qual papers</td><td>Medium amount of evidence. 1 quant, 1 qual</td><td rowspan="3">Low amount of evidence.</td><td rowspan="3">No evidence though wouldn't be expected as regeneration-focused research tends to look at all sectors rather than only the creative industries.</td></tr>
<tr><td>Heritage</td><td>Low amount of evidence</td><td>Low (though Business environment evidence is linked to people pillar)</td><td>Med-High amount of evidence. 2 quant papers</td></tr>
<tr><td>Museums</td><td colspan="2">Low-Med – 2 qual (in practice, papers could fit under ideas or people pillar)</td><td>Medium amount of evidence (covered under Heritage)</td></tr>
</table>

Source: *Frontier Economics*

Note: *Papers are described in more detail below.*

Arts

The main linkages identified in the literature are between the arts and the People and the Business Environment foundations of the creative industries (and by extension the Ideas foundation). There is evidence that the arts contribute to innovation and human capital within the creative industries, and also help attract creative industry firms to an area. Through both these mechanisms, the arts can help increase the productivity of creative industries. Key research on this area includes papers by CEBR (2019), Bakhshi et al. (2014), Tom Fleming

Creative Consultancy (2015), Bakhshi, Mitchell and Smithies (2013), and Graves et al. (2016).

Bakhshi et al. (2014) empirically identified a positive effect that cultural centres have on creative industry wages, providing indirect evidence of a productivity linkage. By using datasets of cultural intensity (such as Culture 24) and regressing wages on these (controlling for the level of education in the workforce and other relevant determinants of wages), they found that a one-unit increase in the location quotient of cultural venues per capita was associated with a 7.1% increase in hourly wages for those employed in a creative occupation within a travel to work area (TTWA)[45] While the paper could not establish a causal link, it offered support for a positive productivity relationship. Below, we review several papers that were able to show how the impact of the arts on different foundations could explain this positive effect.

- **Evidence related to the People (and Ideas) foundation(s)**

The Tom Fleming Creative Consultancy (2015) argued for the existence of spillover effects, both in terms of skills and innovation, between publicly funded and commercially funded arts, and between these and the creative industries, due to the high mobility of workers between the two. Because workers move frequently, knowledge exchanges are common between publicly and commercially funded arts, which in turn increases the wider skillsets of the people in the creative industries. This in turn improves the level of intangible capital stock of the whole industry, as employees become more knowledgeable and versatile.

This mechanism is supported empirically by Bakhshi, Mitchell and Smithies (2013), who found a high degree of labour mobility between subsidised and commercial theatre, noting that 81% of those who were working in commercial theatre had either worked or trained in publicly funded arts.[46] One director, for example, remarked that they would not have been able to build their career without having worked as a resident trainee director in a publicly funded theatre.

Bakhshi, Mitchell and Smithies (2013) also found that a large proportion of those who had worked in a theatre had either worked in other commercial creative industries previously, or had gone on to work in these industries after having worked in theatre, thereby bringing the idea of mobility and knowledge acquisition within the subsidised theatre sector to the more general creative industries. In fact, they found that of those who had worked in theatre, 29% had previously worked in TV, 26% in film and 21% in advertising.

Along similar lines, the BAFTA Career Pathways Survey (2012) found that the theatre industry was the most commonly cited industry from which to transfer into film, television and video games careers. This suggests that subsidised theatre contributes to the development of talented individuals and provides them with skills that are not specifically restricted to theatre. These individuals then go on to work elsewhere across the creative industries.

[45] Where the local quotient is defined as the ratio between the share of cultural venues per capita in a city, relative to the share of that same variable in England overall. The study focused on urban TTWAs only. These areas typically included 100,000 people.

[46] This finding emerged from an open online survey which garnered 1,129 responses, of whom 63% worked in paid theatre.

Further evidence of the skills spillovers between commercially funded and publicly funded arts are evident from Arts Council England (2019), which recognised that many commercial directors including, notably, those from the Bond franchise honed their skills by working in subsidised organisations. It provided additional case studies that demonstrated the virtues of publicly funded arts festivals upon productivity by explaining how the Sheffield 'doc/Fest' ran a festival to celebrate new documentaries, increasing collaborations among filmmakers and offering support for new talents which enabled them to take greater artistic risks.

- **Evidence related to the Business Environment foundation**

According to the theoretical frameworks outlined above, for creative agents to take advantage of this diffusion of local knowledge, we should either expect to see that areas with a large presence of the arts sector attract firms from the creative industries or that the people involved with the arts sector seek areas that are rich in creative industry activity. Indeed, there is some evidence that both events occur. The CEBR (2019) found that creative workers were more willing to live and work in regenerated urban areas with good cultural offerings. Creative industries were in turn attracted to these areas in order to capitalise on this aggregation of employees with applicable skills.

Similarly, Graves et al. (2016) found a positive relationship between cultural events per capita and the density of creative firms. The authors used cross-sectional regressions on a dataset from 2003-2013 to find that a one-unit increase in cultural events per capita (proxied by cultural listings) led to a 0.098 unit increase in the concentration of creative industries when controlling for housing density and network infrastructure among other determinants of the concentration of creative industries.[47][48]

In other words, there is some evidence of a pull-factor of the arts on creative industry firms, which in turn can help improve the overall business environment for the creative industry. By attracting more firms, the arts help improve local labour market matching, reducing search costs, creating an agglomeration benefit, and thereby (potentially) improving productivity and wages in the creative sector.

Heritage

Here, the main linkage was between heritage and the Business Environment foundation of the creative industries (and indirectly the Ideas foundation). The area of research has two notable quantitative papers, one by Graves et al. (2016) and another by Cerisola (2019), which found that a higher density of heritage assets was not only associated with a higher density of creative industry firms but also with positive outcomes for these creative firms.

[47] The concentration of creative industries is defined as the location quotient of creative industries in a local authority ($LQ_{local\_authority}$), where:

$$LQ_{local\_authority} = \frac{Creative\ firms_{local\_authority} / Creative\ firms_{national}}{All\ firms_{local\_authority} / All\ firms_{national}}$$

[48] This finding should, however, be interpreted with caution as the paper cannot rule out some form of reverse causality at play.

- **Evidence related to the business environment foundation**

First of all, a detailed mapping of UK firms onto UK conservation areas found that nearly 26% of creative industries firms were located in conservation areas (Colliers International; 2018). Furthermore, this mapping analysis suggests that, *excluding central London,* listed buildings appear to attract a significantly higher proportion of creative industries firms than non-listed buildings.[49] And indeed, Graves et al. (2016), using the methodology described above, found that a one-unit increase in the density of heritage assets (within in a local authority area) led to 0.04-unit increase in the concentration of creative industries.[50] The researchers also found that prior local-level investments into culture, heritage and sports (one and two years prior to the time period in question) were also associated with an increase in the relative concentration of creative firms in the area.[51]

Similarly, Cerisola (2018) looked at the impact of heritage at the local level in Italy and found that a 1% increase in heritage density (measured by a location quotient) was associated with a 0.18% increase in creative occupations within the creative industries, even after controlling for a variety of other drivers (GDP per capita, education, etc).[52]

While this empirical work by Cerisola (2018) could not conclusively identify causation, it provides support for the idea that heritage supports the development of local-area creative industries. If this evidence is perhaps best characterised as supporting the impact of heritage on the business environment, the exact mechanism through which heritage can contribute to this is likely to be through inspiration effects and idea spillovers. In other words, heritage likely contributes to the Ideas foundation too.

Museums

For museums, the key linkages identified are to the Business Environment and People foundations. In relation to the People foundation, museums tend to loan assets to one another and often collaborate with artists across the creative industries. Furthermore, working in museums equips people with transferrable advanced skills that can be applied elsewhere in the creative industries. These links are best explored by Mendoza (2017) and DCMS (2017).

- **Evidence related to the Business Environment foundation**

For business environment, the evidence presented in the heritage section above is likely to also apply to many museums as, in practice, they are likely to be included in the different measures of heritage density.

- **Evidence related to the People foundation**

[49] This pattern does not appear to hold in central London though this is likely more a reflection of central London's high rents and desirability for all firms (not just those in the creative industries).

[50] It is a little unclear whether the authors use a location quotient to estimate heritage density or simply the absolute number of buildings. We have assumed it is the latter.

[51] The authors do not, however, specify what a 'unit of investment' is so it is difficult to interpret those coefficients.

[52] Where heritage density is 'tangible heritage sites per klm^2' and artistic creativity is defined as proportion of working-age local residents who are engaged in creative occupations/tasks within the artistic, sports and entertainment sector. In other words, the latter sector could be loosely characterised as creative industries.

Mendoza (2017) found that museum leaders were increasingly combining sector and curatorial expertise with business management skills in order to operate efficiently and maintain the museums' success. They also adopted digital technologies to support the museums' objectives, contributing to technological diffusion within the industry. This combination of sector knowledge and broader advanced business skills allows museum managers to take on work elsewhere in the creative industries.

Indeed, museums tend to exhibit a high volume of collaboration with other creative institutions. DCMS (2017) found that most sponsored museums loaned objects to others, with over 4,000 venues benefitting from loans in 2016. The British Museum, for instance, has a strong record of working with galleries across the UK with a wide-reaching programme of loans (it loaned nearly 3,000 objects to 156 venues in the UK in 2016). There are many examples of similar collaborations which improve the allocation of resources amongst organisations, allowing them to produce a higher quality output (in the sense of more varied exhibitions) without altering the total number of inputs, thereby increasing productivity. Collaboration also allows regional sites to improve their cultural offering relative to larger cities, aiding regeneration.

7. Indirect impacts – the effect of interventions on productivity in the wider economy

Overview

As in the previous section, the literature tends to focus on the positive impact of the combined AHM sectors on the general economy rather than focusing on the particular interventions of AHM separately. With this caveat, however, this is an area where the evidence is relatively rich as summarised in Figure 9 below. Multiple papers established relationships between the AHM sector and overall productivity, and between the AHM sectors and local-level productivity.

The most common mechanisms used to explain these links were:

- The creation of a more culturally complete environment that motivates its residents and acts as a positive pull-factor for entrepreneurs, business owners and highly skilled individuals. Support for the Business Environment foundation.
- The professional and personal development of individuals who are employed within the cultural industries, or simply partake in the consumption of cultural goods, who then go on to use these acquired or augmented skills in other sectors, especially to develop new ideas. Support for the People and Ideas foundations.

Figure 9 Impact of AHM on productivity in other industries (by foundation)

	Ideas	People	Business Environment	Infrastructure	Places
Arts	Low-Med amount of evidence. Indirect quant and qual evidence from papers under other pillars.	High amount of evidence. 3 quant papers	Low-Medium amount of evidence. 1 quant	Low amount of evidence because of the way infrastructure is defined in IS (i.e. any discussion of ways in which AHM sites attract people, firms, would be included under Business environment pillar). See section 2.2 for details	Medium – 2 qual
Heritage	Low amount of evidence	High – 2 quant (but high quality)	Medium – 2 quant		Low amount of evidence
Museums	Med – 3 qual	Medium amount of evidence (both pillars covered under Heritage papers)			Medium – 3 qual

Source: *Frontier Economics*

Note: *Papers are described in more detail below. The papers focused on the broader creative industries were excluded from the table.*

Creative industries

While this study's primary focus is on the AHM sectors, some of the evidence reviewed had a slightly broader focus and looked at the relationship between the creative industries and the wider economy. As AHM sectors are also part of the creative industries, some of the findings from this literature are likely to be applicable to AHM. We briefly describe these before summarising the more sector-specific literature we reviewed.

In general, there is a large body of literature looking at the relationship between creative industry density and productivity/wages/employment. Although the robustness of the studies varies, the literature does tend to identify positive effects. For instance, international evidence from Hong et al. (2013) found that creative industry clustering had a positive and significant effect on TFP growth – a doubling in creative industry concentration (measured as a location quotient) was associated with a 4.4% increase in TFP growth.[53] Similarly, looking at EU regions, Boix-Domenech and Soler-Marco (2017) found that, when controlling for capital investment amongst other determinants of productivity, a doubling in the proportion of the workforce employed in the creative industries was associated with a 4% increase in aggregate labour productivity.[54] They also noted that the effects of a high concentration of creative service industries might be as important for regional

[54] They obtained this finding by comparing 250 regions of 24 EU countries in 2008 using a Bayesian Spatial Autoregressive model to regress labour productivity in 2008 (log) on the percentage of the workforce in creative services, the percentage of the workforce in manufacturing, the capital investment rate, number of persons employed, the growth rate of the population, the growth rate of ideas, the depreciation rate, diversity, and accessibility.

productivity as scientific research or highly qualified human capital, though the evidence provided to support this claim was limited.[55]

The apparent linkage between the concentration of creative industries and economy-wide productivity can also be inferred by the evidence on the relationship between the former and wages. In the UK context, and using a fairly robust instrumental variable approach, Lee (2014) found that a doubling in creative industry employment was associated with a 4.75% increase in wages in other sectors within a TTWA.

Should these linkages be causal, the likely mechanism is through the People and Ideas foundations. The creative industries can drive innovation in the wider economy by providing firms in other sectors with an entirely different knowledge base from which to draw on. Relatedly, 'creative' skills appear to have widespread applicability, and can effectively complement sector-specific ones, helping to boost workers' overall productivity.

Perhaps the most compelling evidence is simply in the fact that many creative industry skills are used more broadly in the wider economy. This is evident from the analysis of employment data by Bakhshi, Freeman and Higgs (2013), which showed that, in the UK, more creative specialists (including AHM such as artists, arts officers, arts producers and arts directors) work outside the creative industries than inside them (54%). This stems from the fact that the creative industries offer a combination of creative skills (including content and software) that are transferable to a set of industries, such as advertising, publishing and computer games, that are characterised by the high intensity with which they use these skills. To the extent that these creative skills are partly developed in AHM, this mechanism is also likely to apply between AHM and the wider economy.

Arts

The key linkages between the arts and the wider economy are the People and Business Environment foundations. There is also some qualitative evidence that the arts can contribute to the Place foundation. Key research detailing this includes work by Bakhshi et al. (2014), Boualam (2014), Noonan (2013), Graves et al. (2016), Arts Council England (2019) and the Local Government Association (2013).

- **Evidence related to the People foundation**

There have been several attempts to explore whether 'cultural density', as opposed to the broader 'creative industries density', can bolster local-area productivity/wages/employment. In general, the findings from this literature are not clear cut, with some papers having found positive impacts while others found no or even negative ones. These differences are likely driven by differences in the methodologies (and definitions of cultural density) and data explored.

[55] This finding is justified on the basis that the coefficients for expenditures in R&D (0.08) and the percentage of people older than 25 years who have tertiary education (0.3), which are used as proxies for scientific research and highly qualified human capital respectively, are similar to the coefficient for the proportion of the workforce employed in the creative industries (0.04) when substituted into the same regression equations. In other words, the paper only demonstrates a correlation.

On the positive side, Noonan (2013) found a positive effect of cultural districts on local wages. Cultural districts are defined at the neighbourhood level and include those with a high concentration of cultural activities and institutions within them. Relative to neighbouring non-cultural districts, Noonan found that wages were 5.4% higher. Since the study used a difference-in-difference approach, the findings are relatively robust.[56]

However, other evidence from the USA suggests cultural density does not have a detectable effect on wages. Using a panel of American cities from 2005 to 2011, Boualam (2014) estimated a fixed-effects regression with the use of instrumental variables as well as a wide variety of controls. This is also a robust econometric approach, so the differences in results may, in part, relate to how cultural density is defined. Instead of identifying districts, Boualam created a density variable tracking the proportion of local-area workers in cultural occupations. In a more UK-specific context, Bakhshi et al. (2014) found that cultural clustering had a negative impact on local-level wages *if creative industries wages were excluded*, both when looking at the effect of cultural institutions and cultural occupations.[57]

As for why such a negative effect could exist, the authors (Bakhshi et al., 2014) suggested that workers in other sectors, might, in part, be willing to sacrifice higher wages in exchange for improved AHM amenities. Even if there was a positive productivity effect, this could be outweighed by this amenity effect. But even if this interpretation is right, it is worth noting that this could still boost productivity as lower wages could, in static terms, boost GVA per worker for a given level of skills. If this perhaps runs counter to the underlying government rationale to focus on productivity, it does provide a further reminder of the wider value of AHM to people, as they may be willing to sacrifice higher wages for access to AHM. In sum, the literature suggests that an effect on the People foundation is plausible, but exactly how this effect translates into a productivity increase (or not) is not clear.

- **Evidence related to the Business Environment foundation**

Graves et al. (2016) also looked at the impact of cultural listings on firms per capita (as opposed to only creative industries density) and found that a one-unit increase in cultural listings per capita was associated with a 0.211 increase in firms per capita. While this estimate suggests that a positive impact is plausible, or even likely, the relatively large magnitude suggests it may be an overestimate. Even if the study did control for other obvious drivers of firms per capita, it could not rule out reverse causality (which could be plausible here).[58]

With all these caveats, the study does still provide some evidence that cultural density creates a pull-factor for all types of firms, as it can contribute to a more attractive business environment.

- **Evidence related to the Place foundation**

[56] Because it has variation over time and across neighbourhoods, the study could use a difference-in-difference approach and was therefore ranked SMS 3 by a Whatworks Review. See Noonan (2013).

[57] See Section **Error! Reference source not found.** for further details on the methodology.

[58] In addition, Graves et al. (2016) estimated the impact of cultural listings on creative industries density and firms per capita in separate regressions, so the 0.211 estimate is the sum of the impact on creative industry firms and others, rather than solely non-creative industry ones.

While we did not find quantitative studies that attempted to identify an average effect of the arts on local regeneration, there is qualitative evidence that increasing arts provision can help, although this evidence mostly shows that the arts (and AHM more generally) can help boost local growth without (necessarily) boosting productivity.

For example, the Local Government Association (2013) examined case studies on local investment in the arts and found they could contribute to local growth. The report identified that the arts were a major pull-factor for tourists. One such example was the Hepworth Wakefield, which attracted 500,000 visitors in its first year, contributing £10 million to the local economy. By increasing visitor numbers and tourism to a region, arts centres can drive regeneration. The Arts Council England (2019) asserted that businesses were more likely to expand to places with 'thriving cultural centres', with the arts playing a key role in their creation. The authors argued that public investment into the arts generated clear returns in terms of tourism and job creation – creating a place attractive to visitors that then made it attractive to businesses.

In general, the effect of the arts, and AHM more broadly, on tourism have been well documented. In the main, however, this effect is best characterised as an output effect, i.e. the arts can help increase the overall level of tourism (as in the case of Wakefield above), but this may not immediately translate into a more productive tourism industry. Still, a significant increase in an area's output, partly driven by an inflow of tourists and/or businesses, is likely to help boost productivity. One can think of at least three interlinked channels: a) new ideas and skills are 'imported' and help improve local processes; b) demand pressures (resulting from increases in output) force local firms to innovate; and c) agglomeration benefits, through, for example, more local knowledge spillovers, arise as a result of an increase in the density of local firms/institutions.

Heritage

The key linkage from heritage to the broader economy is through its contribution to the Business Environment and People foundations. Heritage forms a part of the UK's infrastructure stock and shapes the look and feel of cities and rural areas. The available literature is focused on how heritage attracts businesses and individuals to a location, with key papers published by Graves et al. (2016), Faria and León-Ledesma (2009), Cerisola (2019) and Backman and Nilsson (2018).

- **Evidence related to the Business Environment foundation**

To find empirical support for the claim that heritage is beneficial for the local business environment, and more directly to productivity, we turn to the work by Graves et al. (2016), who found that a one-unit increase in the density of heritage assets (measured using a location quotient) was associated with a 0.031 increase in the number of firms per capita in the area.[59]

This idea is extended further from a local to a country-wide scale by Faria and León-Ledesma (2009), who wanted to investigate whether the overall level of

[59] Though the caveats noted in the previous discussion of Graves et al. (2016) remain.

culture of a country had any discernible effect on its GDP per capita growth levels. The authors found that a 1% increase in a country's share of all UNESCO heritage sites (the proxy they used for a country's level of culture but that we can think of as a more specific proxy for concentration of heritage sites) was associated with a 0.2% increase in the GDP per capita growth rate, when controlling for a variety of well-established determinants of GDP growth. While it does not provide a productivity estimate, a more UK-centric study (Heritage Lottery Fund, 2013) finds that GVA is 4.4% higher in listed buildings than the UK average. Although one must be cautious about inferring causality with respect to these results, they still provide a reason for optimism and add credence to the idea that the cultural richness of a given location can impact its attractiveness to businesses.

- **Evidence related to the People foundation**

The literature on the impact of heritage on the People foundation is closely aligned with that looking at the effect of heritage on local-level firm growth, except that the focus is on individuals rather than businesses. Here too, the literature has mostly focused on trying to understand the extent to which heritage sites present a pull-factor for individuals.

In a study of Swedish neighbourhoods (ca. 1,000 people) between 2000 and 2010, Backman and Nilsson (2018) attempted to isolate the impact of heritage density (measured based on the number of historic buildings, monuments and sites) on the flows of highly skilled (proxied by degree qualification) workers. Using a robust model (SMS 3-4) with a combination of random effects and instrumental variable, they found that a one-unit increase in the density of heritage assets per capita resulted in an increase in approximately 50 more high-skilled individuals in the short term (2001-2006) and 80 in the long term (2001-2010). Along similar lines, Cerisola (2019) found that a 1% increase in heritage density (measured with a location quotient) was associated with a 0.11% increase in the proportion of workers doing creative occupations within the scientific and technical sector. Taken together, these studies suggest that the pull-factor of heritage is likely to be stronger for more highly skilled individuals, potentially resulting in larger productivity benefits (given the relatively strong relationship between skills and productivity more generally).

Museums

The key linkages between museums and the wider economy are the business Environment and People foundations, and to a lesser extent the Place and Ideas foundations. In addition, there is some qualitative evidence of the role of museums in driving local regeneration and innovation in other sectors through cross-sector collaborations. Key research exploring these themes was conducted by Mendoza (2017), Scott (2006), Bazalgette (2017) and DCMS (2017).

- **Evidence related to the People and Business Environment foundations**

As in the case of the creative industries, the way in which heritage density is often estimated typically means larger museums are likely to be included. The findings in the above section on heritage's productivity impact on the wider economy are therefore likely to apply here.

- **Evidence related to the Place foundation**

A series of surveys of museum professionals and members of the general public established that museums stimulate tourism in a local area (Scott, 2006) and found that a common sentiment was related to 'civic branding' – the contribution of museums to place recognition. Museums can play several important roles in specific local economic development and regeneration strategies (Arts Council England, 2015) – not only do they provide an area with a focal point to attract visitors, they also create a sense of identity and authenticity within an area. This concept of 'authenticity' has been identified as an important factor in the success of place-based development projects and echoes the sentiments of Scott (2006) above.

Mendoza (2017) adds further support for this mechanism, describing the positive impact museums have on local communities, notably in their placemaking functions that 'connect people to place'. Famous examples of museums that have helped regenerate areas in relative decline include the Turner Contemporary and Tate Modern, which have provided greater 'civic branding' to Margate and London's Southbank respectively.

- **Evidence related to the Ideas foundation**

The literature has also recognised that museums have the capacity to develop the Ideas foundation as a result of collaborations. This was evident in DCMS (2017), which provided case-study evidence of the ways in which museums can generate knowledge spillovers into other sectors. It noted, for example, that the National Museum Liverpool's House of Memories dementia awareness programme had trained over 11,000 museum, healthcare, and social care staff to help improve their quality of person-centred care for people living with dementia. The museum was particularly useful in this programme as it offered a space to protect and log people's memories and experiences.

Further collaborations between museums and other sectors are evident from the Natural History Museum's mining consultancy arm. Amongst other activities, this branch of the museum offers technical due diligence for mineral exploration projects and short courses on mineral deposit types that utilise the museum's extensive ore collections. As a result, the museum brings about improvements in labour productivity via knowledge spillovers.

More generally, Scott (2006) found that museums were a 'unique type of learning experience' that led to the development of personal knowledge, as well as a sense of identity and pride. The prevalence of museums can therefore, in theory, lead to more creative individuals and better ideas in all areas of the economy.

Looking at a different productivity channel, visiting museums was also found to be associated with an increased likelihood of reporting good health (DCMS, 2019). Although causality cannot be inferred with a large degree of certainty in this case, if this relationship leads to reduced demand for health services, it can mean both discernible monetary savings (it was estimated that reducing GP visits and mental health service use would save £1.89 and £2.25 respectively per person per annum, amounting to total cost savings of £44.7m and £60.3m a year when using 2013 visitor figures) and a healthier and hence more productive workforce.

8. Implications for future research

As summarised in Section 4 there are gaps in the literature, and the evidence base for certain channels and types of impacts is sparse. However, many of these gaps may simply reflect a lack of substantive effects, so attempting to develop an evidence base across *all* channels may not be the most effective strategy. Instead, it may be more valuable to conduct further analysis of areas where there is already some evidence, with the goal of obtaining more readily usable quantifiable estimates of productivity impacts.

Next, we briefly describe what we think could be promising avenues for further research, both for direct and indirect impacts.

Potential research on direct impacts

In Section 5, we suggested that the single biggest challenge in collecting further evidence on direct productivity impacts relates to the lack of a consistent measure of outputs in AHM, one that not only accurately captures their value but is also regularly reported on. New work could improve measurement of AHM outputs, and/or provide a better basis for capturing the potential benefits of interventions in these sectors.

As described in Section 3, DCMS has already applied the contingent valuation methodologies to its sectors. But while this allows it to better understand the 'value' of their outputs, one-off valuations do not allow it to track productivity changes over time, let alone identification of their drivers. As such, a recommendation for future research would be to replicate past findings year on year. Critically, the methodology used must remain consistent over time to allow for year-on-year comparisons.

In this respect, recent innovations in contingent valuation studies may help reduce the costs of such studies. When trying to estimate the value of digital goods (e.g. social media and information websites such as Facebook and Wikipedia) Brynjolfsson et al. (2019) used 'online choice experiments' to elicit the full wellbeing value to consumers of such digital goods. The idea here is to ask consumers to engage in 'discrete choice experiments' (DCEs). In a DCE, a consumer is asked to choose between options and select the alternative that they value most. By varying the options that consumers choose between, it is possible to estimate consumers' valuation of different products and product features. Crucially, this type of experiment can be done online, and can therefore easily be repeated year on year.[60]

Another option could be to build on DEA techniques already used to estimate relative efficiency. The key benefit of these techniques is that they allow for multiple outputs while still generating a single aggregated measure of relative efficiency.

As in the case of contingent valuation studies, the key to enabling year-on-year comparisons will be to ensure that the organisations and outputs considered are consistent over time. In this regard, the study by Crossick and Kaszynska (2016)

[60] Another approach would be to attempt to replicate some of the work that the ONS is doing for public services to AHM though this is likely to be fairly time and resource intensive as new quality measures will be needed.

could be helpful as it identified a range of 'outputs' such as health benefits, community regeneration and civic engagement from the AHM sectors.[61] Using their work as a starting point to develop a consistent set of outputs could be an efficient way to improve the evidence base of direct impacts

Another challenge in capturing direct impacts is their lumpiness, as briefly discussed in Section 5. To deal with this issue, one simple solution would simply be to use a longer time-series to capture a representative sample of outputs (including a mix of over- and under-performing outputs) rather than considering examples individually.

Potential research on indirect impacts

While there is significantly more evidence available for indirect impacts, there is a clear lack of papers focused directly on productivity, whether within AHM or on the effect of AHM on productivity in other sectors. More generally, and even when looking at studies on a broader range of outcomes, whether the different foundations or other economic variables such as employment or wages, there is a general lack of robust quantitative papers (i.e. rated SMS 3 or above). As detailed in the previous sections, it is often not possible in the existing literature to rule out the possibility of reverse causality and/or biased estimates (unintentionally capturing unobserved sources of variation).

While even SMS 3 studies are imperfect and often have demanding data requirements (and are therefore not always possible), they will get much closer to identifying a causal effect. Estimates from such studies could therefore provide a more robust basis to quantify the potential (indirect) productivity effect of certain AHM interventions. With this in mind, we suggest a few options for further research, whether looking at the relationship between AHM outputs and productivity directly, or that between AHM outputs and the drivers of productivity (the foundations).

- Research exploring the relationship between AHM outputs and productivity

Building on existing methodologies to study local-level AHM density, new econometric work can address this evidence gap by directly correlating AHM density with firm-level productivity. This can be done using established econometric methodologies drawing on detailed firm-level datasets such as the Business Structure Database (BSD) and Financial Analysis Made Easy (FAME), which contain information on firm revenue, employment, location and productivity over multiple years. Provided the data is rich enough at the local level, it may also be possible to limit the influence of unobserved heterogeneity by using an instrumental variable approach.[62]

- Ideas: research identifying the impact of AHM outputs on innovation

Much of the same methodology and many of the datasets that are described above could also be relevant to a study more directly focused on innovation; the key difference would naturally be the outcome studies. The most used common measure of innovation are patents and R&D. While patent data can be linked back

[61] See *Culture Counts*, available here.

[62] One could, for instance, attempt to follow the methodology employed in Backman and Nilsson (2018) in a Swedish context, see https://link.springer.com/article/10.1007/s10824-016-9289-2

to individual firms (and therefore local areas), many firms and industries do not tend to patent their innovations. Similarly, firms may not always track their R&D spending explicitly. Even when they do, existing public sources of R&D only capture a sub-sample of existing firms.[63] In other words, accurately tracking innovation may ultimately require primary data collection (through e.g. surveys).

- People: research identifying the impact of AHM outputs on skills

New work could also shed more light on the contribution AHM can make to transforming the skills of workers both within the sector and across the economy to meet the demands of the ever-changing economy in light of significant future challenges and opportunities such as artificial intelligence. Traditionally, skills are measured in terms of qualifications, experience or even labour market returns (e.g. wages). New methodologies which capture the essence of skills more precisely (e.g. O*NET or scraping job postings data from sites such as Burning Glass) can paint a more precise picture of the skill requirements of future jobs and how these relate to the skills that AHM delivers now and could deliver going forward.

- Business environment and place: research identifying the impact of AHM outputs on 'local-area dynamism'

Alternatively, an econometric study comparing business impacts before and after the introduction of an AHM institution (e.g. a one-off festival, a new building such as the Turner Contemporary in Margate) could allow for better identification of the direction of causality between AHM and local business activity. While such significant investments have likely already been evaluated as part of the standard government processes, expanding on existing work to focus more explicitly on their effect on attracting firms to the area (e.g. on business relocation and births) would be valuable. This could again draw on the firm-level datasets outline above and could also involve surveys of local businesses and a series of case studies to help evidence any possible theory of change.

[63] In particular, those firms who apply for R&D tax-credits or who were surveyed by the ONS (BERD).

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