



RESEARCH AT RISK

Mitigating the Impact of Covid-19 on Health R&D Investment

About the author's

Chris Thomas is a senior research fellow at IPPR

Shreya Nanda is an economist at IPPR

Charitable Purpose

This research fulfils IPPR's charitable purpose of advancing the voluntary sector, advancing physical and mental health, and of advancing science.

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Executive Summary

The UK government has rightly recognised that science is integral to delivering a more prosperous and healthy nation. Since the 2008 financial crash, the UK economy has struggled with stubbornly low productivity. Research & Development (R&D) is a crucial tool in re-igniting progress on this key measure (Jones, 2020). This is because it is the key to driving innovation – which, by definition, allows us to create more with the same investment of time and money. It is this improvement in productivity that improves living standards, transforms public services and creates real wage growth (Roberts et al, 2020)

Within that strategy, the life sciences and health research should be a priority. The life sciences should be at the heart of creating a 'science superpower'. It is an area with a particularly exciting scientific frontier; with lots of active investors; and which delivers significant return on investment (King's Policy Institute, 2017; European Commission, 2019). It is also a historic UK strength, and a field in which we still retain a strong edge on global competition. Most self-evidently, the innovation created through R&D also delivers health benefits, a long-standing priority of the UK public (see Thomas et al, 2020)

Strong public investment is key, but the government needs businesses and charities too. The UK needs to maximise investment to be competitive on the world stage. That means a strong charity and private sector are integral to our vision of a UK 'science superpower'. Indeed, charities contribute 20 per cent and businesses 57 per cent of the total investment in UK health R&D (OLS, 2019). The life and medical sciences also thrive when there is strong partnership, collaboration and clustering – meaning the government should look to maintain the UK sector's unique diversity.

This means acting to mitigate the impact of Covid-19 on the charity sector. In particular, medical research charity income has been hit hard by the virus. Our new modelling predicts that lost charity income could mean, in a worst-case scenario, medical research charities invest £4.1 billion less in health R&D between now and 2027. Our best-case scenario suggests £1.4 billion less investment over the same period. Our model further predicts a knock-on effect on private investment. It predicts a drop of £0.6bn (best case) and £1.3bn (worst case) from a decline in charity investment. This would yield a total impact caused directly by lost charity income of between £1.9 billion and £5.3 billion¹.

We predict a total of £7.8 billion – nearly £1 in every £10 projected to be invested in UK medical research – is at risk. Our model predicts an additional fall in private investment, due to adverse economic conditions (i.e. independent of lost charity investment), of £2.5 billion. Combined with the above, this means £7.8 billion of medical research investment is at risk. Allowing this to pass would jar, very clearly, with the bold government rhetoric on leading internationally on science and the life sciences.

¹ Note, numbers do not add exactly due to rounding

As such, as a matter of priority at the next fiscal event, we recommend an immediate four step action plan.

First, we recommend that the government supports the medical research charity sector – with a package lasting the rest of this parliament. This support should come via a new life science charity partnership fund, matched to anticipated decreases in charity sector funding, and tapered over time as the sector recovers². This fund should be delivered to charities through a neutral and efficient application process, maintaining the primacy of strategic prioritisation by charities. Our model suggests the following envelope:

Financial Year	2021/2	2022/3	2023/4
<i>Fund Value</i>	<i>£443 million</i>	<i>£300 million</i>	<i>£162 million</i>

Charities should demonstrate how they are using the fund to support the government in meeting their key societal ambitions, such as addressing health inequalities, supporting research talent and jobs, and levelling-up regional economies.

Second, we recommend that the Government should support the diversity of our life science sector, by actively attracting private investment through ambitious new infrastructure. The welcome vision of a science superpower will rely on strong life science actors - charities, universities and businesses. That will only be the case if the government puts in place the infrastructure the sector needs to thrive, and that will attract private investment across the country. The government should therefore invest in life science capacity, particularly (though not exclusively) outside of the golden triangle. Priorities should be social infrastructure (skills), physical infrastructure (digital, manufacturing and transport) and patient capital (to support scale) (Thomas and Nanda, 2020). The government should also ensure capacity for clinical research and trials; support the NHS in adopting and spreading best practice and make clear the UK is a country that values innovation. The case for this is underlined by the fact our model predicts that – without intervention - private life science R&D investment is likely to decline significantly.

Third, we recommend that the Government should translate their R&D commitment from ‘% of GDP’ to ‘£billions’. It would be easy to evade the ‘2.4 per cent of GDP investment by 2027’ spending target if GDP falls substantially. But R&D is a useful activity for a country during an economic downturn. Covid-19 should not be an excuse to spend less than intended on science – particularly given the UK’s track record of underinvestment over the last four decades (Ibid). Government should remain faithful to the spirit of their announcements – by translating their pledge from ‘% of GDP’ to ‘£billions’, using March 2020 GDP estimates. This was also the underpinning of the Spring budget

² In this paper, tapering is linked to charity recovery – so the fund equals the Covid-19 related R&D deficit in each financial year.

commitment to £22bn of public investment in R&D by 2024/2025 (HM Treasury 2020).

Finally, we recommend that the Government make a specific life science R&D commitment. Health research is a key UK strength, and an area in which we have a global edge. It is also a sensible investment in the wake of Covid-19, which has brought health security into clear focus. We recommend government commit to £14.5 billion/annum of life science R&D investment – from all sources: public, charity and private – by 2027³.

³ A recommendation made in a previous IPPR report *The Science Based Economy*. The full modelling is available there.

Introduction

A Science Based Economy

The current government's prioritisation of science has been welcome. Beyond a manifesto commitment of R&D investment reaching 2.4 per cent of GDP by 2027, the Prime Minister has talked in bold terms about making the UK a 'science superpower' (See HM Government, 2019). This rhetoric was backed by action at the 2020 budget, when the chancellor made a firm commitment on public sector investment in R&D over the next five years.

An ambitious approach to R&D would provide a valuable boost for our economy, which has struggled with productivity since the 2008 financial crash, and which has been rocked again by Covid-19. Poor productivity makes it harder to deliver improved living standards. Increasing investment in research and development (R&D) is an established way to improve productivity (Jones 2020) – but is an area the UK has significantly underinvested in since the 1980s (Thomas and Nanda, 2020). Rectifying this should be a priority.

When prioritising R&D, the life sciences and health research should clearly be one of our key priorities. It is an area in which the UK has an enviable academic advantage; that delivers strong return on investment (King's Policy Institute, 2017); and we are home to an exciting range of life science businesses, often based outside London, and with significant potential for growth (Raikes, 2020). As we build the role of science in our economy, health research and the life sciences should be a central pillar in our approach.

A Diverse and Collaborative Life Science Sector

A strong life science sector relies on collaboration between a diversity of actors, each bringing unique strengths to the table. At its best, the public sector takes risks few else could; provides purpose and strategy; and has fantastic innovations to its name: GPS, SIRI, the Internet. UK universities have provided our global reputation, helped attract and train our leading talent, and ensured excellence is at the heart of what we do. Business is a major source of funding, provides the engine for scaling-up innovation, and accelerates exciting innovations and ideas.

If we are guilty of under-appreciating one sector, though, it is probably the unique role played by UK medical research charities. Yet, they are a key part of a thriving and diverse UK eco-system. They have been behind some of the most remarkable health innovations, including:

1. Cancer charities supported some of the earliest research into the treatment of cancers with radiation. Working with the Medical Research Council for Radiology Committee, they researched the use of radium. Their work was crucial to the development of radiotherapy as a mainstream cancer treatment – driving progress on improvements in cancers, such as cervical cancer. Since then, Cancer Research UK have contributed to significant upgrades in radiotherapy, which is an incredibly

precise and sophisticated treatment today.

2. Before the 1970s, few understood why people had heart attacks. Seven in ten were lethal. Charity funded research was amongst the first to show the link between blood clots and heart attacks in the middle of the decade. In the 1980s, further charity research showed clot-busting medicines could be effective when combined with aspirin (in this case, streptokinase). Heart attack deaths fell by around 40% on the back of their finding and, today, 7 in 10 survive (see British Heart Foundation, 2020).
3. In the UK, 5.4 million people are currently receiving treatment for asthma – a disease that made many vulnerable to Covid-19. In the 1990s, Asthma UK supported pioneering research – leading to the development of Xolair (Omalizumab). It reduces the amount of chemical IgE antibodies in the body, reducing inflammation of the lungs. It has been prescribed to 250,000 with severe asthma.
4. Recently, Wellcome Trust researchers discovered a new type of blood cell, by using ‘single cell genomics’ to analyse gene expression patterns in individual blood cells. This kind of knowledge could become the basis for significantly upgrading our knowledge of the immune system, and to develop more effective ways to protect people from infection.

These examples are testament to a remarkable scientific frontier, that could – if properly harnessed – radically improve health in the 21st century. It is also indicative of the role of charities in providing a foundation of early-stage science few others could or would, and which goes on to substantiate amazing innovations. The technology in your smart phone might not come from a medical research charity – but there is a good chance, if a new technology or treatment saves your life, that charities made a vital contribution.

Medical discoveries are not accidental. They come from the significant R&D investment charities make. Medical research charities were the source of around £1.9 billion direct investment in UK R&D in by the most recent figures (AMRC, 2020a) – more than NIHR and the Medical Research Council combined (OLS, 2019). This investment also has a crowding in effect. That is, by using its funds to ‘de-risk’ important scientific prospects, it encourages investment from private partners – who see a UK with a strong charity sector as a more attractive proposition for their own R&D portfolio.

In 2020, charity investment is threatened by Covid-19. The Association of Medical Research Charities reports that, by conservative estimates, their members stand to lose between 30 and 40 per cent of their fundraising income in 2020 (AMRC, 2020b). This cannot help but have negative consequences⁴. Without policy action, this presents a severe risk to the government’s existing

⁴ This paper focuses on R&D investment, but hundreds of jobs would be (and are being) lost too. These cover research roles, but also technicians and support staff. The Association of the British Pharmaceutical Industry have highlighted the importance of these roles in their regular life science skills surveys (ABPI, 2019).

commitments on science. Between the Prime Minister, the Conservative manifesto, and senior advisors, there are existing pledges to:

- Supercharge science and harness the power of innovation, by making the UK a global hub for life science after Brexit
- To level-up the country, by supporting remarkable life science potential in the North and English regions (see Thomas and Nanda, 2020)
- To raise overall UK investment in science to 2.4 per cent of GDP by 2027
- To increase public sector spending to £22 billion per year by 2024/2025

This paper explores the consequences of failing to support the medical research charity community – for a healthier wealthier country, and for the government’s own ambitions on science, health and the economy. Building on previous IPPR work, it makes the case for a strong, diverse and well-supported health research eco-system.

Research at Risk: Modelling the Impact of Lost Income in the Medical Research Charity Sector

Charity income has taken a significant hit due to Covid-19. Fundraising income has been hit by the suspension of major fundraising events; the closure of charity shops; and the wider financial insecurity of the UK public. Surveys of charity executives predict a weighted loss in fundraising income of around 37.5 per cent in the 2019/20 academic year, and of over 25 per cent in the 2020/21 academic year (AMRC, 2020c).

This will have an impact on their capacity to invest in lifesaving R&D. To predict the impact, it is possible to model several scenarios. This gives us the range of likely impacts Covid-19 will have on medical research charity R&D investments over the coming years. They are listed below, in best to worst case order.

1. **The ‘V-Shaped’ Recovery:** The impact if medical research charity life science investment recovers by 2022, as per the sector’s recovery pattern after the financial crash.
2. **The Moderate Case Scenario:** The impact if medical research charity life science investment recovers by 2024, in-line with current expectations amongst charity executives.
3. **The Hysteresis Scenario:** The impact if medical research charity investment does not recover, but instead experiences a hysteresis⁵ effect as impacted productivity after the 2008 crash (Adler et al, 2017).

These scenarios come with the caveat that Covid-19 is not yet over. There may be future lockdowns to come, or other restrictions to scientific or economic activity. This means these scenarios are likely to be based on conservative

⁵ In economics, hysteresis occurs when history affects value – meaning the impact of a temporary shock may become permanent. This may be a likely impact of Covid-19, where the experience of the pandemic may impact consumer behaviours after the pandemic ends.

estimates. Nonetheless, they give us the best available insight into exactly what's at stake.

While the impact of some scenarios is greater than others, there is no model in which the overall impact on UK R&D investment is not severe. In all cases, there are consequences for private sector investment (less charity spend means less private investment is 'crowded-in') and the economy (productivity and jobs). And in every case, we miss the investment needed to deliver the government's commitment to get R&D investment to 2.4 per cent of GDP by 2027 (and more thereafter). For a more detailed breakdown, see the **Supplementary Data** at the end of this paper.

Methodology Note

We assume that public R&D investment is unaffected by the pandemic and will continue to grow in line with March 2020 GDP projections (OBR 2020a). We also include the 2020 budget commitment to spend £22 billion on all R&D by 2024/5. We assume that private R&D investment will follow July OBR GDP projections (OBR 2020b). We assume that public and charity investment crowd-in private investment at the rate estimated in Sussex et al 2016. We assume that Wellcome Trust R&D investment will also follow July OBR GDP projections, as the Wellcome Trust does not rely on donations, but instead generates its income from its investment portfolio. For all other life science charities, we assume that their R&D investment will fall in line with AMRC survey data (AMRC 2020c), and then follow July OBR GDP projection paths.

Scenario 0: Before Covid-19

The UK has committed to a target of 2.4 per cent of GDP invested in R&D by 2027 – from public, private and charity sources (and more thereafter). Before Covid-19, our analysis suggested that – to meet that target – investment in the life sciences would need to reach at least £14.5 billion per year, by 2027 (see Thomas and Nanda, 2020).

Our new modelling indicates that, before Covid-19, we were set to miss this target fairly narrowly – by £0.8 billion per year in 2027. However, as the below scenarios show, we are now likely to have a much greater shortfall (up to £2 billion too little per year, in scenario 3 and at least £1.4 billion too little per year, in scenario 1). Ultimately, this will mean less treatments for patients with all kinds of diagnoses – heart disease, cancer, mental ill health, musculoskeletal conditions or respiratory diseases.

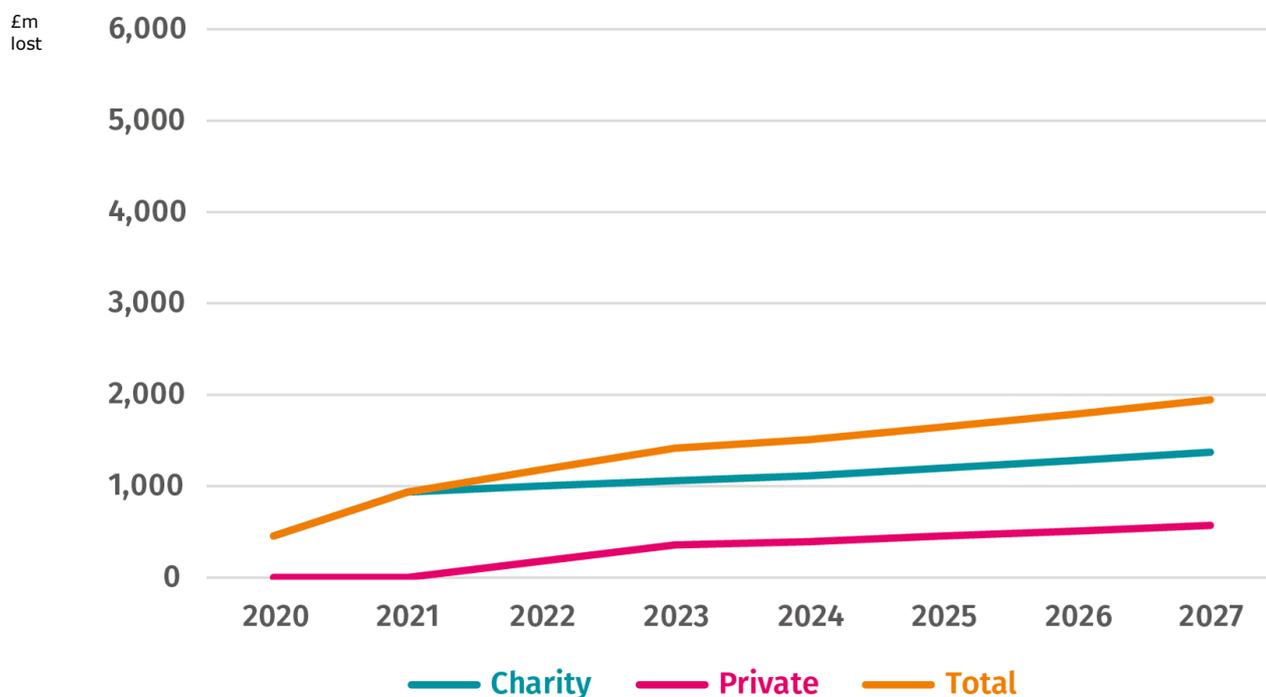
In other countries, R&D investment is increasingly rapidly. In Germany, investment exceeded 3 per cent of GDP in 2017, and continues to rise. Allowing Covid-19 to undercut medical research investment is a certain way to reduce the UK's global competitiveness – and weaken the economy.

Scenario 1: The V-Shaped recovery (Best)

After the financial crash, charity R&D investment had broadly recovered by year 3. If that trend were repeated in the years following the Covid-19 crisis, this would broadly constitute a 'V-Shaped' recovery. However, the impact on R&D investment would still likely be severe. The two years of significantly decreased investment would still lead to significant overall losses, and a weaker 'crowding-in' effect on private investors. We predict a total loss in life science R&D investment, both charity and private, in this circumstance of £1.9 billion.

Figure 1: The 'V-Shaped Recovery'

Predicted cumulative loss in life science R&D investment - private, charity and combined – attributable to medical research charity investment - if a complete recovery from Covid-19's financial impact amongst medical research charities⁶ is achieved in year 3 (£m)



Source: Authors' analysis of ONS 2019, OLS 2019, ONS 2020, OBR 2020a, Sussex et al 2016, OBR 2020b, and AMRC 2020c.

This does not include a further estimated £2.5 billion drop in private life science R&D investment over the period, which is not attributable to reduced medical research charity investment.

Scenario 2: The Moderate Case Scenario (Medium)

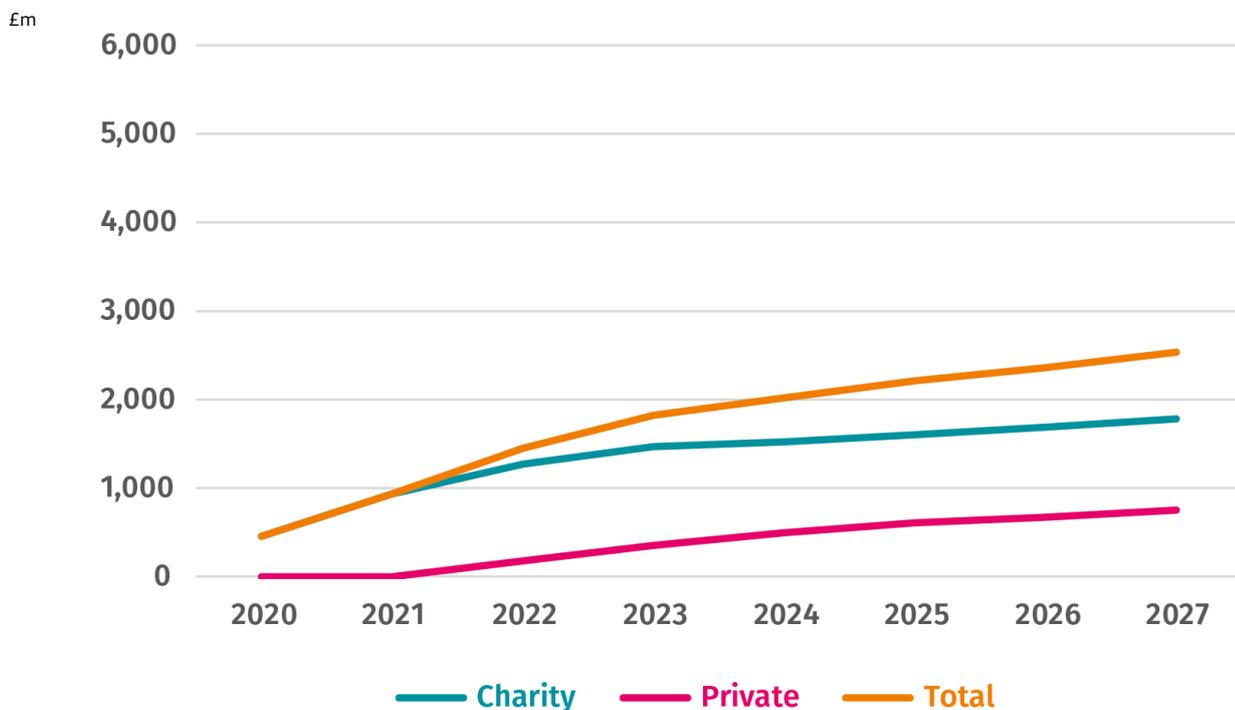
AMRC surveys of charity leaders suggest that a repeat of the impact of the financial crisis remains optimistic (i.e. that recovery in three years will be

⁶ Excluding the Wellcome Trust, which has a different financial model

ambitious, see AMRC, 2020c). Covid-19 is a different type of crisis, significantly impacting demand for charity fundraising products, restricting usual fundraising activities (e.g. race for life, the London to Brighton Bike Ride, or the London marathon), and changing charitable activity (e.g. donations to NHS charities through Captain Tom, rather than to medical research charities). While the sector is already reacting to these changes with innovation, senior leaders expect it to take 5 years for R&D investment to recover from the Covid-19 shock (AMRC, 2020c). Our modelling estimates that this would come with a cumulative impact, between now and 2027 and attributable to reduced charity investments (i.e. lost charity investment and lost 'crowded-in' private investment), of £2.5 billion.

Figure 2: A Moderate Case Scenario

Predicted cumulative loss in life science R&D investment - from private, charity and combined – attributable to a decline in charitable investment, if a complete recovery from Covid-19's financial impact on medical research charities is achieved in year 5 (£m)⁷



Source: Authors' analysis of ONS 2019, OLS 2019, ONS 2020, OBR 2020a, Sussex et al 2016, OBR 2020b, and AMRC 2020c.

This does not include a further estimated £2.5 billion drop in private life science R&D investment over the period, which is not attributable to reduced medical research charity investment.

Scenario 3: Hysteresis (Worst)

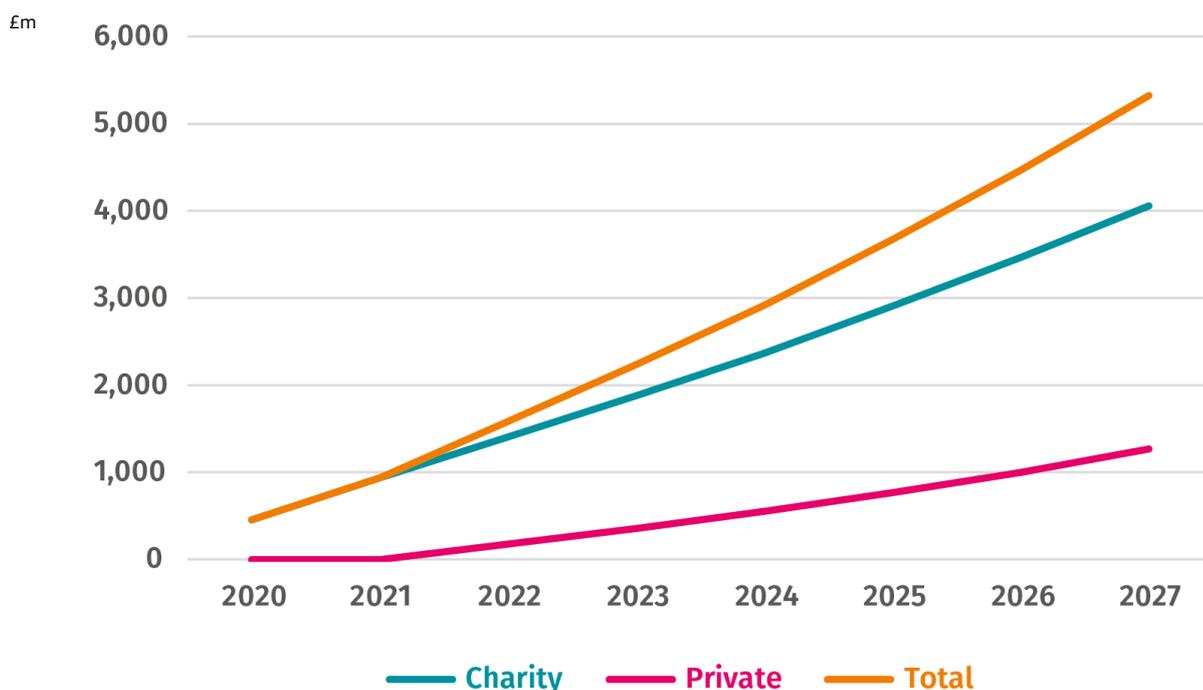
⁷ Excluding the Wellcome Trust, which has a different financial model

There is a reasonable worst-case scenario that the income of medical research charities never recovers. Covid-19 is changing behaviours significantly, including donation behaviours. If individual financial insecurity combines with a permanent change in the ability of the sector to generate income, then the sector may be subject to income hysteresis – a permanent loss of income from a temporary shock.

This might seem unrealistically pessimistic – yet, hysteresis was observed in UK productivity after the 2008 financial crash. Moreover, consumer behaviour in the UK and weaker than expected recent growth statistics suggest hysteresis is not an improbable outcome. This would, naturally, be more severe than the previous two scenarios. We estimate that the cumulative impact in this scenario would be, by 2027, £5.3 billion⁸ (i.e. from lost direct charity investment, and reduction in ‘crowded-in’ private investment).

Figure 3: The Hysteresis Scenario

Predicted cumulative loss in life science R&D investment - from private, charity and combined – attributable to a decline in medical research charity investment⁹, if a complete recovery from Covid-19’s financial impact amongst medical research charities is not achieved (£m)



Source: Authors’ analysis of ONS 2019, OLS 2019, ONS 2020, OBR 2020a, Sussex et al 2016, OBR 2020b, and AMRC 2020c.

⁸ Including the private investment at risk from adverse economic conditions (i.e. at risk independently of charity investment), the worst case is £7.8 billion lost medical R&D spend in the UK

⁹ Excluding the Wellcome Trust, which has a different financial model

This does not include a further estimated £2.5 billion drop in private life science R&D investment over the period, which is not attributable to reduced medical research charity investment.

A diverse life-science ecosystem is vital

The UK's strength as an eco-system comes from its diversity of funders and collaborators – whether businesses, academics, universities, charities, learned societies or government bodies. Our model shows a direct impact of reduced medical charity research investment on two of these actors (charities and the private sector). One argument might be for government to pick up the deficit with public money. This section outlines why an approach, like this, which disregards a diverse and collaborative research sector would be a mistake:

Why is the medical research charity sector so important?

A substantial source of R&D funding

According to the latest data, medical research charities contribute almost £1.9 billion of life sciences spend per annum (AMRC, 2020a). This is almost twice as much as the Medical Research Council, and significantly more than the National Institute for Health Research (NIHR). This means the charity sector invests £1 in every £5 that goes into the life sciences (see OLS, 2019). This investment is a key part of government plans to reach 2.4 per cent of GDP invested in life science spend by 2027. Indeed, the modelling presented in this paper suggests the impact on Covid-19 could leave the life sciences sector over £1 billion short of where it needs to be by 2027, in terms of investment, if government are to meet their wider aspirations.

Large-scale capital investment

The Francis Crick Institute is one example of medical research charities supporting major life science infrastructure. Founded by Cancer Research UK, Wellcome Trust, the Medical Research Council, UCL, Imperial College London and King's College London, it is the largest biomedical research facility under one roof in Europe. A second example is the British Heart Foundation Data Science Centre, a £10 million investment which will deliver the data and data science needed to address some of the most pressing challenges in heart and circulatory health research.

Charity investment also supports infrastructure outside the golden triangle and has the potential to make a positive contribution to future UK ambitions to 'level-up'. For example, Versus Arthritis have research centres across the UK, including a Primary Care Centre in Keele University, a Biomechanics and Bioengineering Centre in Cardiff, a Pain Centre in Nottingham, a Centre for Genetics and Genomics in Manchester and a variety of other regional research institutions.

Support for academic talent and patient voices

The UK's global edge in the life sciences relates, in no small part, to its academic infrastructure. It is home to leading academics and universities. Medical research

charities directly contribute to strong universities – with £12 billion of charity-funded research taking place in universities since 2008.

Our continued world leadership requires a pipeline of research talent. The UK's medical research charities provide particular support for new and early career researchers. Last year, the AMRC's members funded 17,000 research salaries, with 1,750 of those PhD students. This contribution to the sum of the UK's research talent is critical to sustaining our scientific pedigree.

The medical research charity sector is also a key source of patient voice and advocacy. Without listening to patients, it is very hard to make sure health gains from R&D are targeted at the things that matter to people in the UK. Charities have been critical in embedding patient voice as a 'norm' in how R&D happens – not just in their own work, but in their collaborations with government and industry (see AMRC, 2014).

Research Diversity

As IPPR have previously shown, 'life sciences' actually refers to a very broad range of research and development activities – disease prevention, aetiology, diagnosis, treatment evaluation and health service research (Thomas and Nanda, 2020). Different funders contribute to different parts of the life science R&D process. Medical research charities are particularly good funders of early-stage pilots, treatment development (50 per cent of publicly funded treatment development research comes from AMRC members) and prevention (20 per cent of publicly funded prevention research spend comes from members of the AMRC). They are also a significant source of R&D investment into rare diseases (AMRC, 2019). In short; they fund research in areas that the government doesn't; they link health research to the patient voice and they de-risk research/create capacity for others (thus, the strong 'crowding-in' effect of charity spend on private investors).

Why is attracting private investment and innovation so important?

A key detriment of reduced medical research charity investment in science would be a corresponding loss of private investment¹⁰. Moreover, the impact of Covid-19 on the economy has put further private investment at risk. For all the reasons above, the UK would be a less diverse and attractive place to do science, and so less would happen. We further predict – independent of charity investment levels – private sector spend will fall due to Covid-19 – cumulatively, by £2.5 billion between now and 2027. This would be problematic – exciting life science businesses and private investment are important for a range of reasons:

Life science businesses are the biggest global investors in R&D and a UK economic bedrock

R&D has a well-established link to productivity gains. It drives innovation, which in turn allows us to produce more for the same time/capital invested. These gains (when well distributed) allow us to increase our living standards, pay and

¹⁰ Crowded-in by charity investment, which 'de-risks' R&D that would otherwise be unviable or too risky for businesses

public services. This makes more R&D very important. Absolutely no-one – from any sector – contributes more investment to global R&D than businesses in the life science sector (Thomas and Nanda, 2020). Indeed, the sector has both the highest number of businesses in the top 1,000 R&D investors, and also provides the highest net investment (£s). This makes it a crucial part of any conception of a science-based economy.

Industry are leading on levelling up

Private investment is often better than any other sector at supporting innovators across the whole country. Private investment in the North of England is three times the amount spent by the public sector, which is disproportionately focused on the South of England (See Thomas and Nanda, 2020). This means that pharmaceutical companies – innovative start-ups through to those manufacturing vaccines – are often central to economies outside of London and Oxbridge. This makes it important to attract more investment – and to use public money to attract that investment to the areas that most need it. This will be a critical factor in the success of the Prime Minister's manifesto commitment to match 'opportunity' (which is not equally distributed) with 'genius' (which is).

Health Resilience

Covid-19 is not a once in a lifetime event. In fact, it is a symptom of growing global health insecurity. World Health Organisation data shows that the risk of global pandemics is growing. Elsewhere, climate change is increasing the odds of new types of illness, while anti-microbial resistance makes new threats of 'old' diseases.

A strong life science strategy is the right medicine. It ensures our ability to pre-empt threats, to respond with research when they happen, and to make a strong contribution to global manufacture of vaccines when needed. The UK could have been better prepared, from this perspective, at the start of this crisis. This means strong, innovative and supported businesses, operating across the country.

Hesitation today might mean we never recover against global competition

The UK has long been a 'destination' for the life sciences. However, we must not be complacent. There is significant global competition for private R&D spend. That competition is fiercest around the life sciences, if only because it is the sector that invests the most in research – beating technology, automobile and aerospace sectors.

In the last few years, the share of global private R&D investment going to the UK has decreased (Thomas, 2019). That funding has predominantly crossed the Atlantic, where the US share is increasing substantially. Moreover, China and Singapore – amongst others – have put significant funding into generating market share. Closer to home, European competitors like Germany are putting public investment into overall R&D at a far faster pace (already, 3 per cent of their GDP).

Policy Implications

There is every reason to increase the role of R&D in the UK economy. Even before we think about high-impact events like Covid-19 and Brexit, the country faced a significant productivity challenge. Normally, after a fiscal crisis, productivity recovers. However, after the 2008 crisis, we observed 'productivity hysteresis' – whereby the negative impact on productivity became permanent. This is a problem for living standards, wage growth, public sector sustainability and our ability to compete in the global economy.

Yet, R&D – and particularly health research – is also an excellent antidote to the challenges facing the UK. Covid-19 has created a substantial health backlog, which may impact outcomes for years or decades to come. New discoveries and a renewed focus on improving health outcomes is one way to begin rectifying this. Moreover, Covid-19 has proven the importance of health resilience – to the economy, to our health and to our way of living. A stronger health sector, with more thinkers, more lab space, more capacity and more agility is a good way to support that.

As such, we recommend the government take bold and targeted action at the next fiscal event.

First, we recommend that the government support the medical research charity sector through the rest of this parliament

To help lessen the impact of the reduction of medical research charity income specifically, government should introduce a new fund designed to support the medical research charity sector. This fund should be transitional funding, matched to charity sector losses. In exchange for that support, charities should demonstrate how they plan to meet key government priorities, such as levelling-up, creating jobs and skills, and addressing health inequalities. On the basis of modelling here, using our moderate case scenario (see **supplementary data**) we recommend the fund runs as follows:

Financial Year	2021/2	2022/3	2023/4
Fund Value	£443 million	£300 million	£162 million

Beyond factors already outlined in this briefing, we anticipate the scheme would:

- Help maintain research capacity, and avoid leading talent leaving the country in search of funding elsewhere
- Help maintain diverse research, as charities often fund in areas underserved by other funders, such as rare conditions or prevention
- Support jobs, thousands of which are provided in the medical research charity sector, and many of which will be under threat.
- Provide extra R&D beyond what the public sector can raise to invest through taxes

Second, we recommend that the government should support the diversity of our life science sector, by actively attracting private investment through ambitious new infrastructure

More generally, the government must demonstrate its commitment to health research, life science and innovation – at a time of global strife. This means providing the infrastructure, both physical and social, that underpin great scientific advances. It also means actively using that to provide optimal conditions for private investment into the UK, as opposed to competitor markets, especially given our model predicts it will decline significantly thanks to Covid-19.

To drive this investment, we recommend prioritising three strategies to overcome barriers in the current UK system:

- Skills infrastructure: The life sciences are skills intensive. Government should explore all avenues to deliver the skills the sector needs, including further use of apprenticeships and technical education. Devolution should be used to ensure that skill supply and demand are aligned, in line with previous IPPR work (see Thomas and Nanda, 2020)
- Physical infrastructure: There are parts of the UK where infrastructure needs to be improved. The life sciences rely on clustering – skilled people, tenacious charities, exciting businesses all coming together. That cannot happen without good transport and – ever more today – without good digital infrastructure. Both could be improved in some of our major life science hubs, such as the North East.
- Patient capital: Funding to scale invention and business models is a problem for the life science sector. Greater availability to capital should be used to deliver that scale. Equity funding through the British Business Bank is one possible option.

We further recommend that the government take opportunities to show their commitment to R&D and the value they place on health innovation:

- Clinical research capacity: Research investment goes where it feels valued and wanted. Covid-19 has been detrimental to both clinical trials and to clinical research capacity. Government should look to expand and accelerate research activities, working with the MHRA. Moreover, they should prioritise time for research in clinical roles.
- An innovative NHS: Equally, investment goes where innovations are subsequently used. As argued elsewhere (Thomas, 2020), the government should look to accelerate innovation spread by adopting a 'mission-based approach' to innovation adoption (see Ibid).
- Stronger use of data: Patient data is opening unprecedented R&D and innovation possibilities. The government should look to enhance validation of real-world data; link data across geographies (following on from the

Connected Health Cities project) and explore fair and safe ways that barriers to integrated, high quality data can be reduced.

These would provide the conditions for researchers, businesses and charities in the sector to thrive – for the benefit of our long-term health and wealth

Third, we recommend that the government should translate their R&D commitment from ‘% of GDP’ to ‘£billions’.

The UK spending commitment was made based on GDP projections ahead of Covid-19. However, the virus has caused significant economic damage. In April, the economy had contracted 20.4 per cent (year on year). The OECD have subsequently predicted we will be the worst hit of any advanced economy. Theoretically, this might allow government to hit their 2.4 per cent spending target (but not their 2025 public sector science investment target) far more easily. However, taking the easy route would be a significant error. R&D is an economic activity that is incredibly useful during economic downturn, not least because it has such a strong link to productivity gains.

Instead, government should commit to the spirit of the target – and use the Comprehensive Spending Review to make a firm commitment on investment in £s rather than as a percent of GDP. The alternative would be unlikely to meet rhetoric around the UK being a science superpower – given the UK has underinvested by £222 billion in R&D since 1985, compared to the OECD average.

Finally, the UK government should create a new target for health and life science R&D spend specifically.

The link between health and wealth has never been clearer. Covid-19 has demonstrated that poor health can cause economic ruin, as well as fundamentally change to our way of life. Before Covid-19, there had already been a strong case for prioritising health research and the life sciences. It has a huge return on investment, it is an existing strength, it is a priority for the general public, and it offers the opportunity to support levelling-up. Now the case for a strong health research base is even more compelling.

The UK government should set out its ambitions for investment in life science specifically at the Comprehensive Spending Review. It should outline what it aims to achieve in terms of public, charity and private investment by 2027. To safeguard this commitment against economic fluctuation, it should be given in £s, rather than as a percentage of GDP.

It should use this as an opportunity to address key structural problems within UK health R&D. In the Life Science Based Economy (see Thomas and Nanda, 2020), we called on government to take a ‘strengths-based approach’ – based on increasing the ability of the UK to lead globally. This means using more R&D investment to address the following.

- **Too little investment overall:** We have a wonderful history in medical science, with leading charities, universities, academics – and a rich history of major discovery. Yet, overall investment in R&D by the UK has been far

too low. This makes it harder to react, with agility, to crisis events – or to pre-empt new health challenges.

- **Too little support for our regions:** Many parts of the country has incredible life sciences potential. Yet, that potential is not backed by public investment – with the North, the Midlands, Scotland and Wales particularly poorly served. This is limiting our potential. The government should make sure everywhere has the R&D funding necessary to reach their potential and should actively look to use funding to make 'high potential' life science clusters outside the 'golden triangle' global leaders.
- **Severely under-served conditions:** Many conditions have high disease burden in the UK but receive relatively little research investment. This category includes cardiovascular disease, mental ill-health, respiratory disease and musculoskeletal conditions. Correcting this would help link UK R&D to UK patient needs. We recommend a £1.3 billion bespoke fund to support R&D in areas it has been traditionally lacking, with governance from across the sector.
- **More mission-based research:** The UK will face significant health disruption in the decades to come. Pandemics are increasing; anti-microbial resistance is a growing threat and the need profile of the country is chasing. We should extend our use of mission-based research, to meet these challenges head-on and ensure R&D is targeted at providing health security. Charities have pioneered on mission-based research – and there are many examples of large 'challenge' grants bringing the best scientists to work on the most pressing health challenges of our time.

To see more on these recommendations, see Thomas and Nanda (2020).

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Supplementary Data

Predicted R&D investment by sector in four scenarios (£m)¹¹

Scenario 0: Pre-Covid Trajectory
Scenario 1: A V-Shaped Recovery

Scenario 2: A Moderate Scenario
Scenario 3: The Hysteresis Scenario

Scenario	Sector	2020	2021	2022	2023	2024	2025	2026	2027
0	Public	2,457	2,948	3,439	3,926	4,419	4,677	4,869	5,068
	Charity	1,952	2,027	2,101	2,171	2,248	2,379	2,477	2,578
	Private	3,856	4,002	4,310	4,601	4,926	5,371	5,764	6,061
	Total	8,265	8,977	9,850	10,698	11,593	12,428	13,110	13,707
1	Public	2,457	2,948	3,439	3,926	4,419	4,677	4,869	5,068
	Charity	1,496	1,547	2,036	2,113	2,192	2,298	2,390	2,486
	Private	3,361	3,659	3,883	4,201	4,674	5,002	5,380	5,645
	Total	7,314	8,155	9,357	10,239	11,285	11,978	12,640	13,199
2	Public	2,457	2,948	3,439	3,926	4,419	4,677	4,869	5,068

¹¹ Note, this table includes both the predicted drop in private investment caused by lost charity income, and the predicted drop in private investment independent from lost charity income

	Charity	1,496	1,547	1,766	1,973	2,192	2,298	2,390	2,486
	Private	3,361	3,659	3,883	4,201	4,569	4,954	5,370	5,629
	Total	7,314	8,155	9,088	10,100	11,180	11,930	12,629	13,184
3	Public	2,457	2,948	3,439	3,926	4,419	4,677	4,869	5,068
	Charity	1,496	1,547	1,631	1,695	1,759	1,841	1,914	1,990
	Private	3,361	3,659	3,883	4,201	4,516	4,849	5,200	5,442
	Total	7,314	8,155	8,953	9,822	10,695	11,367	11,983	12,500

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