False economy?

How NHS medicine procurement threatens the UK's Life Sciences growth engine

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WPI STRATEGY

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About The Authors

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Key Points

The Department for Health and Social Care (DHSC) has recently applied more stringent price controls on the sale of medicines, requiring historically and internationally high rebates from the revenues of Life Sciences companies. The DHSC is currently deciding whether to maintain the more stringent price controls or return them to less burdensome long-term averages in the period 2024-2028.

While ostensibly saving the NHS money, the analysis set out in this report argues that more stringent price controls are a false economy. Billions of potential investment in UK life sciences R&D would either take place elsewhere in the world or not happen at all, foregoing future economic growth and high-value employment in the UK, and reducing the tax base needed to sustainably fund the NHS.

The DHSC's Impact Assessments (IAs) examining stricter price controls on medicines conclude that investment in UK life sciences R&D will indeed be reduced. But they assert that, because of the global nature of the life sciences industry, R&D investment will be reduced exactly in proportion to where in the world it currently takes place.

Academic evidence and our analysis both challenge these conclusions. They suggest that the DHSC's analysis does not consider the full extent of how stricter price controls affect the UK's commercial environment for life sciences, subsequently affecting the decisions of global boardrooms concerning life sciences R&D investment in the UK.

Our analysis finds that:

- The higher the payment rate, the greater the negative impact on R&D investment.
- R&D investment is only expected to increase in the period 2024-2028 when the payment rate is below 10%.
- Under a 20-30% payment rate, R&D investment in 2028 is forecast to fall 20% from its 2023 level - and to be 26% below the level it would be if rates were below 10%.
- That equates to a loss of £1.9bn of UK R&D in 2028 alone, and a cumulative £5.7bn of R&D investment foregone over 2024-28, as a result of high payment rates.

These impacts on UK life sciences R&D have consequent economic and fiscal impacts:

- When comparing a 20-30% payment rate to a sub-10% payment rate, the resulting loss in economic output over 30 years is worth over £50bn.
- When comparing a 20-30% payment rate to a sub-10% payment rate, the long term losses in tax revenue are forecast to be worth £17.9bn.
- Should such a policy be maintained, the losses would grow disproportionately as UK life sciences adjusted to a new, lower growth equilibrium. Retaining high rates for the five subsequent years would mean foregoing over 30 years a further £90bn of GDP and around £30bn in associated tax revenues.

These losses, however, come alongside certain benefits. The NHS would receive more revenue from pharmaceutical companies with higher payment rates. Seen in the most narrow financial terms, the policy trade-off could be framed as whether the revenue gain to the NHS is more than the lost tax revenue from reduced R&D. Our analysis finds that:

- When comparing a sub-10% payment rate with a payment rate of 20%-30%, there is a net loss of £6.0bn to the UK economy over 30 years. The NHS gains around £11.9bn from a higher rate, but the Exchequer loses £17.9bn.
- While the NHS savings resulting from higher payment rates are more immediate than the Exchequer's losses, the latter grow rapidly as the impact of higher rates weighs on the economy. Moreover, all figures are expressed in real, present value terms, meaning that we can be confident that the UK experiences substantial net fiscal losses even after giving due credit to the immediacy of NHS benefits.
- The combined total of NHS revenue and future tax revenues is maximised under a payment rate below 10%.

The paper also finds that the magnitude of harm accelerates as the duration of any policy of high payment rates endures, as the UK completes a transition onto a new equilibrium of lower research intensity. We find that should 20-30% rates be applied for ten rather than five years (i.e. from 2024-33):

- Annual R&D investment would level out at around £1.9bn below 2023 levels
- Compared with a scenario of sub-10% rates, a decade of 20-30% rates benefits the NHS by around £24.5bn in revenue. However, the Exchequer ultimately loses £48bn in tax revenue, a net loss of £23.5bn to the state.

The analysis in this paper only addresses some of the channels by which higher payment rates impact the economy and NHS productivity. There is good evidence that life sciences R&D, particularly clinical trials, can generate considerable income for the NHS, provide greater access to treatments for patients, and support the training and development of NHS staff.[1] These are excluded from this analysis, as are the consequences (such as improved labour force participation and productivity) resulting from improved patient access to medicines, a likely result of lower payment rates. In excluding such effects, we take a conservative approach to estimating the financial disbenefits of high payment rates.

Moreover, while the financial analysis here is instructive, it is important that decisions not be taken based only on net financial impact to the state. The net economic impact (i.e. taking into account lost GDP, not just lost tax revenues) should ultimately be more important for policymakers. Here, the disbenefits of higher rates are substantially larger, since £3 of GDP is lost for every £1 of tax – further underlining the case against super-high payment rates.

Finally, it must be recalled that these economic effects are in addition to the wider societal benefits that arise from using new medicines to improve population health and wellbeing.

Introduction - £5.7bn of UK R&D in jeopardy

Life sciences is one of the most important sectors to the UK economy. It contributes tens of billions in economic output every year, supporting almost 600,000 jobs. It improves the productivity of the NHS by producing innovative medicines and by undertaking revolutionary scientific research. It helps to fund public sector expenditure by paying £10bn annually in tax to the Exchequer. In addition to all of this, it was the life sciences sector that was instrumental in overcoming the Covid-19 crisis.[2]

The Government recognises the sector's importance. The Chancellor has identified life sciences as a 'key growth sector', highlighting its highly innovative and investment-attracting capabilities.[3] A comprehensive life sciences Vision was published in 2021, presenting a blueprint for how to tackle future diseases, build on existing science and research infrastructure, support the NHS, and create the right environment for life sciences to grow.[4]

Yet this report argues that there is a gap between the Government's language on supporting the life sciences sector and the direction of policy impacting on UK life sciences research and development (R&D).

The Department for Health and Social Care (DHSC) has recently applied more stringent price controls on the sale of medicines, requiring historically and internationally high rebates from the revenues of life sciences companies. The DHSC is currently considering whether to maintain the more stringent price controls or return to them to less burdensome long-term averages in the period 2024-2028. It argues that this will save money. But our analysis suggests this would be a false economy, as it would reduce future investment into UK life sciences R&D. Critically, as well as foregoing growth and high-value employment, that would reduce the tax base needed to sustainably fund the NHS.

The policy context

The regulatory regime governing the cost of branded medicines that are sold to the NHS is complex. Detailed explanations are available from several sources but a detailed understanding is not required to follow the argument made in this report. The context is as follows:[5]

- **The growth in costs to the NHS of branded medicines is controlled by Government policy**. This has been the case - in various forms - since the 1950s. The large majority of these costs are covered by a voluntary scheme that is negotiated every five years between the Government and the life sciences sector. The scheme's stated aims are to improve patient access to medicines, to keep the branded medicine bill affordable for the NHS and to support innovation.[6] Those sales that are not covered by the voluntary agreement are instead covered by legislation in a statutory scheme. The schemes are intended to be complementary and under them both, total medicine costs are controlled by requiring pharmaceutical companies to make clawback payments (referred to in this report as the 'payment rate') to the Government for any medicine sales above a pre-agreed limit.
- **Very high recent growth in medicine sales have increased the rebates required of medicine suppliers**. Several factors have influenced this, including costs related to the recovery from the pandemic (though not Covid-19 vaccines, which are managed separately) as well as growing demand for new medicines. The voluntary scheme automatically adjusts

to increased growth in sales, with the recent high growth seeing the payment rate increase from 5.1% in 2021 to 15% in 2022, and to 26.5% in 2023. These payment rates were regarded as so intolerable by two large pharmaceutical companies that they recently left the voluntary scheme.[7]

Higher payment rates ultimately mean that the life sciences sector is self-funding a large share of the UK's medicines consumption. The industry has highlighted that such rates are untenable if it is to continue to invest, launch the best new medicines in the UK, ensure consistent, reliable security of supply, and remain internationally competitive. Such a system, it argues, cannot be sustainable given that NHS demand will only grow further given demographic need and continuing innovation.

Why policymakers should care

This report makes the following argument:

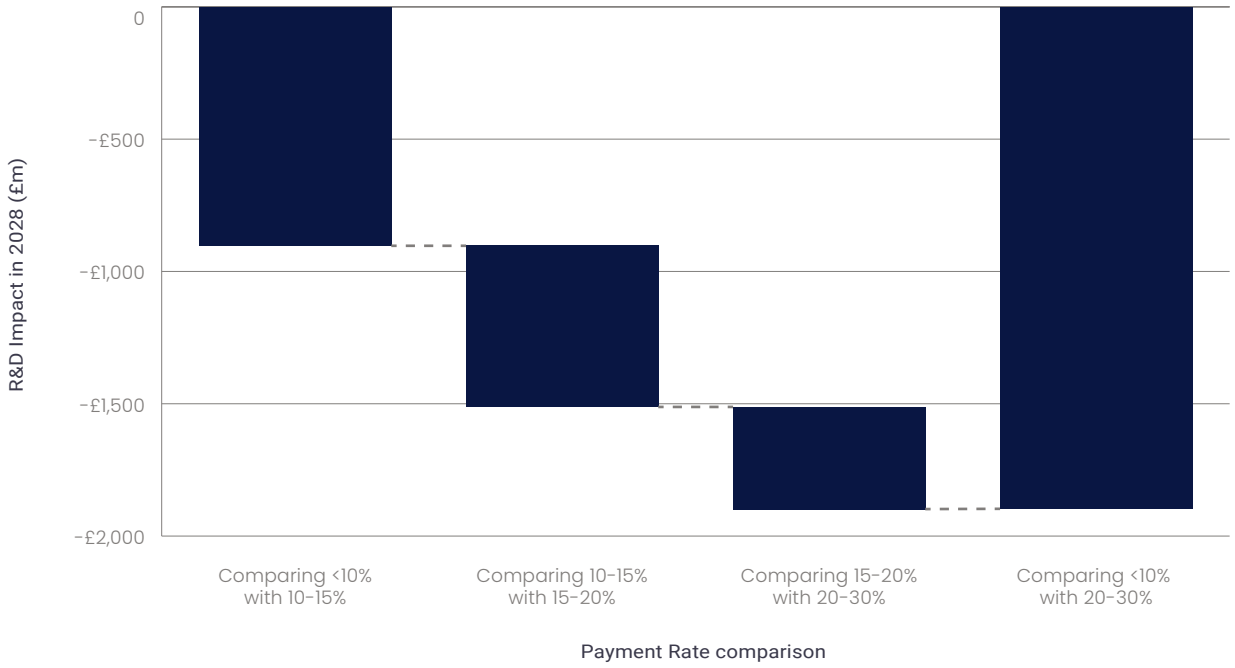
- Higher payment rates on medicines affect the attractiveness of the UK as a destination for UK life sciences R&D investment.
- The DHSC's Impact Assessments (IAs) on the effects of increased rebates do not consider all the available evidence, underestimating the extent to which UK life sciences R&D will be reduced.
- Private sector R&D investment acts as a down-payment on future growth, which will ultimately be affected if payment rates remain historically high.
- This would be inconsistent with the Government's commitment to its life sciences Vision, and more generally the Chancellor's growth strategy.
- It would directly constrain the size of the tax base required to sustainably resource the NHS, meaning that it is counterproductive in the long-term.

While not calculated in this analysis, there is also good evidence on how life sciences R&D activity, particularly clinical trials, can generate income for the NHS, provide greater access to treatments for patients, and support the training and development of NHS staff.[8] We ignore such effects in our analysis. We also ignore the economic consequences (such as improved labour force participation) resulting from the benefits of improved patient access to medicines, which is expected to result from lower payment rates. In excluding all such effects, we take a highly conservative approach to estimating the disbenefits of higher payment rates.

Our analysis quantifies the impact that such an approach could have. Private survey evidence collected by the ABPI allows us to estimate the impact on R&D investment under four different payment rate scenarios. The impact in 2028 is shown in Chart One, below.

A key finding is that should payment rates remain at current levels, i.e. between 20% and 30%, there will be an estimated £5.7bn less life sciences R&D conducted in the UK over the next five years than if payment rates returned to single digits, with £1.9bn lost in 2028 alone.

Chart One: R&D impact in 2028 when comparing payment rate scenarios (£m)



The rest of this report develops this analysis in the following sections:

- A description of key shortcomings in HMG's existing IAs.
- Quantification of the economic and fiscal impacts of lost UK life sciences R&D.

CHAPTER 1

Higher payment rates - an alternative analysis

Since the beginning of 2022, DHSC has published two analyses on higher payment rates for branded health service medicines. These Impact Assessments (IAs) state that higher payment rates will reduce the revenues of life sciences companies, resulting in:

- A reduction in global life sciences R&D investment, including some in the UK.
- A reduction in the economic benefits that arise from R&D 'spill-over' effects.

Crucially, the IAs assume that, because of the global nature of the life sciences industry, reduced R&D investment will be experienced evenly across those countries where life sciences R&D investment takes place. Put another way, if the UK currently accounts for 5% of global life sciences R&D investment, then 5% of the total reduction in global R&D investment resulting from higher payment rates would occur in the UK market.

This chapter argues that the IAs have got this wrong. They underestimate the impact that higher payment rates will have in the UK, subsequently underestimating the impact on the economic benefits generated from R&D. These underestimates are driven by inadequate consideration of the full evidence base on the subject, and thus failing to quantify it in the IAs. There are three headline problems with HMG's current approach:

- It simplifies the findings of the research it cites.
- It does not recognise today's environment for global life sciences R&D decisions.
- It ignores wider evidence that offers a counterargument.

Each of these problems are now described in turn.

Simplified interpretation of research findings

The IAs dismiss the argument that higher payment rates for branded health service medicines are a significant determinant of where R&D takes place.[9] They instead argue that supply side factors, such as the availability of expert scientific labour and favourable tax conditions, are the principal determinants of where to locate R&D activity.

While such decisions are certainly multifactorial, there are three issues with how this is presented in the IAs:

- **A key source supporting the argument pre-dates the establishment of the UK clawback mechanism.**[10] Published in 2007, the prevailing system of controls was less onerous; while cross-industry list price cuts were applied every 5 years or so, the effect of each cut eroded over time as new products came to market and existing products progressed through their lifecycle. Even the largest such cut, worth 7% in January 2005, was much less onerous than current voluntary and statutory scheme payment rates. The interviewees who informed the research may not have highlighted payment rates as a significant factor influencing R&D investment decisions simply because they were not a significant factor at the time. The ABPI's own recent survey suggests payment rates are now high on the agenda of life sciences companies and very materially affecting R&D decisions.

- **The conclusions of the same source are not as clear cut as the IAs suggest**. The source finds, for example, that:

  > *"…when underlying fundamentals were similar enough that the industry had a number of realistic choices, executives' perception of market conditions is an additional variable that can become an important factor in the overall choice [of where internationally-mobile investment is located]".*

  This directly challenges the assertion in the IAs that reduced R&D investment will be distributed evenly across global markets. It suggests that higher payment rates could directly lead to R&D investment being redirected to markets that otherwise have similar competitive attributes to the UK. To give this further context, the prices paid by the NHS for medicines are already low by international standards even before application of payment rates (an analysis published in 2022 concluded that, *'…the UK already exhibits some of the lowest medicine prices of any comparable country, and suggests that these may be falling further'*).[11] As such, the source cited within the IAs actually indicates that the UK was already at a competitive disadvantage when R&D decisions were being made, one since exacerbated by rising payment rates.

- **No consideration of how commercial environment factors can themselves affect the supply-side**. For instance, the IA highlights expert scientific knowledge and skills as a key determinant of where R&D expenditure is directed. Yet there is no discussion of how reduced revenues from higher payment rates will affect the investment made to develop that expertise - and hence the availability of such skills in the future. A 2018 Science Industry Partnership survey assessed the impact of apprenticeship reforms in science-based industries, with the top reason for choosing not to employ apprentices in their organisation as being a lack of staff/ resources to offer training (chosen by 46% of respondents).[12] Indeed, a private survey of ABPI members found 96% of respondents expecting to reduce employment in the event of payment rates reaching 24%.[13]

The changing landscape of global R&D

A decade or more has passed since some key sources used as evidence in the Government's IAs were published. The global landscape of life sciences R&D has changed substantially since, and is changing rapidly still.

One example comes from a 2022 report commissioned by the European Federation of Pharmaceutical Industries and Associations. It found that at the turn of the century, annual pharmaceutical R&D investment differed by €2bn between the US and Europe. In 2020, this difference had increased to €25bn. The report also concluded that China is emerging as an increasingly competitive region for companies to locate their R&D activities, and that favourable commercial environments are attracting more clinical trials outside of Europe, especially for innovative products such as cell and gene therapies.[14]

Another example comes from the University of Cambridge's Institute for Manufacturing, which reviews the UK's innovation and industrial performance in comparison to other countries. It highlighted declining productivity, a deteriorating trade balance and stagnant R&D expenditure in the pharmaceutical manufacturing sector. The drivers of these trends are site closures by major sector employers, increased offshoring of pharmaceutical manufacturing, the large share of domestic R&D expenditure decisions being taken abroad, and UK companies reducing in-house R&D investment in favour of acquiring small firms.[15]

These trends, in addition to the UK's changing relationship with the world following Brexit, suggest that an understanding of the influencing factors behind global R&D decisions has to consider more contemporary research papers, which can offer up-to-date insight.

The wider evidence base

There are counterarguments to those made in the IAs, yet are not referenced in the DHSC analyses. For example:

- **A 2020 study following the announcement of stricter price controls on patented medicines in Canada**. The study tested the assertion of policymakers that there was no evidence linking pricing, R&D and access to medicines.[16] The study systematically reviewed academic studies published between 1995 and 2020 on medicine pricing in developed countries. It concluded that:
    - For every 10% decrease in real pharmaceutical prices, R&D investment decreases by 5-6%.
    - Implementing drug price cuts or freezes lead to a 21% reduction in the probability of FDI taking place.
    - Amongst the publications cited in the literature review, two studies found an explicit link to stricter price controls with lower domestic investment.[17]

As well as this impact on decreasing investment, there was strong evidence that price controls discouraged the entry of new medicines to market.

- **The factors affecting where clinical trials are conducted**. ABPI company feedback has stressed that companies are ethically obliged to conduct clinical trials where patients will ultimately be able to access and receive the medicines being trialled. Moreover, countries that have lower margins on medicine sales are less attractive for trials (as it is less likely that after trial sales make economic sense). This effect is amplified by the fact that some countries require companies to conduct later phase trials if there is an intention to ultimately licence medicines in those countries. Research has demonstrated that fewer clinical trials ultimately mean fewer economic benefits.[18]

CHAPTER 2

The impact and consequences

The previous chapter sets out how there is an evidenced link between the commercial environment for UK life sciences and lower investment in life sciences R&D. This chapter quantifies that impact and estimates the potential consequences for future UK economic growth and tax revenues. The analysis:

1. **Estimates the impact on life sciences UK R&D investment**, calculated for four scenarios for the payment rate in the period 2024-2028. These estimates are based upon the results of a survey of ABPI member companies.

2. **Converts R&D impacts into economic impacts**, using parameters for the rate of return on life sciences R&D investment established in academic literature. It then applies discount rates according to the Government's own Green Book methodology.

3. **Assesses the resulting impact on tax revenues**, under different payment rate scenarios, and how these compare to potential NHS revenues from higher payment rates.

The findings from this process are now described in turn. A methodology in Annex A of the report explains the sources and approach to calculations.

The R&D impact

Respondents to the ABPI's survey were asked about their UK R&D investment plans under four payment rate scenarios across the period 2024-2028. These scenarios were:

- Scenario 1: A payment rate of <10%
- Scenario 2: A payment rate of 10-15%
- Scenario 3: A payment rate of 15-20%
- Scenario 4: A payment rate of 20-30%

The payment rate under Scenario 1 is used as the baseline against which comparisons are made within the analysis. Historically, rates have generally been below 10% (the average for 2014-21 was 6.88%) so this provides a useful reference point for the analysis.

Respondents to the ABPI's survey were asked to provide the UK R&D totals that were delivered in 2021, that are expected to be delivered in 2023, and that are projected to be delivered in 2028 under each payment rate scenario. The answers were used to present the information in Table One, with three key conclusions about the impact on UK life sciences R&D investment:

- The higher the payment rate, the greater the anticipated negative impact on R&D investment.
- R&D investment is only expected to increase in the period 2024-2028 under the payment rate scenario of <10%.
- Under the 20-30% payment rate scenario, R&D investment in 2028 is expected to be around 20% lower than 2021 (and 26% below the R&D level prevailing under the sub-10% scenario in 2028).

Table One: % change in R&D investment by payment rate scenario[19]

Payment rate Scenario 2024- 2028	% change in UK R&D investment 2023- 2028
<10%	7.8%
10-15%	-5.5%
15-20%	-14.5%
20-30%	-20.1%

Reported 2021 R&D investment by survey respondents was £3.8bn, representing well over half of the UK total; as such, this represents a large sample from which we may reasonably generalise when estimating industry-wide impacts of alternative payment rate scenarios (see methodology for assumptions around 2021 R&D life sciences totals).

The figures in Table One were used to estimate the industry-wide impact if all UK life sciences companies reacted as forecast here. The starting point for the analysis is taking an assumed level of UK life sciences investment based upon the latest available official data, then assuming it follows the path indicated by the survey responses, and assuming that the path from the start 2024 to the end of 2028 is linear.[20]

The results of this analysis are presented in Table Two, which estimates the cumulative level of life sciences R&D across 2024-28 under the alternative scenarios. It finds that there is a £5.7bn difference in total R&D investment - £35.6bn vs. £29.9bn - across these five years between the sub-10% payment rate scenario and the 20-30% payment rate scenario.

Table Two: Total life sciences R&D investment under different scenarios, 2024 - 2028

Payment rate scenario	Total R&D investment 2024-2028 (£billions)
<10%	£35.6
10-15%	£32.8
15-20%	£31.0
20-30%	£29.9

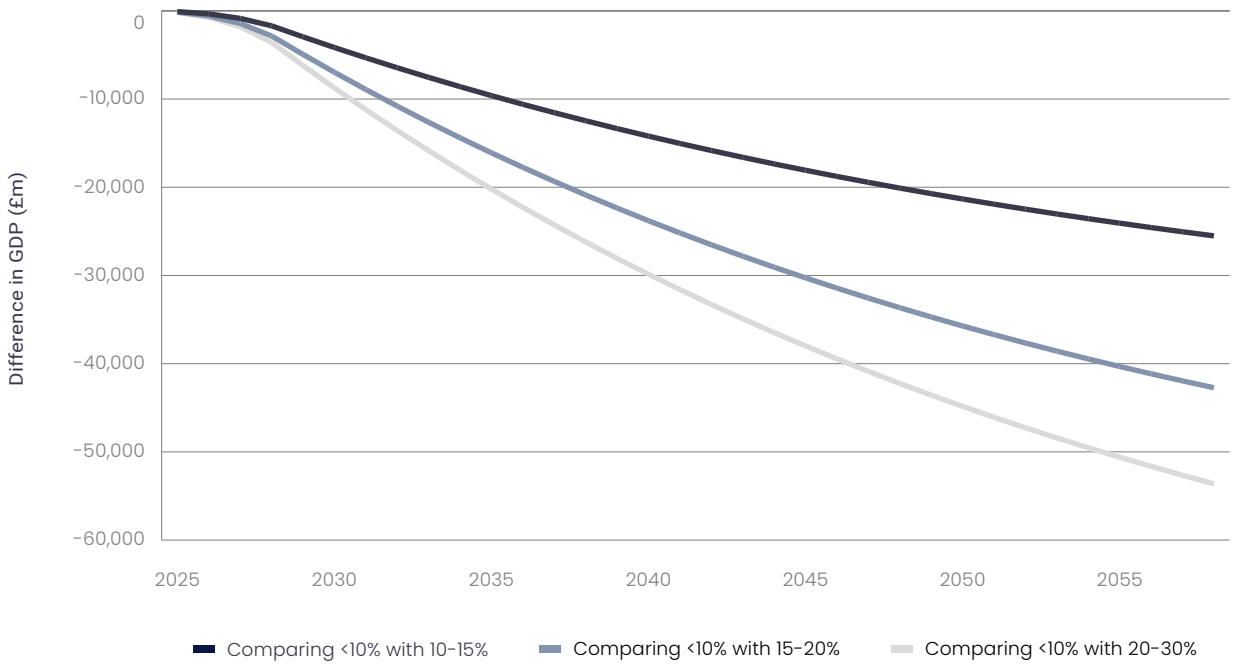
The economic and fiscal impact

The assumed path for life sciences R&D set out in the previous section can be converted into economic impacts. This is done by applying the rate of return established in the academic literature, i.e. the benefit for every £ invested in UK life sciences R&D in every year going forward, then discounting the benefits as recommended in HM Treasury's Green Book (see methodology for further detail).

The analysis captures short-, medium- and long-term effects by capturing all impacts from 2024 until 2058 (30 years after 2028 in each payment rate Scenario, in line with Green Book appraisal methodology).

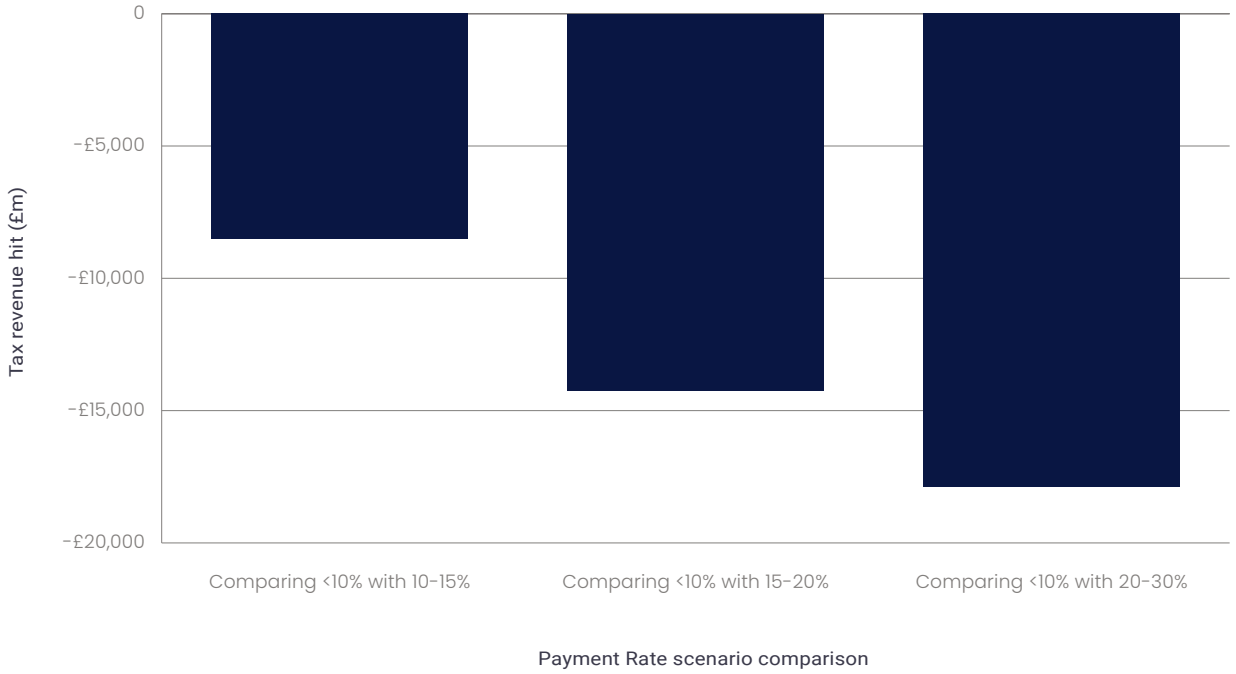
Chart Two shows the cumulative loss in GDP over time resulting from the higher payment rate scenarios when compared with the baseline payment rate scenario of sub-10%.[21] For instance, the chart shows that when comparing the 20-30% payment rate scenario with the sub-10% baseline payment rate scenario, over £50bn of GDP is foregone over the period.

Chart Two: Cumulative GDP losses over time (£m)



GDP impacts can be converted into foregone tax revenues for the Exchequer, shown in Chart Three. For instance, the total tax revenue foregone over 30 years as a result of 5 years of 20-30% payment rates is £17.9bn, compared with those under the baseline scenario of <10% payment rates.

Chart Three: Tax revenue losses (£m)



It is important to appreciate that this is permanent damage resulting even from a temporary policy of higher payment rates. Higher rates for 5 years lead to £5.7bn less R&D being conducted and this reduces future productivity both for the firms affected and others, via what are known as economic 'spillover effects'. Such losses are irreversible - even if later reforms facilitate future recovery of R&D to per-2024 levels, GDP and tax revenues will still be less *than they would have been* - a permanent scarring effect.

Should higher payment rates continue beyond 2028, the magnitude of the harm to GDP and tax revenues thereafter would be much greater since by then, a new equilibrium of lower research investment will have been reached. The negative impact of each subsequent year would reflect at least[22] the £1.9bn per year of reduced R&D applying from 2028 onwards. This is an annual loss of 67% more R&D than is forecast to occur across the average of the years 2024-28 period. If for example, 20-30% rates applied across the subsequent 5 years of 2029-34, the additional harm caused by those years of lower investment would ultimately cost £90bn in foregone GDP and almost £30bn in lost tax revenue.

What this means

The overall message within the above sections should be uncontentious. If UK life sciences R&D investment is reduced because of a deterioration in the UK commercial environment then there will be implications for future growth and tax revenue. Any period of high payment rates causes permanent losses; the scale of these losses rises disproportionately if they are maintained for an extended period.

This, however, does not present the full picture of costs and benefits. The NHS would receive more revenue under higher payment rate scenarios. A full financial analysis should compare the NHS revenue gain from higher payment rates to the loss in tax revenue.

One way of looking at this is assessing the combined total of NHS revenue and future tax revenues under different payment rate scenarios. To do this, our analysis uses the ABPI's forecasts for NHS revenues under different payment rate scenarios in the period 2024-2028, comparing them to our forecasts of lost tax revenues arising from reduced life sciences R&D investment. As can be seen in Table Three, the sub-10% payment rate scenario maximises these revenues, being £5.9bn higher than under the 20-30% payment rate scenario.

Table Three: NHS and R&D tax revenue under each payment rate scenario, 2024 - 2028, £bn

	NHS revenue	Tax revenue generated by R&D	Combined NHS and R&D generated tax revenue
<10%	£4.6	£112.9	£117.5
10-15%	£8.3	£104.4	£112.7
15-20%	£11.6	£98.7	£110.2
20-30%	£16.5	£95.0	£111.5

This can be expressed in terms of net effects (see Chart Four), with key conclusions being:

- Lost tax revenue will be greater than gained NHS revenues under every payment rate scenario above the baseline. Note that this analysis discounts future benefits, meaning that it adjusts for the fact that negative tax impacts develop over a longer time period than do NHS revenue gains, which are immediate.

- When comparing the sub-10% payment rate scenario with the 20-30% payment rate scenario, the NHS gains around £12bn in revenue but the Exchequer loses £17.9bn in revenue, a net loss of £5.9bn.

Chart Four: Net loss (NHS Revenue Gain vs. Tax Revenue lost) when comparing against baseline (£m)

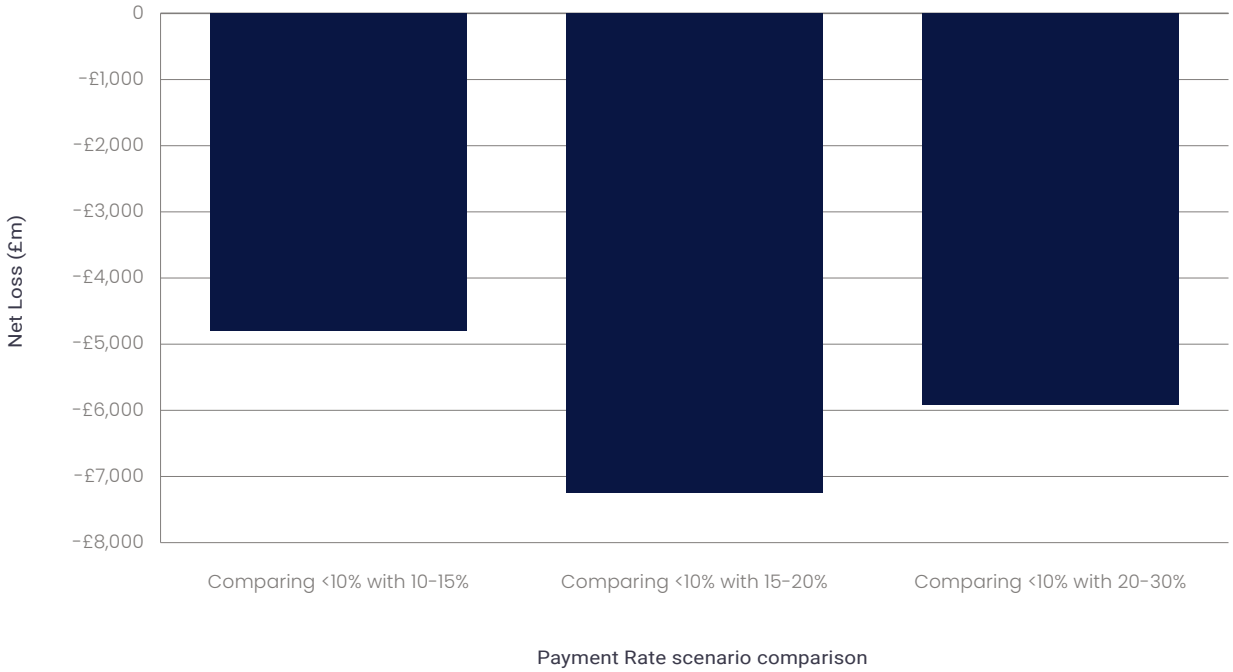


Table Four below extends the analysis to consider the net impacts were a policy of 20-30% payment rates to apply for a ten year period (2024-28) rather than five (2029-2033). While annual NHS revenues remain consistent over the period, the GDP and tax revenue impacts that arise from lower R&D are amplified under the 20-30% scenario. This is because the lost future benefits of R&D that does not happen overlap with each other. For instance, in the year 2034 there would be lost GDP and lost tax revenues arising from lower levels of R&D in each of the previous years between 2024-2033. Key findings are:

- Lost tax revenue is again greater than NHS revenues under all higher payment rate scenarios.
- When comparing the sub-10% payment rate scenario with the 20-30% payment rate scenario, the NHS gains around £24.5bn in revenue but the Exchequer loses £48bn in revenue, a net loss of £23.5bn.

Table Four: NHS and R&D tax revenue under each payment rate scenario, 2024 - 2033, £bn[23]

	NHS revenue (£bn)	Tax revenue generated by R&D (£bn)	Combined NHS and tax revenue generated by R&D (£bn)
<10%	£9.4	£229.2	£238.6
10-15%	£16.9	£206.4	£223.3
15-20%	£23.7	£191.0	£214.7
20-30%	£33.9	£181.2	£215.1

Conclusions

This analysis underlines how higher payment rates represent short-term economising at the cost of long term sustainability. While understandable from the NHS procurement viewpoint, from a national perspective it is "penny wise, but pound foolish".

The analysis in this paper only addresses some of the channels by which higher payment rates impact the economy and NHS productivity. There is good evidence that life sciences R&D, particularly clinical trials, can generate considerable income for the NHS, provide greater access to treatments for patients, and support the training and development of NHS staff.[24] These are excluded from this analysis, as are the consequences (such as improved labour force participation and productivity) resulting from improved patient access to medicines, a likely result of lower payment rates. In excluding such effects, we take a conservative approach to estimating the financial disbenefits of high payment rates.

Moreover, while the financial analysis here is instructive, it is important that decisions not be taken based only on net financial impact to the state. The net economic impact (i.e. taking into account lost GDP, not just lost tax revenues) should ultimately be more important for policymakers. Here, the disbenefits of higher rates are substantially larger, since £3 of GDP is lost for every £1 of tax – further underlining the case against super-high payment rates.

Finally, it must be recalled that these economic effects are in addition to the wider societal benefits that arise from using new medicines to improve population health and wellbeing.

Annex A: Methodology

The starting point for Life Sciences R&D investment

ONS data records that there was £8.2bn of R&D expenditure included in the product category of 'Chemicals and pharmaceuticals' in the UK in 2021.[25] Due to a recent methodological change in ONS data reporting, the breakdown between 'chemicals' and 'pharmaceuticals' business enterprise R&D is no longer available.

Instead, our analysis adjusted this £8.2bn total to represent just pharmaceuticals R&D. Previous ONS data split R&D investment for chemicals and pharmaceuticals into separate categories. Using this data, it is possible to say that in 2020 pharmaceuticals accounted for 86% of the total R&D investment undertaken in chemicals and pharmaceuticals.[26] This 86% proportion was assumed to apply in 2021 as well, producing a figure of approximately £7.1bn assumed R&D investment.

Using ABPI survey evidence

The ABPI conducted a survey of its members, asking about past, current and future investment in R&D in the UK. The outcome was totals for:

- R&D investment undertaken in 2021.
- R&D investment planned in 2023.
- R&D investment expected in 2028, under four different payment rate scenarios.[27]

The path of R&D investment between 2023 and 2028 was assumed to be linear, i.e. there would be equal falls in R&D investment from the previous year in 2024, 2025, 2026 and 2027. This is a simplified assumption. For instance, it may be that falls in R&D investment happen slowly at first as firms take time to unwind investment and find other countries to perform it, then accelerate rapidly to level off at their 'new normal' level earlier than 2028 - this would suggest an S-curve pattern. This would not have a material impact on the principal analytical results in the paper.

Calculation of costs

Using the above figures as the foundation of the calculation, the process for calculating the costs to GDP and tax revenues from higher payment rates were as follows:

- Assume that the path of R&D investment for all UK Life Sciences R&D matched those derived from the ABPI survey.
- Convert the differences in R&D between scenarios into an impact on future economic output. This uses an assumption incorporated into previous work undertaken by ABPI in collaboration with PWC, as follows: "*Existing literature suggests that every £1 invested in private R&D today leads to a stream of future benefits to the economy as a whole equivalent to £0.50 per year in perpetuity*".[28]
- Discount future benefits using HM Treasury Green Book Methodology.[29]
- Calculate tax impacts, which are assumed to be one-third (⅓) of the GDP impact.[30]

Note that in making the above calculations all values are converted into 2023 prices.

Calculation of Benefits

Forecasts for the amount of voluntary scheme revenue per one percentage point of the payment rate were provided by the ABPI based on the annual forecast exercise 2022-2028. It assumed the same exclusions and exemptions as per the current voluntary scheme The midpoint of each payment rate scenario was used in calculating the assumed revenue that the NHS would receive under each payment rate scenario, e.g. 17.5% was used for the payment rate scenario of 15-20%. For the payment rate scenario of <10% a figure of 6.9% was used, in line with the historic average of the payment rate before 2022.

Endnotes

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19 All values converted to today's prices. Figures in the second column should be interpreted as the cumulative impact of different payment rates over the period 2024-2028.

20 For example, if R&D investment is £1bn less in 2028 than in 2023, expenditure reduces by an equal amount in the intervening years.

21 Figures have been discounted over time.

22 This assumes that by 2028, companies will have fully adjusted to the new commercial environment and will not reduce their R&D further; this may be optimistic as some investment decisions may take more than five years to fully unwind.

23 Note that these calculations sum the tax revenue impacts 30 years beyond the end of each period, i.e. 2024-2028 to 2058 and 2029-2033 to 2063.

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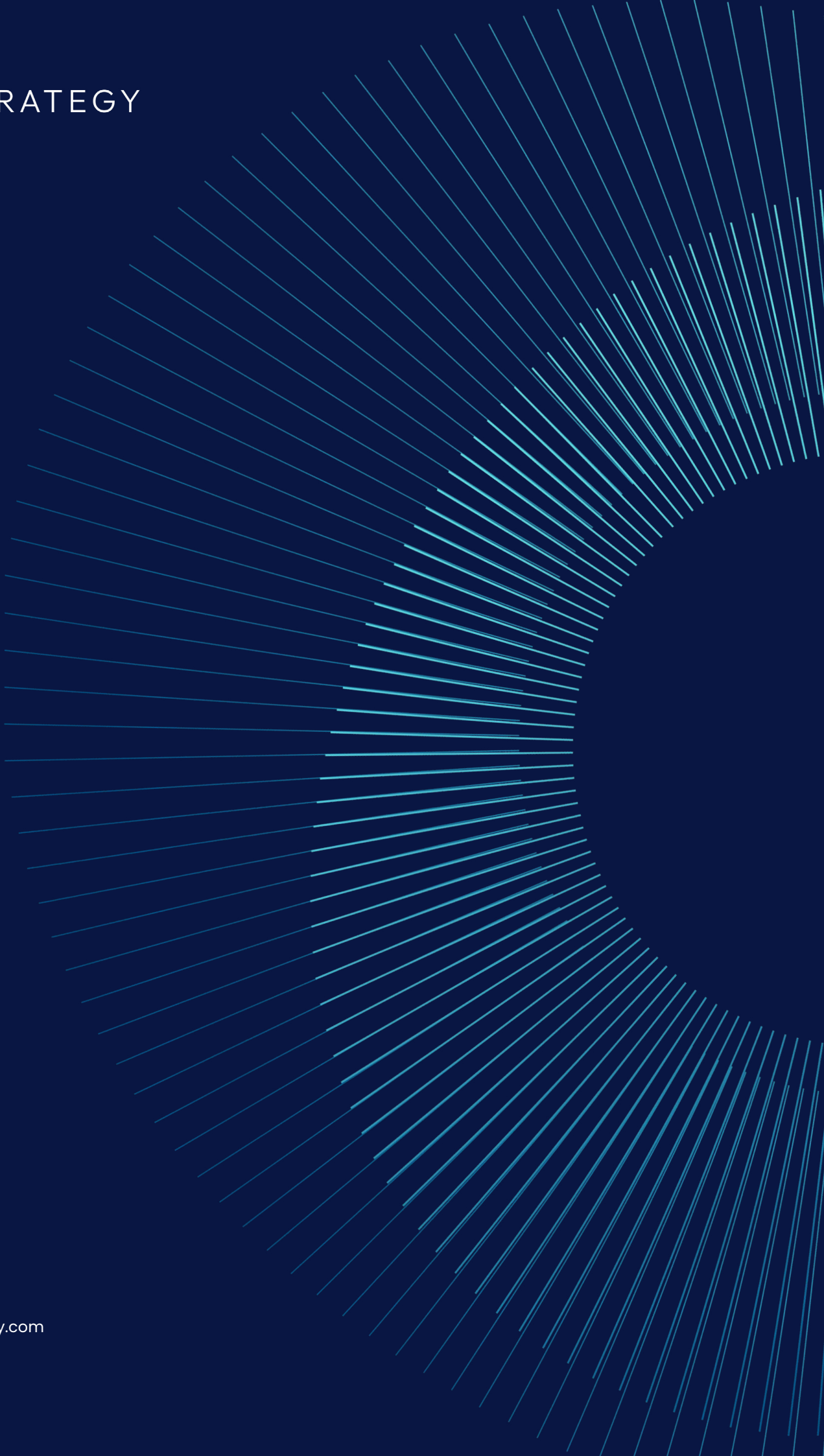

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