The fiscal case for COVID-19 vaccination: a UK treasury perspective

EPH235

George Bray[1], Simon Brassel[1], Jingyan Yang [2], Charlotte Leversha [3], Cale Harrison [3], Tianyan Hu [2], Margherita Neri[1], Lotte Steuten[1]
[1]Office of Health Economics, London, UK [2]Pfizer Inc., New York [3]Pfizer, UK

INTRODUCTION

- The COVID-19 pandemic had significant impact on the health of the UK population and its wider economy. Whilst COVID-19 continues to circulate amongst the British population, semi-annual vaccination remains in place for certain risk groups and has been found to generate public health benefits as well as societal value in terms of productivity benefits (Harrison et al., 2024).
- However, increasing levels of public debt and current geopolitical circumstances add pressure on public health budgets and eligibility for vaccination is increasingly restricted to smaller population groups at higher risk of severe outcomes (e.g., elderly, clinical risk groups).
- While the general link between the health and the wealth of a nation is well established and adverse changes in population health are projected to significantly increase the future fiscal deficit in the UK (OBR 2024), the fiscal impact of the COVID-19 immunisation programme on the Treasury's accounts is unknown.
- This study therefore estimates the fiscal return on investment (ROI) of current COVID-19 vaccination coverage when compared to a no vaccination scenario across four working-age population groups aged 18-64:

  1. Not in clinical risk groups (not at-risk, NAR), 2. In clinical risk groups (at-risk, AR), 3. Health and social care workers (HCW), 4. Informal caregivers (ICG)

METHODS

- We developed a de novo Fiscal Health Model linking a multi-cohort Markov model with three disease states -susceptible, infected, and long COVID (symptoms >6 months post-infection) - to five fiscal states to assess the impact of COVID-19 vaccination on Treasury inflows and outflows.
- A short-term decision tree was incorporated within the infected Markov state to capture different clinical outcomes associated with each infection. These outcomes determined transitions out of the infected state.
- The disease model used input data covering both the Delta and Omicron periods (Harrison et al., 2024; UKHSA, 2024) and incorporated real-world vaccine effectiveness based on the 2023/2024 season (Rudolph et al., 2025; Nguyen et al., 2025; Appaneal et al., 2024).
- Each health state was linked to five fiscal states - full-time employed, part-time employed, unemployed, economically inactive, and retirement after pension age - using employment proportions from ONS (2022; 2024). Individuals with long COVID were more likely to be economically inactive (ONS, 2022). Infection and its long-term effects could also increase absenteeism.
- Fiscal states determined which benefit and pension payments applied, while disease states determined NHS health care costs.
- Time spent in each health–fiscal state combination determined fiscal streams (see **figure 1**) over an individual's working-age (excluding retirement) and total lifetime (including retirement). Lower infection rates led to higher employment, fewer sick days, and greater income tax contributions.
- Main outcomes were the fiscal benefit–cost ratio (fBCR) and net fiscal benefit (fNB), expressed in 2023 prices (£) and discounted at 3.5%.

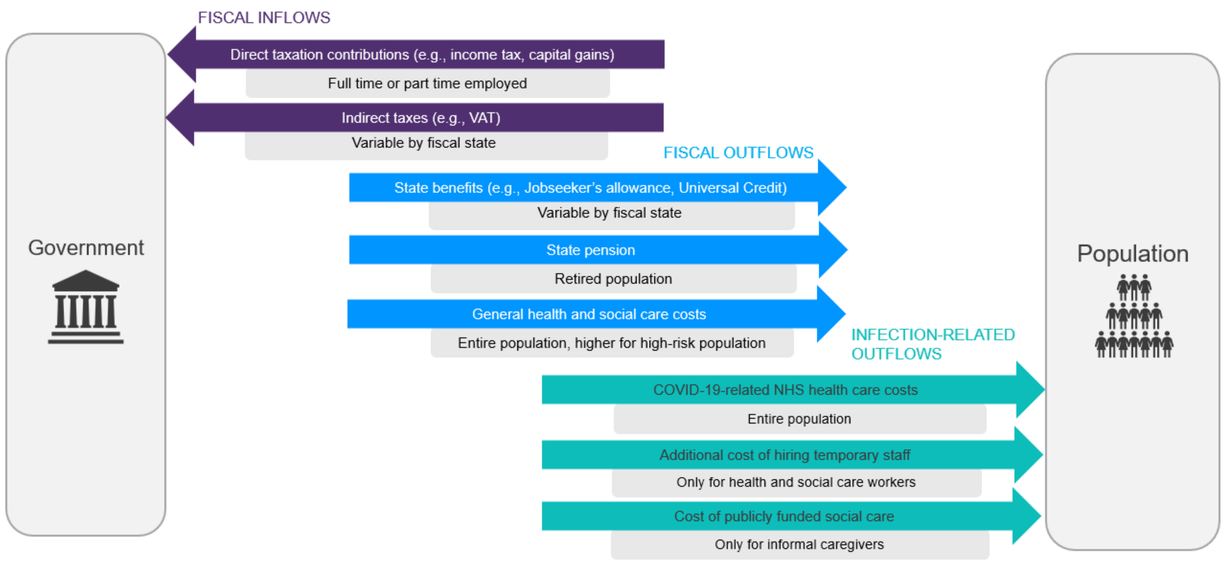

FIGURE 1: ILLUSTRATION OF FISCAL STREAMS INCLUDED IN MODEL

RESULTS

TABLE 1: FBCRS AND FNBS FOR EACH POPULATION GROUP ACROSS DIFFERENT TIME HORIZONS

	5-year		Working-age lifetime		Total lifetime	
	Fiscal Return per £1 spent	fNB	Fiscal Return per £1 spent	fNB	Fiscal Return per £1 spent	fNB
NAR	£0.65	-£214.5M	£0.98	-£24.4M	£0.41	-£1.7B
AR	£1.05	£26.4M	£1.32	£266.8M	£0.35	-£1.1B
HCW	£1.06	£9.3M	£1.46	£144.8M	£0.94	-£27.6M
ICG	£1.23	£55.3M	£1.54	£212.8M	£0.82	-£131.0M

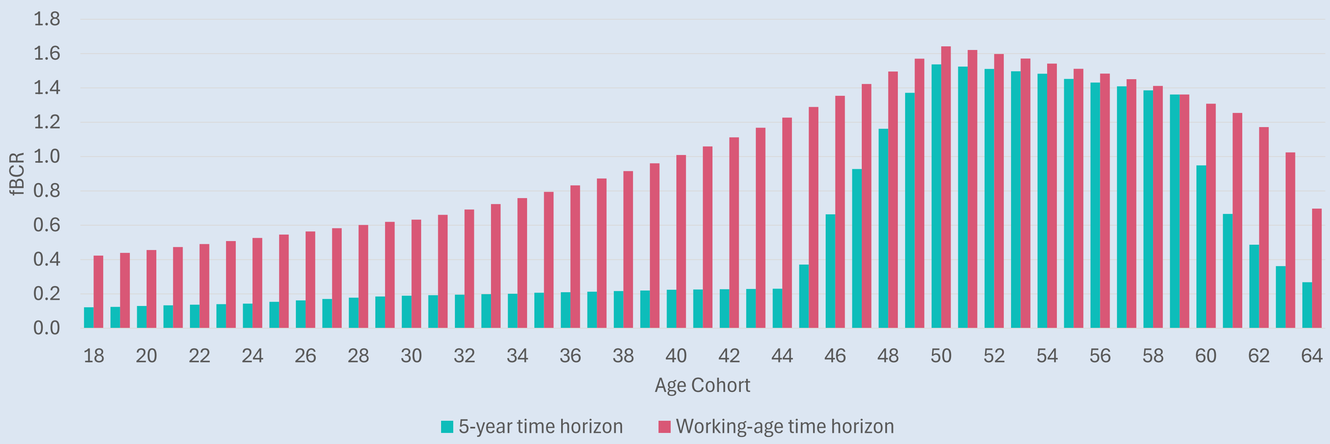

FIGURE 2: DISCOUNTED FBCR BY AGE GROUP FOR 18-64-YEAR-OLD NOT AT-RISK COHORTS

- COVID-19 vaccination yields a positive ROI (fBCR>1) for those aged 18-64 AR, HCW and informal caregivers before retirement (see **table 1**). For those NAR, who were previously eligible for boosters, COVID-19 vaccination approximates cost-neutrality prior to retirement. For all groups but the NAR group, investment in current levels of vaccination becomes cost-neutral after 5 years.
- When considering individual age cohorts, the fBCR peaks for the 50-year-old cohort. This is because vaccination prevents more severe disease and has more scope for taxation returns at later working ages (see **figure 2**).
- Vaccination prevents infection and hospitalisation outcomes, leading to higher tax contributions and savings in terms of COVID-19 and Long COVID healthcare costs. However, the fBCR reduces substantially across all groups when considering a lifetime horizon, as more people survive to retirement age, increasing the Treasury's pension liabilities in the long-term. This can be seen in **figure 3**, which shows the fiscal streams across the lifetime of NAR 18-64-year-old cohorts, with pension payments of survivors imposing significant costs to the government account.
- The differences between the NAR group and AR group are due to more severe COVID-19 cases being prevented in the AR group, increasing the preventative benefits of vaccination. This is partially offset by more people surviving to incur increased general health care costs during the working-age lifetime. Over the total lifetime, the fBCR is larger in the NAR group compared to the AR group as more deaths are averted due to vaccination in the AR group, meaning a larger difference in pension liabilities.
- HCWs and informal caregivers generate larger ROI compared to the NAR group due to the additional fiscal streams considered, namely temporary staff costs and costs of replacing informal care. Moreover, the informal caregiver population is skewed towards older ages, where vaccination is more impactful.

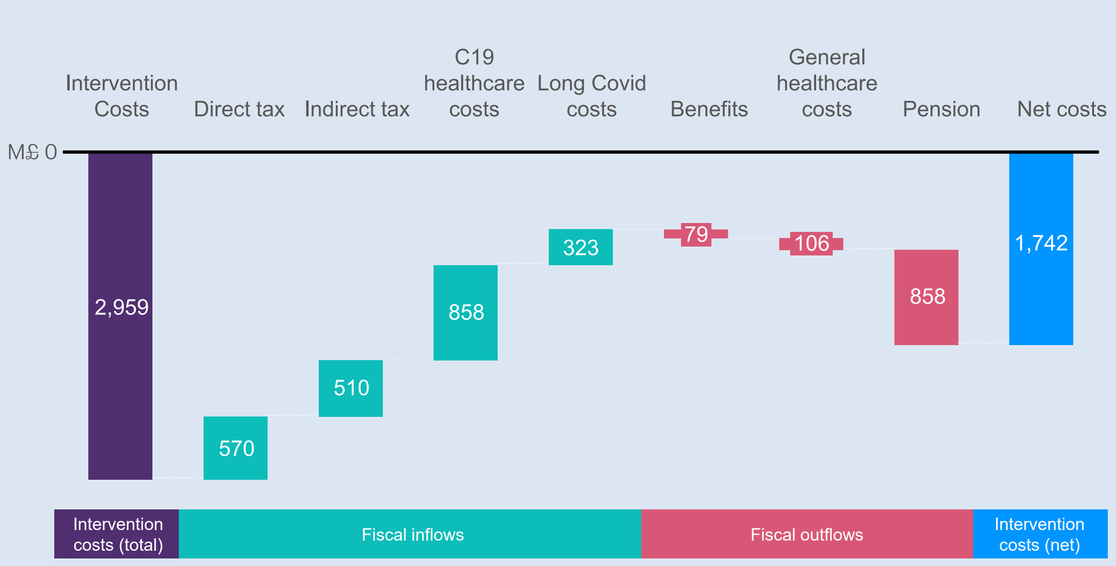

FIGURE 3: FISCAL STREAMS FOR 18–64-YEAR-OLD NOT AT-RISK COHORTS IN £ MILLION.

Conclusions

- COVID-19 vaccination of 18–64-year-olds generates a positive fiscal ROI to the UK Treasury, notably among HCW, informal caregivers, and people AR, which accumulates quickly and decreases after retirement age.
- This fiscal health analysis complements standard cost-effectiveness analysis and provides evidence to support public funding of COVID-19 vaccination for the UK government. Within 5 years, fiscal returns 65% of the costs with vaccination everyone NAR are recouped, while a return between +5% and +23% can be achieved for vaccinating those AR or those who provide formal and informal care.
- The results show a lower ROI when considering the total lifetime, due to the impact of pensions and lower tax contributions for those who enter retirement (longevity-related fiscal costs).
- A limitation of our analysis is it does not consider how parameters may evolve over time. For example, retirement age may increase over time so younger cohorts in the model will on average work longer, meaning we may be underestimating the potential future benefits of vaccination and/or underestimate the future spending power of future older adult cohorts.
- **Fiscal Health Model can provide a valuable perspective of the actual impact of vaccination in general and highlights the positive impact of COVID-19 immunisation on the fiscal sustainability in the UK.**

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DISCLOSURES

This study was sponsored by Pfizer. JY, CL, CH and TY are employees of Pfizer and may own Pfizer stock.

Contact: George Bray, gbray@ohe.org
Office of Health Economics, London, UK

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