DEPARTMENT OF SOCIAL POLICY AND INTERVENTION

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Still safe? Still in their hands?

An Evaluation of NHS privatisation in England since 2010.

PhD Thesis

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I have a strong belief that *my* role in this work is not worthy of celebration and that it is just the outcome of me doing an average job at an average 9-5. I also really dislike the times when I became emotionally invested in the work, bought into its grandeur, or sought social status from it. I feel most protected from this are when I'm rooted by friends and family. My immediate family are my ultimate source of support, love, and protection – I know they will never let me down, nor I they. I'm also blessed by many dear friends who have known me much of my life make me feel like myself regardless of life's twists and turns, thank you Emily, Harry, Hattie, Ben, Dave and Jack. Finally, Raheem – thank you for your love and unconditional companionship, it means the world.

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Abstract

"Stopping public services from functioning
They tell us privatising
Is the only way of surviving
They then set up private companies
Then take our country's stolen money
They take our money and buy our country away from us"

- Femi Kuti, *Privatisation*

England's NHS has experienced increased privatisation via a shift towards the contracting-out of publicly funded healthcare to private providers. Originally founded through a widespread nationalisation of hospitals, the NHS (National Health Service) is considered a symbol of national pride as the crown jewel in the welfare state and one of the core achievements of socialism in post-war Britain. This has made the privatisation of the service a site of fervent political and public discourse. Yet, missing from this debate has been the input of rigorous research into the extent and impacts of privatisation. Given the importance of healthcare provision to population health, it is crucial to understand why the NHS has been privatised and whether privatisation has improved or worsened healthcare quality. This thesis makes three major contributions to these debates by answering: a) what are the causes of NHS privatisation, b) what is the extent of privatisation, and c) what are the impacts of privatisation on healthcare quality?

The first paper of this thesis analyses the association between for-profit outsourcing and quality of healthcare provision. It uses a novel data resource of NHS expenditures which link NHS suppliers to their legal company status, identifying all reported expenditures going to for-profit companies, charities, and NHS organisations. This data enables us to analyse the aggregate effect of privatisation at a population-level for the first time in England. This paper reports that for-profit outsourcing has increased from just below 4% to just above 6% between 2013 and 2020 and shows a consistent increase over this period. Using multivariate longitudinal regression models, the paper finds that an annual increase of one percentage point of outsourcing to the private for-profit sector corresponds with an annual increase in treatable mortality of 0.38% or 0.29 deaths per 100,000 population (95% CI 0·15% to 0·62%; p= 0.0055) in the following year. Given the increase in privatisation over this period,

we use the average marginal association from the regression model to calculate how many additional deaths can be attributed to observed changes in outsourcing since 2013. We find changes to for-profit outsourcing since 2014 can be associated with an additional 557 treatable deaths (95% CI = 153-961). The paper concludes that increases in privatisation are corresponding with worse quality care in England's NHS.

The second paper builds on the first by asking: 'if privatisation is not improving patient outcomes, why is it increasing?' and uses the answers to generate theories as to the processes of privatisation. To answer this the paper conducts a thematic analysis of 20 in-depth interviews with NHS commissioners which ask them why they perceive the NHS uses private providers and what factors might explain variation in outsourcing between different commissioning regions. I find that the key themes are: the "choice agenda" and independent provider locations; limited NHS capital; increasing need and the ability of NHS providers to meet it; appetite for change amongst key individuals working at the commissioning body; and the impact of financial pressures on commissioning decisions. A new theory of privatisation is explored from the qualitative results differentializing between 'managed' and 'uncontrolled' outsourcing. The commissioner-provider relationship sometimes locates decision-making power with providers and sometimes with commissioners, but the commissioners are never able to challenge the policy landscape they inherit from central government. The study also concludes that the experience of commissioners navigating the provision of healthcare with struggling NHS providers, worsening social determinants of health and financial pressures means that positive decisions to use private providers based on anticipated quality are not always possible.

The third paper of this thesis asks whether the post-2010 fiscal austerity in England accelerated NHS privatisation. It answers the question of whether, and in what ways, a) NHS underfunding b) Local Authority cuts and c) welfare cuts are associated with the regional changes to NHS privatisation observed since 2010. The paper analyses the aggregate association between changes in funding levels for regions and their relative changes to levels of privatisation. We find that levels of government

funding are not associated with regional levels of privatisation. This finding has implications for how we understand the impacts of privatisation on health outcomes. If there were a strong association between finances and privatisation – the association with poor health outcomes may be confounded and ultimately caused by austerity policies. Instead, with these findings, we move closer to rejecting that hypothesis and conclude, rather, that the impacts of privatisation and austerity on health are independent of each other.

The fourth and final paper of this thesis conducts a narrative review of the literature evaluating the impact of health privatisation on healthcare quality across high-income countries. Previous reviews of the private healthcare have focused on comparing quality between private and public hospitals – which does not fully capture the effect of privatisation, that of a transfer from one sector to another. We make an important contribution by including the dimension of time to aggregate the evaluations of transfers from public to private healthcare provision. We find that hospitals converting from public to private ownership status tend to make higher profits, primarily through the selective intake of patients and reducing staff numbers. We also find that aggregate increases in privatisation are frequently corresponding with worse health outcomes for patients. Our review provides reason to challenge the justifications for healthcare privatisation and concludes that the evidence for further privatisation of healthcare services is weak.

Memorable moments in creating this thesis.

In producing this work, I have been lucky to have had interactions with wonderful people that have shaped this work, and myself, in profound ways. Here are some of the most memorable.

"*I don't expect you to do anything, just thank you for listening*"
We hang up and it strikes me that our talk had not been a transactional one. She had reached out after reading the first chapter of this thesis but wanted nothing other than to share her story which she felt was described by the research. The details of what she shared – of times working in private mental health hospitals - are not mine to repeat. But the urgency with which she relayed the information will remain with me, grounding this work in an urgency of its own and a seriousness with which it is undertaken.

"You should have started with knee surgeries and built up to this"
My friend gives me a wink and a hug as we stand in front of hundreds of activists gathered in parliament square and I prepare to tell them why they have gathered here, how we calculated 557 additional treatable deaths corresponding with more privatisation and what it means for those seeking to influence health policy in England.

"Outsourcing is a triggering term"
Most academics are minded, due to the available evidence or their political leanings (or both), to oppose privatisation. The work produced in this thesis and in my other research conducted alongside it has, however, had moments of pushback. Private health interest groups and private social care lobbyists mostly offer amusing and curious interactions. But when an NHS commissioner said this, I felt a little surprised. It was the first time I realised the qualitative interview process deals with individuals who have, well, some individuality.

"I think little of it was in Bevan's mind's eye when he created the NHS"
The final interaction I had from an NHS commissioner involved in the second chapter of this thesis is peculiar. The process had been a bit painful at times, the dynamic never quite that of equal partners and I never fully learned the politics and motivations within which they operated. It was a surprise then, when this landed in my inbox, a call to arms and a list of harrowing realities of the private sector. Deaths of patients, children exploited for financial gain, staff unprepared. Only revealed after the submission of my paper to publication with some best wishes.

"*It's nice to see a student from Oxford who gives a toss*"
In sharing this work I have had lots of feedback from people in the media, public and different stakeholders – all of it political in one sense or another but basically none of it personal. Then, walking out of a political conference I had spoken to, a quick interaction starting with the kind of compliments I had come accustomed to, but followed by a phrase that so perfectly positioned me and othered me from the space of working-class identity and radical politics we had just walked out from.

"Save the NHS Ben"
The final words from one of my wonderful, kind, and generous supervisors as we said farewell. It's a horrible phrase. Ladened with the self-aggrandising ethos too common in academia alongside a probably unhelpful NHS metaphor, perhaps with a dumping of irony. But it also represented a meaningful transition I felt I had been through as a researcher. I won't save the NHS. But I will likely spend my career researching and exposing flaws in health and social care services with a laser focus on the private sector and its consequences for patients.

Thesis outline

	Title	Authors and contribution	Research Question	Data (variables)	Methods	Results	Publication stage
Paper 1	Outsourcing health-care services to the private sector and treatable mortality rates in England, 2013–20: an observational study of NHS privatisation	Benjamin Goodair, Aaron Reeves (My contribution: Study design, data processing, data analysis, manuscript writing)	Is privatisation in England's NHS associated with better or worse quality healthcare?	Expenditure files from NHS commissioners, collected by Rahal and Mohan (2022) (% for-profit outsourcing). Avoidable Mortality (Treatable mortality rates)	Panel data analysis, multivariate linear regressions	Privatisation correspond with worse quality care, measured through higher mortality rates from curable causes.	Published in Lancet Public Health DOI: https://doi.org/10.1016/S2468-2667(22)00133-5
Paper 2	'Accident and Emergency'? Exploring the reasons for increased privatisation in England's NHS.	Benjamin Goodair	Why do healthcare commissioners perceive that the NHS contracts services from independent providers?	Interview data (20 interviews, 3 commissioning sites) RTT waiting times data (% independent treatments)	Thematic analysis	Privatisation largely occurring due to NHS not meeting demand, the behaviours of independent providers, and the philosophy of CCG leaders.	Published in Health Policy DOI: https://doi.org/10.1016/j.healthpol.2023.104941
Paper 3	Selling out: Did fiscal austerity accelerate NHS privatisation in England between 2010 and 2023?	Benjamin Goodair, Anders Bach-Mortensen, Aaron Reeves (My contribution: Study design, data collection, data analysis, manuscript writing)	Has austerity corresponded with higher levels of NHS privatisation?	Commissioner allocation, LA allocation, DWP expenditure. RTT waiting times data (% independent treatments), NHSSPend (% for-profit outsourcing). Commissioner Accounts (Balance)	Panel data analysis, multivariate linear regressions	Austerity is not associated with regional levels of privatisation – and pathways to worsened population health are independent of each other.	Targeting submission to BMJ/ Journal of Social Policy
Paper 4	What is the impact of healthcare privatisation on the quality of care?	Benjamin Goodair, Aaron Reeves (My contribution: Study design, data processing, data analysis, manuscript writing)	What is the impact of privatisation on the quality of care in high-income countries?	Existing peer-reviewed evidence.	Narrative review	Hospital conversions often correspond with cuts to staffing and selective provision, outsourcing often aggregate associated with worse population health	Published in Lancet Public Health. https://doi.org/10.1016/S2468-2667(24)00003-3

Background

"Killing fields need blood to graze the cash cow
It's a number game, but shit don't add up somehow"

- Mos Def, *Mathematics*

Introduction and puzzles

Many health systems around the world are experiencing increased privatisation. Sold as a silver bullet to fix almost any problem from poor rural health coverage to financial crises - the private sector is touted to solve it all by delivering better and cheaper care (Cameron, 2011). This trend has resulted in the displacement of state-owned provision, often due to a concurrent underinvestment in public healthcare, while the private provision is increased under the mask of the NHS 'brand'. In England, this process is particularly notable given the history of nationalised healthcare and the political sensitivity over the public nature of the NHS (National Health Service). Important then, is to measure, understand and test the impacts of this development in England.

The first puzzle of this thesis is a simple one, how much has the NHS been privatised in England and what type of privatisation has occurred? Despite the political importance of privatisation in England, levels of NHS outsourcing are widely contested or absent. The government response is that there has a) always been levels of for-profit NHS services and b) the current levels are not increasing (Hancock 2023; Jayanetti 2022). However, contesting that are those that believe the NHS is experiencing 'creeping privatisation' (Byrne 2023). The reason this question is left open to debate, supposedly, is the absence of granular, contract-level data (The King's Fund 2022a).

Another element of measuring privatisation is being clear about the types of privatisation are being conducted in England's NHS. Some try to suggest that the NHS is not observing privatisation because there has been no major sell-off of public assets and costs have not been largely shifted onto the patients (Iliffe and Bourne 2021). However, for others, private welfare has three dimension: provision, financing, and decision-making (Burchardt 1997a). So, understanding the types and processes of privatisation are important to clarify for the NHS in England.

The second puzzle is why has for-profit delivery of NHS treatments increased? At a central policy level, the marketisation of the NHS was intended to increase for-profit delivery of healthcare but, in being left open to the market, large regional discrepancies have occurred (Goodair and Reeves 2022b). Without central planning about who should deliver NHS treatments, if we want to be able to understand the impact of the reform, being able to trace the reasons it is increasing in some areas and not others are key.

The final puzzle of this thesis is the impact of these trends on the quality of healthcare. Perhaps the most contentious and important puzzle for policymakers. Those advocating the benefits of NHS privatisation often rely on evidence and theory about competition effects – and construct a largely unevidenced narrative about the behaviours of for-profit companies being more responsive to consumer needs and ultimately higher quality (Le Grand 1997). On the other hand, those suggesting NHS privatisation should worsen the quality of care suggest that for-profit providers are likely to cut costs at the expense of quality of care, whilst the competition effects between for-profit and public providers are likely to be negative as for-profit providers skew the market in their favour (Pollock 2005).

These three puzzles, 1) to what extent, 2) why and 3) to what effect, are the questions this thesis solves in relation to NHS privatisation in England from 2010 to present. The importance of this is clear – concerns about privatisation is that it may worsen the quality of healthcare resulting in worse health outcomes for the population relying on NHS services. If this is the case, empirical evidence detailing this is vital to enable policymakers to reverse a potentially destructive trend in welfare states around the world.

Theory and measurement

"Kept going till the power died,
Or the patient did; whichever came first."

- Rhyme Asylum, *Broken Window*

Underpinning the analyses in this thesis is the assumption that there is something meaningfully different between 'public provision' and 'private provision' which will impact on the quality of public services. For my analyses, I draw a binary distinction between *public* and *private*. Therefore, I utilise a conceptualisation of privatisation which is also categorical in its thinking. The following section will outline the theoretical argument, situated within the academic debates, for why *private* can be expected to be different to *public,* why that might matter for the quality of care, and why we might construct binary concepts of public or private domains.

What is privatisation?

A cliché of England's health policy literature has been to state that 'NHS privatisation' is a term overused and under conceptualised (Powell and Miller 2014). But there do exist clear frameworks for us to borrow when understanding this concept. For example, Burchardt's (1997a) 'Wheels of Welfare' model identifies three distinct dimensions of services: financing, provision, decision. Financing and provision are self-explanatory, the decision-dimension is important because it details whether, according to Burchardt's model, the state or the service-user controls the decision to receive services, how much to receive and from whom. These three dimensions have been used by many since to discuss the types of privatisations.

The Wheels of Welfare model is useful because privatisation can then be conceptualised differently given any combination of public/private control over each dimension. For instance, were the funding and decisions of the service to remain under state control but the provision to be privatised, we could term this type of privatisation as 'contracting out' or 'outsourcing'. For Burchardt, 'outright privatisation' only refers to when all three domains are transferred from public to private. In this thesis, I will adopt the term 'privatisation' slightly differently, and rather, refer to transfer from public

to private of *any* of the domains identified by Burchardt. This is perhaps the most expansive and inclusive definition of privatisation, and I will then specify which 'type of privatisation' is being assessed according to whether 'decisions', 'provision' or 'financing' is being transferred to private individuals/ companies. For example, the type of privatisation most important to this thesis is that of 'outsourcing' - one of the types of privatisation identified in Burchardt's wheels of welfare where funding and decision remains publicly controlled but provision is 'contracted-out' to the private sector.

Measuring this definition of outsourcing is heavily contested and currently unsatisfactory for the analysis of its impacts. One means of measuring it has been by looking at the annual accounts released by the DfH+SC (Department for Health and Social Care) – these show small increases in spend on 'non-NHS providers' after 2010 followed by a plateauing since around 2015. This however is an imperfect measure given that many of the expenditures are hidden by the categorisation of accounts and whilst the first payments may go to public bodies, the end provider might be a private provider still (Rowland 2019). New measures of outsourcing are desperately needed which can be broken down beneath the level of 'non-NHS provider' to see the type of service, the actual provider and the monthly changes over long periods of time.

Alternative conceptualisations of privatisation exist too – some have suggested that binary distinctions between public and private are unhelpful and that a sliding scale of 'publicness' should instead be adopted (Andrews, Boyne, and Walker 2011a; Boyne 2002; Bozeman 1987). The attractiveness of this model is that there are many ways in which categorising an aspect of service delivery as either 'public' or 'private' is not satisfactory. For most of the time covered in this thesis, NHS England was an independent body, owned by the state but institutionally separated from the Ministers in the Department for Health and Social Care. Should, then, all the decisions made by the NHS be considered private under this new quango organisation or entirely public if it is a state-owned organisation? Perhaps the values of individuals operating at the top of NHS England should be taken into account? If the aim is to capture the behaviours influenced by private interests and accountabilities, then

perhaps neither is perfectly satisfactory and it is somewhere in the middle. Similarly, it might be useful to distinguish between situations in which private health services operate in different regulatory conditions. Take two hospitals which both have mixed financing 70% public and 30% private; but one hospital's private funding is via patient-charges and the other by regulated insurance schemes. The former option, intuitively, appears more privatised than the latter as the former might have zero aspect of 'publicness' compared to the latter where the government might control the terms of insurance schemes and mitigate any risks of extreme debt for patients.

However, policies regulating the different healthcare sectors often treat all public providers and private providers distinctly – in a binary way. For example, the new licensing scheme introduced for NHS providers in 2022 applied many demands on NHS Trusts (the organisational body of NHS-owned hospitals) that it didn't on private providers in the NHS such as net zero emission targets (NHS England 2023b). Similarly, the 2012 reforms to the NHS protected the rights of 'private providers' (Parliament: House of Commons. 2012). Or, the Welsh government response to excessive profits and poor quality care in children's social care was to ban the existence of for-profit provision (Welsh Government 2022). Given that the aims of this thesis are to measure the impact of privatisation with a 'policy evaluation' methodology, it makes sense to analyse within the binaries implemented in policies. Therefore, testing whether the binary categories have an impact is, in some ways, an effort to validate this binary conceptual framework. The extent, and variation, in the difference in quality of care with and without 'private' provision should help us understand whether the public-private divide is at all meaningful – or whether we need to consider an alternative measurement of publicness.

This section has outlined the concept of privatisation as applied in this thesis – one which is categorically defined and focuses on the outsourcing of services as provision of treatment is transferred from the public sector to the private sector. Even once stated that the concept of privatisation can be categorically applied in measurement, we require more theoretical assumptions for privatisation to matter for the quality of care. The two important assumptions, for theories of

change in any direction, are therefore that a) for-profit providers have different behaviours to public providers and/or b) that the inclusion of for-profit providers impacts the behaviours of public providers.

Why would it matter for the quality of care?

The empirical work produced in this thesis does not take an a priori position on how the behaviours of private providers would differ – nor does the empirical work measure those behaviours. However, the reason for conducting this research is a suspicion that privatisation might worsen the quality of care. In this section I will draw the argument for why we might expect privatisation to worsen quality of care theoretically. The main contributing argument is that the process of privatisation via outsourcing is a simultaneous application of market forces and for-profit ownership status. Consequently, the theory of how it should impact the quality of care should combine the two.

Theoretical debates on privatisation frequently make two distinct claims 1) that ownership status of providers matters for quality of care and 2) that competition effects matter for the quality of care.

The theoretical debate on ownership status considers whether increased financial incentives in the private sector make them more efficient and responsive to 'consumer' demands or more likely to prioritise profits at the expense of the quality of care. For advocates of the private sector, the financial accountability placed upon private sector companies means that they will go to extra lengths to make sure that patients are well-treated according to their needs because if they fail to attract custom, the business dies (Niemietz 2015). Similarly, the motivation to make a profit for shareholders means they are likely to cut away unnecessary bureaucratic processes which are commonplace in the 'bloated public sector' (Burgess and Currie 2013). Overall, this gives private companies a competitive edge over the public sector which is often restrained by inflexible cultures, regulatory demands, and no incentive to innovate or take risks.

The reason that these dynamics don't always play out as desired, and that we might expect the profit motive to deteriorate the quality of care is that it is difficult for public bodies to encourage private providers to prioritise quality of care. This process requires 'quality' to be clearly observable and prioritised rationally (Dranove & Satterthwaite, 2000). However, it is suggested that the quality of health services is often unobserved, resulting in an information asymmetry as commissioners struggle to identify the quality and performance levels from providers (Besley & Malcomson, 2018). Furthermore, there is some evidence suggesting that in more competitive markets, independent providers prefer not to reveal information on service quality (Jin, 2005). This would lead providers and commissioners to prioritise more observable outcomes – which may well, in both cases, include the cost of the services. In England's NHS, some services in primary and community care are competitively priced. Under these conditions it is much less clear how competition may affect quality as it depends on the nature of the competition and the relationships between cost efficiency and quality of care (Gaynor et al., 2015).

In absence of being able to properly incentivise private providers to prioritise quality of care over all else, private companies are then more likely to act in ways which sacrifices quality for financial reward – such as hiring fewer staff, paying staff less, over-prescribing services, or releasing patients too quickly.

A criticism of this portrayal of the differing incentives of private and public organisations compares the motivations of the individual employees. Le Grand (2003) suggests that it is not the case that public sector bodies are run by 'altruistic knights' nor that PFP (private for-profit) organisations are entirely run by 'self-interested knaves'. Citing the scandal in Mid Staffordshire NHS Trust and the existence of social enterprises in the non-public sector, Le Grand suggests the portrayal of private sector firms as less caring is an unfair criticism of healthcare providers. Le Grand also stresses that there exists a large variety of healthcare providers in the private market and therefore assumptions about their priorities are largely overgeneralised (Le Grand, 2013). However, to individualise the motivations is to

misrepresent the argument – which is more about the regulatory demands and the accountability mechanisms rather than personal morals. Indeed, were we to adopt a Marxist perspective, we might argue that the individuals are not innately 'knaves' or 'knights' but responding to structures of the institutions and systems they inhabit. Capitalism exerts power over all people, including the capitalist via "mute compulsion" or "invisible thread" (Marx 2011; Mau 2023). And so, people are disciplined to respond to the forms of value created in capitalism – prioritising capital not because they are morally inferior but because healthcare has become a capitalist structure.

A secondary debate is focussed on the impact of competition in health systems – rather than ownership status. Some public management theorists propose that increased marketisation should increase the quality of care delivered by healthcare providers. As Gaynor et al. (2015) explain, if prices are fixed by administrations, as in the case of most acute care in the NHS, competition is fought over non-price outcomes, anticipated to be an observed quality of service. This competition over contracts, based entirely on the differing levels of deliverable quality, is why quasi-markets are expected to improve the quality of healthcare.

Criticisms of quasi-markets include that they are a function of New Public Management policymaking which is at odds with values in a national health system (Barry, Chandler, & Dent, 2004; Simonet, 2013). New public management was an approach to public service organisation to reform public services in the image of private sector markets. But this might not be able to applied so easily to healthcare because the risks of allowing variation in providers for 'consumers' to demand their preferred option will lead to inequity and higher risks of poor quality providers operating. Equity and accessibility may be key goals for a national health system but are of less interest within the framework of markets and competition (Fotaki, 2010). Furthermore, the arguments underpinning marketisation rely on specific conditions to be in place – primarily that the market allows the best performing providers to function. However the conditions required for this to be true are often not evident in the public sector (Corlet Walker, Druckman, and Jackson 2022). The requirements for equity and

universality in public services are not prioritised in the processes introduced by New Public Management thinking. These debates over the drivers of quality in health systems are important as they suggest that there are conditions required for the effective functioning of a quasi-market which may not be present in the NHS, motivating an evaluation of the effects of outsourcing in this project.

However, neither of these theoretical debates are, in isolation, sufficient to fully explain the effects of privatisation on healthcare quality. Privatisation, through the outsourcing of services to private sector, is the simultaneous application of competition and ownership status. Instead, we need to consider the combined effect of these two dynamics at play. Does the theory of competition effects change if the competition is between private and public providers? Do the behaviours of for-profit providers vary in a competitive situation to those in the public sector?

One attempt to combine the two comes from Besley and Malcomson (2018) who combine theories about competition and the for-profit gap in quality. They argue that, given that for-profit service providers deliver lower levels of unobserved quality but are also more responsive to consumers, a system that combines the two is theoretically desirable. However, this theory is still entirely focused on the quality of individual providers. Rather, thinking about the performance across the sector, theories need to consider important factors such as imbalances in competition, the type of market or whether competition changes the behaviour of public providers.

For instance, one way in which privatisation – rather than ownership – could impact quality of care is if patients are cherry picked by private providers and then public hospitals are left with more 'difficult to treat' patients. In this scenario, neither ownership nor competition has caused the poor outcomes, rather a combination of the two. The profit incentives of private providers, combined with the competitive market has resulted in a situation in which the quality of care could be improved or worsened by changing the functioning of the healthcare system – but potentially resulting in dangerous outcomes in public providers.

Another way that current theory is inadequate is that it doesn't account for competition changing the way ownership status functions. In the absence of competition, public hospitals may be prioritising quality, fulfilling regulatory demands, and working according to best practice. With competition between public hospitals, this may change, and hospitals may have to prioritise efficiency and cost of service if they are competing against other hospitals for contracts and patient choice. But then with competition against private providers, they may have to act differently still – competing against companies which don't have to pay staff the same wage or cooperate with as many demands when licensed as providers of the NHS.

There is a strong argument for why for-profit providers may deliver worse quality care in a service like healthcare when 'quality' is hard to measure and enforce via contracts. There is also a tense literature debating the benefits of competition in public services. However, there is to date, very little evidence on the impacts of healthcare outsourcing.

Evaluating the impacts of privatisation empirically

"Equality rejected it will not make them a profit,
If we don't float the same boat
then they will push us off it"

- Shay D, *A Figure of Speech*

A large literature has attempted to evidence the size and direction of the differences between for-profit and public providers in different healthcare settings.

For many settings, the only possible comparison is between for-profit companies and charities. Herrera et al. (2014) conducted an overview of the systematic reviews of the evidence. They conclude that there is significant evidence to suggest that Private Not-For-Profit (PNFP) providers have better health outcomes than Private For-Profit (PFP) providers. However, in some contexts, charitable status is used as a signal of quality by providers looking to increase their consumer confidence. Jones et al. (2017) find a significant increase in the number of nursing homes switching to for-profit status following a policy change in 2002 enforcing the publication of quality indicators for each nursing home. The finding suggests that organisations, in the absence of alternative signals of quality, may indeed

use non-profit status as a signal of quality to increase consumption from a market. The importance of this is that if charity status is traded on, the for-profit motive might exist in the third sector too – and the effect size of difference in quality between the two sectors will be underestimated.

Direct comparisons between public and for-profit providers are less common in the literature and face difficulties in isolating the effect of ownership. Herrera et al. (2014) found no systematic reviews which compared health outcomes between publicly owned providers with for-profit providers in high-income country contexts. One of the difficulties in measuring the differences in outcomes between PFP and public healthcare providers is that there is usually expected to be a large amount of patient sorting which means that even after controlling for observable characteristics of the patients, analysts are not entirely confident of their findings.

In England, the difficulty in comparing the procedures and case mixes of for-profit and NHS providers has resulted in a gap in knowledge as to the relative performance. The largest literature empirically testing for the for-profit gap in healthcare quality in England comes from evaluations of New Labour's introduction of private providers. In the mid-2000s in England, the Labour government rolled out a policy of introducing Independent Sector Treatment Centres (ISTCs) (Naylor and Greggory 2009). ISTCs were set up in areas where NHS waiting lists were particularly long and private sector companies were given generous contracts to offer NHS patients the option of receiving their treatment by the private provider.

A few papers have analysed the comparative performance of the ISTCs and NHS providers, all finding it hard to draw firm conclusions. In theory, this would have been ideal conditions to outsource services – a well-funded and functioning public sector only outsourcing specified services where waiting lists were long. However, the evidence is mixed, for example, Chard et al. (2011) assessed the differences in surgeries provided to NHS patients by ISTCs and NHS providers in 2008. The findings suggest that the patients treated by ISTCs were less likely to come from socioeconomically deprived areas and had healthier preoperative conditions. The findings also suggested that, controlling for preoperative

conditions, those treated by ISTCs had better post-operation outcomes. However, the authors conclude that these differences, in both preoperative and postoperative observations are small and that the difference in quality of the two provider-types could well be explained by unobserved differences in the case-mix. Similarly, Pérotin et al. (2013) find that patient experiences differ according to hospital ownership in both directions with NHS-owned hospitals being awarded higher experience scores for some services and lower for others than independent hospitals. However, the authors find no overall effect between public and private hospitals once averaging the scores and controlling for patient characteristics.

Kelly and Stoye (2020) implement a slightly different method and compare outcomes between different areas according to the local health market's exposure to private introduction from the ISTCs. This is different from the direct comparisons between the two types of provider and may account for the idea that private sector competition could improve the performance of public sector providers. The author's use hospital readmission as their measure of service quality and find that "the introduction of private hospitals did not lead to either increases or decreases in quality on these measures" (Kelly and Stoye 2020). This paper provides an important methodological grounding for evaluating the effects of PFP organisations across a whole system. Comparisons between independent and NHS-owned providers in England's health service produce unclear findings with some suggestions that more affluent and healthier patients are sorted into private-sector providers meaning that better outcomes for private-sector patients are hard to associate entirely with the ownership of providers.

Alternatively, there is evidence from social care markets to suggest that a gap in quality between public and for-profit providers may exist in the UK. In England and Scotland, the evidence suggests that publicly owned social care providers outperform for-profit providers in their official inspection ratings (Bach-Mortensen, Goodair, and Barlow 2022a; Bach-Mortensen and Montgomery 2019; Barron and West 2017). However, the make-up of the social care market in England is dominated by private providers. Social care was never fully nationalised in England and the policy landscape has

been much more purposeful in outsourcing residential care to for-profit companies. The lax regulatory conditions and weak market oversight mean that in the social care sector many more poor performing private companies have been enabled to deliver vital public services. The key question is whether the NHS is heading towards such a similar landscape – or is already there.

The 'for-profit gap' in quality suggests that for-profit providers tend to deliver worse quality care than independent non-profit providers in healthcare settings internationally and public providers in social care settings in England and Scotland. Understanding the quality gap in the healthcare market in England is difficult because of patient sorting and the historic market dominance of public providers, especially of acute care which has the best measures of quality.

While the evidence and theory determining the 'for-profit gap' in care quality can motivate an understanding about the ways outsourcing to for-profit providers may impact the quality of healthcare systems, there is little evidence about how these provider-level effects aggregate across a system.

One instance of system-wide privatisation in Italy in the 1990s indicates that greater PFP provision is associated with higher mortality rates. Quercioli et al. (2013) find that post-devolution to Italian provinces, regions with higher increases of private sector involvement saw higher numbers of avoidable mortality. The context is slightly different to the UK, regional devolution meant that each region could structure their health service as they wished, equally the levels of private provision were already much higher than seen in any of the UK nations. Nonetheless, the research provides the only insight as to how a health service reform, resulting in greater privatisation, may impact the quality of care. It also suggests that the direct association between outsourcing and quality of care is a negative one.

Private sector involvement in non-healthcare services within the NHS

PFP organisations also deliver specific services for publicly owned care providers in England, particularly in the acute care sector. The sub-contracting of services from hospitals – one means of

outsourcing - has a longer history in England's NHS than the wholesale commissioning of health services from the private healthcare market. Often termed facilities management (FM), services such as cleaning, catering, laundry and building management have been outsourced to the private sector from the 1980s (Njuangang, Liyanage, & Akintoye, 2018). The longer history of outsourcing these services means that there is evidence which directly measures their effect on the performance of providers.

Comparisons between public and private cleaning services indicate that the for-profit gap may exist within FM services too. Toffolutti et al. (2017) find that NHS hospitals with PFP cleaning services have a higher incidence of MRSA infections, lower experience scores for cleanliness of bathrooms and wards and less availability of hand-washing materials. In a separate paper, the authors find that 'gaming' is observed in outsourced cleaning services whereby the delivery is improved according to the timings of inspections (Toffolutti, McKee, & Stuckler, 2017). The evidence showing that the delivery of specific services within NHS hospitals shows that ownership status is important at very granular levels of service delivery.

Slightly different from FM is the use of management consultancy to 'buy-in' business expertise to NHS services. Outsourcing of management processes to expensive consultancy firms is another way that NHS organisations have outsourced non-healthcare services. While the outsourcing of management takes place across different tiers of the NHS, research suggests that there is a positive relationship between the use of management consultancy by NHS Trusts and hospital inefficiency (Kirkpatrick et al., 2019). However, the authors find no association between outsourced management consultancy and patient experience scores. Management consultancy outsourcing is used to try and improve the efficiency of different process in the healthcare system but there is no evidence that this happens and some evidence to suggest the opposite may be true.

Commissioning from Private Sector Providers in England's Health Market

A key demand on commissioning from a healthcare market is choosing the provider with the best 'quality of service'. However, some suggest that commissioners are not able to rationally choose the best quality service because 'quality' is hard to observe and therefore other, more observed, factors become prioritised in the decision-making process. Healthcare decisionmakers have a large array of influences including financial, political and clinical demands (Guimarães and Carvalho 2012; Kavosi et al. 2018; Williams, Brown, and Healy 2018). The context in which they work mean that quality and cost decisions are made for reasons far from the ideal of rational choice (Williams, Brown, & Healy, 2018).

i. Accountability

The commissioning process of healthcare services changed in England in 2012 as competition regulations were introduced and the commissioning bodies were reorganised in the Health and Social Care Act. However, the legislative demands on commissioners were not entirely clear to those asked to fulfil them (Allen et al., 2017). Evaluating how and why private sector provision has risen since the 2012 reforms is difficult because the accountable actor is not always easy to locate and the application of the reforms not always even.

An ambiguous locale of power and accountability in the decision making of whether to outsource services to the private sector were introduced by the 2012 reforms. Allen et al. (2017) found significant differences in commissioner's interpretations of local discretion in whether competitive tendering is used or not. The ability for commissioners to decide when contracts go out to competitive tender is sometimes perceived to be determined by strict regulations and sometimes understood as conducted by commissioner discretion. This balance is interpreted differently across CCGs (clinical commissioning groups – the regional health boards in England until 2022) meaning some commissioners have more power in the decision-making process than others.

Meanwhile, Calovksi and Calnan (2020) found that commissioners tend to exercise their agency in very limited situations where there is a choice between procuring a service as opposed to working with existing providers. There are only a few situations where contracts are decommissioned and then procured competitively. Commissioners tend to avoid this process due to the logistic and financial demands of a procurement process, the underdevelopment of the health provider market, and a loyalty to the NHS Trusts (ibid.). However, Calovski and Calnan (2020) argue that these moments of choice between procurement and continuing contracts are the largest determinant of whether a private sector provider gains access to the NHS' market.

Part of the limitations of autonomy for CCGs is a result of the fragmentation of authority in the 2012 Health and Social Care Act (Checkland et al. 2018). Commissioning Support Units, Local Authorities and Public Health England have all shared some of the responsibilities of the previous Primary Care Trusts. Rather than creating a localised structure of independent actors, the power of decision-making has become flexible, diffuse and difficult for some CCGs to navigate (ibid.). Checkland et al. (2018) conclude "Thus it would seem that, whilst the idea of local organisational autonomy carries within it the promise of responsiveness and efficiency, increasingly complicated health care systems require meso-level co-ordination to ensure system integrity". The regulation applied to the role of the CCGs means that their new autonomy in the commissioning process has been hard to realise.

A second ambiguity in the commissioning process is the clarity of the strategies introduced in 2012. Allen et al. (2017) found that commissioners identified inconsistencies between 'integrated care' and 'competitive tendering'. This tension was evident in the policymaking process too. 'Integration' was added into the 2012 policy framework to water-down the competitive aspects after an original white paper produced in 2010 received heavy criticism during consultations with key interest groups (Calnan, 2020). This uncertainty in the levels of agency legally allocated to commissioners has consequences too, with several examples of commissioners receiving legal challenges when private sector providers believe they have lost contracts unfairly (Modi et al., 2018).

The diffuse organisational structures and the ambiguous legislative framework make evaluating the commissioning process difficult. The decision for whether a contract is tendered to a private provider is a result of many factors and responsibility can lie with many different actors. This complexity does not apparently function evenly across different commissioning groups either. The literature describes regulations that are not clear nor consistently interpreted, alluding to an uneven application of the regulations and potential for large inequalities in the commissioning process (Allen et al., 2017).

ii. Budget constraints, austerity and cost-efficiency

Financial demands on commissioners have been particularly severe in the last ten years within England's NHS. The NHS budget has been increasing at an annual 1.4% adjusting for inflation since 2009, considerably lower than the 3.7% average increases over its lifetime (King's Fund, 2021b). The mechanisms used to pressurise ambitious efficiency savings for providers have been to reduce increases in national tariff pricing. Meanwhile commissioners have consistently had to deal with budgets that under evaluate the expected increases in demand. This has resulted in sporadic funding increases which plug missed fiscal targets whilst impossibly demand to be invested in further efficiency gains (Gainsbury 2017a, 2021).

Commissioning budgets have increased at a rate lower than their demand since 2016 (Gainsbury, 2021). There are ways in which commissioners have been evidenced to deal with this pressure. Robertson et al. (2017a) isolate six ways that NHS organisations' responses to financial pressures directly impact on patient care. These include creating thresholds for patients to need to meet to receive treatment, delaying care and deflecting services to other parts of the system. However, one response from commissioners that the authors missed is the public tendering of NHS contracts which are both a result of financial pressures and directly effecting the quality of patient care.

Calovski and Calnan (2020) conducted an ethnography of two CCG sites to understand how commissioners came to their decisions on selecting services. In one of their sites they found large financial pressures on both the commissioners and providers that hugely affected their decision-

making. Hospital Trusts were using their near monopolies on acute care and Payment by Results contracts to secure their own financial needs which meant that one of the CCG sites were having to procure from the private market to find cheaper alternatives (ibid.). This contrasted with their other ethnographic site which experienced few financial constraints and chose to largely continue working with NHS Trusts, which was generally the preferred option. In this sense, financial constraints are as important as the legislative framework for any increases in private sector service provision in the NHS.

Financial constraints are also pivotal in the commissioning process before the decision-making stage. Checkland et al. (2018) find that financial constraints on the management of CCGs were meant to be alleviated by Commissioning Support Units. Buying in commissioning support is required rather than having the CCGs doing the work themselves (Petsoulas et al. 2014). However, in practice, CCGs are often reluctant to outsource their commissioning process to the CSUs (commissioning support units, new regional bodies introduced in 2013 to provide commissioning and procurement services to any CCG in their region) at the risk of losing important relationships, inducing higher costs and not having any agency in the process (ibid.). Financial constraints in the NHS affect both the commissioning decisions and the decision-making process. In both cases more constraint appears likely to increase the possibility of private sector involvement. Commissioning support is provided by a mixture of public and private sector bodies whilst the relationships between CCGs and national providers are considered at risk is commissioning decisions are made by less-connected CSUs (ibid.).

A systematic review of experiences working in the adult social care sector suggests that wide-scale outsourcing of services may facilitate the implementation of austerity programmes (Bach-Mortensen and Barlow 2021). Experiences of those working in the commissioning system describe how the large proportion of the market being run by independent providers was an enabler for budget cuts because defunding contracts is easier for commissioners than firing public employees. However, there is no evidence that outsourcing care services to the private sector is cost-effective (Petersen, Hjelmar, and Vrangbæk 2018). Evidence from social care services do not apply directly to the healthcare market

which is much less dominated by private sector provision but the mechanism of outsourcing contracts which are easier to subsequently cut may well exist in both service sectors.

In some ways outsourcing can be understood to be driven by budget constraints as price-competition is used by the commissioners. Equally, there is evidence to suggest that having a pre-existing mixed-market system can also enable further budget cuts that commissioners may not be able to fulfil in a public monopoly. Outsourcing, as a means of public service delivery, enables commissioners to avoid decision-making about where cuts are made. Independent providers can make decisions about cutting staff, or infrastructure, or other forms of service quality, which may be too unsavoury in publicly run organisations.

iii. Personal Relationships, Institutional Cultures, and Politics

Relationships are another influencing factor on the decisions made by commissioners. In years leading up to the Health and Social Care Act, individual personal relationships and trust between people contracting and providing healthcare were at the heart of commissioning decisions (Chambers et al. 2013; Porter et al. 2013). However, threats of decommissioning, Payment by Results contracts and the use of commissioning support units are all cited as threats to the relations between the CCGs and the health market (Allen et al., 2017; Checkland et al., 2018; Petsoulas et al., 2014). While research finds that relationships between providers and commissioners remains important for both parties, it is less clear how these relationships have changed with the introduction of more competitive tendering (Allen et al., 2017; Petsoulas et al., 2014). In the literature of commissioning in NHS England there often seems a tension between the relationships and the competitive and financially strained working conditions imposed on the health system from 2012 onwards. How this affects the decisions made and the consequent quality of service providers is unclear.

iv. Quality

Outsourcing is also done to improve the quality of the service, potentially because a private sector provider can offer access to skills or technologies without the government organisation having to make substantial investments (Kavosi et al., 2018). Qualitative research on the behaviours and experiences of commissioners find that they believe outsourcing is done when it improves the quality of services for patients (Allen et al., 2017; Calovski & Calnan, 2020). A gap in the literature is whether the information commissioners use to make decisions (eg. provider experience) is usually apt in determining the future provision of care.

While quality of care is at the front of commissioner's objectives, equity of care is often reported to be far down the list of priorities (Wenzl, McCuskee, and Mossialos 2015). This finding is exemplary of the range of priorities that commissioners must balance and how even the uncontentious aim of commissioning the highest quality of provider can be theoretically difficult let alone in practice.

Commissioners work within a complex system of personal, structural and legal pressures. The demands on them range from financial constraints in their organisations to conflicting and ambiguous legislation. Research has developed a considerable understanding of some of the experiences of commissioners looking to purchase healthcare from England's health market for the NHS. However, gaps remain about how quality and equity are taken into account in the moments when commissioners experience agency.

Competition and Cream-skimming

Outsourcing to private sector providers from an internal-market necessitates increasing the plurality of providers competing for custom from patients and commissioners - increasing competition. Competition is suggested to be a key mechanism for driving up performance and increasing the aggregate quality of services. The entry of new providers necessitates current providers to match their offering or lose out on custom. This process of financial incentive to drive performance, has been

fostered in the NHS since the creation of the internal market in 1991. Whether it is beneficial is hugely important because it represents a large part of the underlying ideals which lead to the 2012 Health and Social Care act.

A second way that the entry of new providers can effect the performance of pre-existing providers is through the selective provision of services, a practice termed 'cream-skimming'. This is theorised to usually be the selective provision of the most profitable services, which in healthcare can be the healthiest patients with the fewest complications, or the simplest procedures. Patient choice and sorting plays a role here as the case-mix of privately treated NHS patients could be different due to those which choose to be treated by private providers.

Competition and cream-skimming are two mechanisms which are important mediators of the effect of outsourcing on health outcomes for patients. It may be the case that more competition improves aggregate quality of care, including the performance of public sector providers, nullifying the 'for-profit gap'. However, the competition between public and private providers is unlikely to function as theorised and evidence of 'cream-skimming' may be one explanation why outsourcing does not result in better care.

i. Competition

Advocates of outsourcing healthcare provision to an external market of providers often do so on the grounds that it increases the competition between providers (see. Niemietz, 2015). This is contentious, and some argue that the two factors of provider ownership and competition between providers are entirely separate and should not be conflated (Hart, Shleifer, and Vishny 1996). The consequent, yet no less contentious, argument for those advocating mixed-markets is that: *if competition is increased*, all providers are forced to improve their performance (Le Grand, 2007). In terms of evaluating outsourcing, the role of competition is very important, even if theoretically competition should not justify outsourcing.

Competition, as a policy tool, has been used in the NHS over the last 40 years through the mechanisms of: patient's choice, publishing targets and increasing the numbers of providers in the market (Krachler et al., 2021). The first formal targets for NHS providers were introduced in the 1992 briefing *The Health of the Nation* which included 27 performance targets. Since then, these have been a common mechanism for governments to increase competition between providers, perhaps evidenced most clearly by the short-lived star rating system of hospitals introduced in 2001. Patient choice has also been a mechanism for competition used by consecutive Westminster governments. Examples include the introduction of the Patient's Charter in 1991 and New Labour's Any Qualified Provider policy which meant patients could choose their preferred provider for acute services. The prevailing belief of policymakers is that competition drives both efficiency and quality but the evidence is more equivocal.

The creation of the internal market in 1991 was the first-time competition between hospitals was encouraged. This competition can be approximately measured by analysing the number of providers within a certain catchment area and therefore estimates of its association with health outcomes, efficiency and equity can be made. Propper et al. (2004) use this exact method and find a positive association between the levels of competition and the number of deaths following emergency heart attack admissions. Although the authors admit time-series analysis is required in the future, they conclude that weak quality-signals in the internal market in England are likely behind their small but significant association between competition and higher death rates.

In a separate paper Propper et al. (2008a) use a difference-in-difference model to measure the effect of competition on hospital performance between 1991 and 1999. They again find that competition is associated with increases in mortality rates but also that it is associated with declines in waiting times. This finding alludes to a positive impact on the heavily observed quality outcomes (ie. waiting times) but a negative impact on quality outcomes that are poorly observed (ie. death rates). This finding supports the claims that information asymmetry could lead to providers prioritising observable outcomes over non-observable quality of care.

In 2006, competition reforms introduced patient choice and fixed hospital prices. Here too, health economists have tried to measure whether these specific forms of competition result in better quality care. During this period, research found an association between higher competition (number of hospitals within a travel area) and better quality of healthcare - in the form of lower mortality rates following emergency heart attack admissions (Bloom et al. 2015; Cooper et al. 2011; Gaynor, Moreno-Serra, and Propper 2013).

The use of econometric techniques to understand associations between competition levels and healthcare quality can give us important understandings about how the healthcare system is performing, the interpretation of these findings for policymaking, especially systemic restructuring, is much harder (Bevan and Skellern 2011). Findings about the associations between hospital density and quality of healthcare were controversially interpreted causally and cited by David Cameron justifying early versions of the Health and Social Care Act his government would go on to implement (Pollock et al. 2011). Using the evidence of associations between the number of providers and mortality rates to justify outsourcing to the private sector is a clear conflation of competition and ownership status.

Niemietz (2015) makes a comparison of the 1990s and 2000s reforms, drawing on the quantitative evidence to argue that the pro-competition reforms generally failed in the 1990s but laid the foundation for more successful patient-choice reforms in the 2000s. Niemietz (*ibid.*) then goes on to argue: "to take competition to a higher level, the market has to be moved from static competition to dynamic competition – a market with entries and exits. A strict no-bail-out clause for failing providers, alongside the right of independent sector organisations to take over insolvent providers, would go a long way towards this." Niemietz's and David Cameron's conclusions show clearly how the logic of competition within the public sector leads to the inclusion of private sector providers from a largely nationalised service.

'Competition' has been encouraged in England's NHS through different means, with research finding some positive associations and some negative associations with the quality of the care. However,

those which advocate for outsourcing to the private sector have extended the logic of competition to the private sector beyond what the evidence can suggest. Evaluations of outsourcing need to consider that 'competition' is a key mechanism theoretically claimed to improve service quality targeted by outsourcing even though many consider competition and outsourcing entirely distinct.

ii. Cream-skimming

It is suggested that in market systems, there are incentives for providers to selectively treat the most profitable patients - which are usually those which are the healthiest and are least likely to experience complications in their treatment. This 'cream skimming' (also referred to as 'cherry-picking') has been evident since the 1990s as the competition between providers was introduced into the system (Pollock 1994). However, the introduction of PFP providers creates the perfect conditions for selective treatment by the new organisations entering the market.

The 'case mix' of NHS patients treated by private and public services has been shown to differ greatly in terms of sociodemographic characteristics. Even more importantly, quantitative analysis of the introduction of independent providers in the mid-2000s suggests that cream-skimming behaviour negatively affected health outcomes in public sector providers (Cooper, Gibbons, and Skellern 2018). Cooper et al. (*ibid.*) compare outcomes in incumbent public hospitals which have an ISTC very nearby, somewhat nearby and not at all nearby. This categorisation is intended to be a proxy for the levels of competition of independent providers in the 2000s reforms. The authors find that in the hospitals with the greatest competition from independent providers, there was more post-treatment sickness and longer hospital stays that in hospitals with no, or less, competition. These findings suggest that increased competition produced a sicker case mix for the incumbent hospitals, reducing some measures of performance – even if waiting times before operations decreased.

Owusu-Frimpong et al. (2010) find that the differences extend beyond demographics to differing perceptions of healthcare: "The cohort of private healthcare users displayed a heightened sense of consumer awareness". The authors also report that "Less than one-half (48.9 per cent) of public users

do not find it easy accessing the services of medical specialists compared to the majority (65.2 per cent) of private healthcare users." (ibid.). The combination of these two findings start to draw a picture about how patients may perceive and experience the system differently depending on whether they sort into the private sector or public sector providers.

There is a difficulty in knowing how the patient sorting occurs. Each ISTC in the 2000s had an 'exclusion criteria' to refuse the patients they were not willing to admit (Mason, Street, and Verzulli 2010). While this is a clear example of 'cream skimming' it is not possible to say how much of the variation in case mix is a result of this and how much is a result of patient choice (Cooper et al., 2018).

Cream skimming was clearly evidenced in the 2000s reforms which permitted PFP providers to exclude certain demographics from their services, such as patients with higher numbers of diagnoses and procedures (indicating complex needs) as well as patients from more deprived backgrounds (Mason et al., 2010). Since then, cream skimming may have become more widespread as access to the market has become widespread. Any evaluation of outsourcing must recognise that private provision will vary for several reasons – one of which will be the selective positioning of PFP providers in areas of healthcare which are most profitable to them.

Methodology

"Corporate production in a state of mass combustion
Greed and lust and dangerous repercussions"

- Ms Lauryn Hill, *Consumerism*

Computational social science has enabled the study of society through the access to large datasets, non-traditional sources of data and computationally intensive statistical analysis. Throughout this project I built web-scrapers, parsed data from pdfs, ran simulations analysing over 12 million slight variations of a regression, published my own R package for reproducing my results, won a team data science competition and cleaned numerous datasets containing millions of observations. I have developed my R and python coding to a stage where I have become the coding life-support for dozens of postgraduate and research students in my department. The reason for building these skills is a belief that it has opened a window to analyse social phenomenon in granularity that was previously impossible.

Underlying my computational social science skills is a commitment to try and adhere to Open Science. Taking inspiration from computational social scientists who publish entire coding libraries along with data and resulting papers open access (Rahal 2018, 2019; Rahal and Mohan 2022). Each paper with empirical work in this thesis publishes their own data, with tools to reproduce analysis – links to each provided within the papers. Further, all papers produced during the thesis have been published open access. The 'methodology' aspect of this are the values and reasons behind those practices. First is to achieve transparency. Academic malpractice in quantitative research has high-profile cases. And, while publishing data is clearly not enough to prevent malpractice, it is one way to enable accountability to the results presented in research papers. The second value underlying the open science aspects of this thesis is that 'science' should be available to all. Knowledge, skills and data should not exist behind paywalls, 'available via email from the author', or with the cost of a Stata license. There is more this thesis, and I, could do to adhere to these values. Where quantitative research has to catch up with understanding researcher positionality and reflexivity; qualitative

research lags behind in terms of open science – something I aimed, but failed, to challenge by publishing the qualitative data used in paper 2.

The methods and approaches of research in this thesis borrow a positivist epistemology. Such an approach relies on the 'counting of human experience'. The reasons for this are almost entirely pragmatic and I would not wish to contend that the most valuable forms of knowledge are those crudely counted. I would also fully accept that the violence of positivist research is that it often excludes minorities, only cares for average experiences and relies on those observed by unrepresentative data collection processes. The limitations section will further expend on the weakness of this thesis along these terms. However, there are some things researchers can do to improve upon traditionally positivist research. The first is to report reflexivity, we can conduct mixed-methods research, and use our positivist findings to motivate further qualitative research. This research does all three of those practices in order to acknowledge that experiences are not well counted, and the manipulation of those counts is not a neutral act.

My positionality as a researcher, in terms of my status, values and relationships has shaped how this thesis has been constructed and the outcomes it has achieved. I started the process as a socio-economically, nationally, and culturally privileged researcher. I am one of a few people in my research community for whom racialised and exclusionary migration policies are not applied. This meant that, within 10 months of starting the program the first chapter of this thesis was prepared – a paper which has likely built a platform for the rest of my career. Specifically, I wrote the code to clean and analyse the data for the first paper mostly sat on a comfortable sofa whilst 'locked down' due to COVID-19. For many this was a period of extreme personal burden, for me it was an emotionally difficult but practically very simple experience. Throughout the writing of this thesis, my status within academia, the department I work in and the community of researchers I work with has grown. I write and speak with confidence, feel entitled to positions of authority in academia, and take many career opportunities which are offered to me. This level of confidence and status is a direct response to the

structural barriers which almost always function in my favour and has enabled me to complete this thesis on time, without personal sacrifices, and with freedom to work as I want.

My political attitude towards privatisation started as thinking that profit-making from public services was 'probably immoral'. I believed in social democratic principles and opposed the seeping of capitalist demands into vital services – but mostly out of principle and political values. This undoubtedly shaped the kinds of research questions I asked. I was interested in the impact on quality of care and open to the idea that privatisation likely worsened healthcare. A different thesis might have studied the impact on 'efficiencies' or simply focused on the failings within the public sector. While I believe it would be difficult to defend a thesis claiming that NHS privatisation 'saves lives' whilst adhering to scientific principles – I do think some more positive conclusions could also be reached with integrity to data and scientific processes if someone started from a different political standpoint.

My politics have also changed through this process, impacting how I write about privatisation. I still consider profit-motives immoral but now also consider it 'probably dangerous'. I feel much more comfortable advocating for nationalised services as I think that, on average, privatised services deliver worse care, exploit patients, and can result in the most profound of personal losses. This means that, for example, in the fourth paper I write some strong claims about the dangers of outsourcing – something I would have been shyer of at the start of the process. However, I am also much more aware of the potential dangers in heralding a public service. Given the structural violence performed by the state and experienced through services, like the NHS, which reflect colonial histories, socioeconomic exclusion, and patriarchal structures (Cowan 2021; Sowemimo 2023). And so, my current positionality in terms of political values is as though I'm cycling on the left in a right-sided driving world. I have a, perhaps healthy, but unsatisfactory position where I oppose privatisation and oppose the inequalities which are entrenched in a state-run service where the state is patriarchal, capitalist, and colonial.

Methods

"Let's see how many… they kill in cold blood
In the name of a traditional mandate."

- Sa-Roc, *Kali's Sword*

Each paper deploys their own research methods, quantitative and qualitative, which are detailed within the papers. In this section I will not repeat those but rather discuss on some of the research methods deployed across the whole thesis and some processes which may not traditionally be considered a 'research method' but were important to the process through which this thesis was conceived.

None of the individual papers are 'mixed-methods' in this thesis, but the project is designed as a mixed methods piece of research. The quantitative work in paper 1 informed the case selection for paper 2 – as I took extreme cases to understand some of the potential omitted variable bias in the relationship between privatisation and quality of care (Seawright 2016). The qualitative data in paper 2 informed a test for generalisability in paper 3 of one of the raised concerns – levels of central government funding. And the work in this thesis has created the basis for further grant bids to identify health inequalities as well as experiences of privatised services which I have submitted to several UK funding bodies.

As a social policy researcher, I am committed to the disciplinary departure point that policies matter, they impact lives, and that they can be improved – or worsened. Consequently, I took considered steps to make sure the thesis is informed by the policy debates and that the work that has already been published has had policy impact. I have written numerous public-facing pieces on NHS privatisation beyond the articles in this thesis, I have spoken to national media outlets, on political platforms, to mass rallies and to important stakeholders (Goodair 2023; Goodair and Reeves 2022a, 2024a; We Own It 2023). Whilst the formatting requirements of a thesis do not well allow for the impact-outputs to be included, they were an important part of the work I conducted and should be acknowledged as part of the process.

A large 'method' deployed in the creation of this thesis was that of community-building and collaboration. Not in the sense of participatory research methods, but rather within the academic community I located myself. One way this was done was by working hard to develop supportive and inclusive research community within the PhD programme I was enrolled. This thesis is directly a product of the labour of others building this community and the reciprocation I attempted. Technical skills, creative processes and logistical demands were all supported and achieved thanks to the community I had built and benefited from others building. At several times in my past, I have been concerned that academic processes can be isolating, I feel more confident than ever that this is not necessary and that the best work in academia is a product of deep collaboration.

Another way which this thesis is the result of collaboration is that I spent more than 2 years also working on a separate project identifying the impacts of privatisation in children's social care services in England. This has resulted in measurable outcomes of three published papers, two more under review, and a grant on which I'm now employed (Bach-Mortensen, Goodair, and Barlow 2022b, 2023; Bach-Mortensen, Goodair, and Esposti 2024; Nuffield Foundation 2023). Moreover, the work in this thesis has a lot to thank for that collaboration in terms of developing my thinking, my working practices, my emotional wellbeing, and my financial wellbeing. Working with Anders was – and fortunately still is - such a personally and professionally positive experience and the work of this thesis would be infinitely poorer without that collaboration.

A final 'method' applied was a sense of personal fun, enjoyment, and light-heartedness in some of the processes involved in producing the thesis. Be it the several graphs I embroidered by hand, the R-based poems written on the community whiteboard, or the accompanying Spotify playlist which has been constructed to be consumed alongside this thesis (https://open.spotify.com/playlist/4LxC3SgFLlhCBOkvmK4jt2?si=fc7278b6281b4816). A PhD can be an emotionally consuming and dramatic process. I have worked very hard to emotionally detach myself from the outcomes of the work and to enjoy the process instead. The result is, I hope, a

sustainable working ethos and a happy researcher who is always excited for the next day's work. After all, it's only a 9 to 5 which pays the bills.

Papers

"I make monopolies out of property
Never shot a gun nor killed anyone myself
But billions die cos of me"

- Akala, *The Thieves Banquet*

Paper 1: Outsourcing health-care services to the private sector and treatable mortality rates in England, 2013–20: an observational study of NHS privatisation

Benjamin Goodair and Aaron Reeves

Abstract

Background: The effects of outsourcing health services to for-profit providers are contested, with some arguing that introducing such providers will improve performance through additional competition while others worry that this will lead to cost-cutting and poorer outcomes for patients. In this paper, we aim to examine this debate through empirically evaluating the impact of the Health and Social Care Act of 2012 on treatable mortality rates, and, therefore, with quality of healthcare.

Methods: We utilize an entirely novel database composed of parse-able procurement contracts between April 2013 and February 2020 (n = 645,674, value > £25,000, total value = £204.1bn) across 173 of England's Clinical Commissioning Groups (regional health boards). The data is compiled from 12,709 heterogenous expenditure files primarily scraped from commissioner websites with supplier names matched to registers identifying them as NHS organisations, companies, or charities. We supplement this data with rates of local mortality from causes which should be treatable by medical intervention indicating the quality of healthcare services. We estimate multivariate longitudinal regression models with CCG-level fixed effects analysing the effects of for-profit outsourcing on treatable mortality rates in the following year. We use the average marginal effects to estimate total additional deaths attributable to changes in for-profit outsourcing. We provide alternative model specifications to test the robustness of our findings, match on background characteristics, examine the potential impact of measurement error and adjust for possible confounding factors such as population demographics, total CCG expenditure and Local Authority expenditure.

Findings: An annual increase of one percentage point of outsourcing to the private for-profit sector corresponds with an annual increase in treatable mortality of 0.38% or 0.29 deaths per 100,000 population (95% CI 0·15% to 0·62%; p= 0.0055) in the following year. This finding is robust to matching on background characteristics, adjusting for possible confounding factors, and measurement error in our data set. Changes to for-profit outsourcing since 2014 can be associated with an additional 557 treatable deaths (95% CI = 153-961). Interpretation: The privatisation of England's NHS, through the outsourcing of services to for-profit companies, consistently increased in the period 2013 to 2020. Private sector outsourcing corresponds with a decline in the quality of healthcare services, resulting in statistically significantly increased rates of treatable mortality.

Introduction

In 2012, the Health and Social Care Act intensified pressures on the NHS to outsource service provision from state-owned provides to private for-profit providers, but in so doing created concerns that this would undermine the quality of care. England's NHS has long mixed private and public provision. Since 1991, it's two-tier system, which consists of a private health sector serving a minority of the population and a National Health Service serving the majority, was blended with the introduction of an internal market for the NHS , constituting of NHS purchasing bodies which contract services from a mixed pool of NHS-owned, for-profit, and non-profit providers, all of which serve NHS patients. Some services have remained predominantly delivered by NHS providers, but some services have been largely shifted towards a 'mixed market' or mostly by independent providers. Facilities management and some ancillary services were quick to be 'contracted-out' to the private sector in the 80s and 90s – impacting the quality of these services (Elkomy, Cookson, and Jones 2019; Goodwin and Pinch 1995). Whereas mid-2000s reforms centred patient choice by introducing a 'consumer market' which increased the use of private finance and independent sector treatment centres (Gingrich 2011).

The 2012 reforms deepened competition regulation outlawing anti-competitive behaviour by commissioners with the aim of opening up the market so that more NHS services could be delivered

by non-NHS providers (Krachler and Greer 2015; Sanderson, Allen, and Osipovic 2017). This made it virtually compulsory to outsource, or at least impossible to ensure contracts remained in the NHS (Pollock et al. 2012). The specifics of these reforms are outlined in secondary legislation, 'the Procurement, Patient Choice and Competition Regulations No. 2 (2013)', which directly ruled against any commissioning priority based on ownership status – meaning NHS providers could not be preferred to for-profit organisations by legal right.

The ensuing period of for-profit outsourcing from England's NHS has coincided with a worsening trend in some indicators of healthcare quality. Treatable mortality rates have stagnated since 2013, breaking from a trend of decline over the previous 10 years and leaving England with mortality rates which compare poorly to other high-income countries (The Nuffield Trust 2018). Similarly, increases in waiting times and decreased patient satisfaction suggest the service is failing to maintain standards of care (Green et al. 2017; Honeyford et al. 2017). While austerity measures have almost certainly played a role, we examine whether outsourcing to for-profit companies has contributed to this increase in treatable mortality (Alexiou et al. 2021; Watkins et al. 2017).

This rise in treatable mortality potentially confirms the worries of those who were sceptical that outsourcing to independent healthcare providers would incentivise providers to introduce innovative practices and improve overall performance (Pollock and Price 2011). This has occurred in other countries, such as when mortality rates rose in Italy following a period of privatisation, and in other parts of the healthcare service, such as when cleaning services were outsourced in the NHS (Quercioli et al. 2013a; Toffolutti et al. 2017a).

Why might for-profit outsourcing be related with aggregate treatable mortality? One theory is that cost-cutting behaviours in for-profit providers means that having higher shares of for-profit providers will lead to worse healthcare quality and worse health outcomes (Kunz et al., 2020). Another key dynamic is the different case-mixes often evidenced in for-profit and public providers – a result of

'cream-skimming' and concentrating the most complicated cases in public providers which have no extra staff or funding to compensate (Beckert and Kelly 2021a).

But the evidence on the impact of 'creeping privatisation' in general and in England's NHS specifically remains uncertain. In general, these findings are often inconclusive in that they do not analyse the aggregate effect of outsourcing on service-wide performance (Chard et al. 2011; Pérotin et al. 2013). Moreover, such comparisons between for-profit and not-for profit providers are often inappropriate because the case-mixes of private and public services are quite different.

The 2012 reorganisation created new bodies for NHS health-procurement: Clinical Commissioning Groups (CCGs), these replaced the old Primary Care Trusts with responsibility for public health services transferred to LA responsibility. CCGs were also individually required to publish their expenditure data which produced discrepancies in the location and availability of commissioning expenditure which has made the evaluation of outsourcing previously unfeasible.

In this paper, we examine the impact on treatable mortality of increased outsourcing to private for-profit providers from England's CCGs during the period immediately following the implementation of the 2012 Health and Social Care Act. To do this, we draw on an entirely novel data set which brings together every reported financial transaction between CCGs and private healthcare provides across 173 CCGs. This data allows us to conduct, to our knowledge, the first empirical evaluation of one of the most controversial reforms in England's recent history.

Methods

The biggest challenge preventing evaluation of outsourcing from England's NHS until now has been the lack of a harmonized data resource suitable for analysis. We utilize an entirely novel database compiling parse-able procurement expenditures between 2013 and 2020 (n = 645,674, value > £25,000, total value = £204.1bn). This allowed us to analyse the impacts of for-profit outsourcing in

unprecedented detail, conducting the first robust empirical assessment of for-profit outsourcing from the NHS following the 2012 Health and Social Care Act.

Data Collection

Procurement expenditures were collected using web-scraping tools sourced from each CCG's website. In total 12,709 data files containing CCG expenditures were downloaded, parsed and cleaned. The names of suppliers in these files were then matched to names in the Companies House Register, Central Register of Charities and NHS Digital using algorithmic reconciliation of the names of suppliers. Full detail of the curation process along with access to the underlying raw data is available from Rahal and Mohan (Rahal and Mohan 2022). The method builds on recent progress to scrape, parse and merge disaggregated public payments datasets making them accessible data resources with many applications in research and policy (Rahal 2018, 2019).

The response variable used in this research is our measure for healthcare quality, 'treatable mortality'. This is defined as: "deaths that can be mainly avoided through timely and effective healthcare interventions, including secondary prevention and treatment" (ONS 2021a).

According to the ONS: "Treatable mortality measures the effectiveness of timely healthcare interventions, including secondary prevention and treatment" (ibid.). This measure is an age-standardised rate of mortality per 100,000 population for specific causes of death – a full list of causes considered 'treatable' can be found in the supplementary material (Appendix 1, S.24). However, CCGs represent GP patients through membership – rather than representing a geographic population. Consequently, this measure is an approximate measure of population outcomes in the same area rather than precise outcomes for patients using CCG patients.

The explanatory variable of interest is a measure of 'outsourcing' which can be defined as: 'Commissioning expenditure which is received by for-profit companies as a percent of total expenditure'. This value excludes expenditure received by private non-profit organisations – all those

registered to the Central register of Charities – as we are specifically interested in the aggregate effects of outsourcing to providers which have profit-maximisation incentives.

Data was collected on all live English CCGs as of 2019. Of the full 191 sample, 173 provided at least some machine-readable data between 2013 and 2020, although most of those have years missing due to mergers or missing periods in data publication (see Appendix 1, S.21 for full description of missing data, S.22 for a table listing all study variables and summary statistics, S.23 for full locations of the data as well as a discussion of the data limitations).

Statistical Analysis

We ran fixed effects and first differences regression models on the association between outsourcing and treatable mortality, these models will control for all time invariant confounders at the regional level. We also ran our fixed effects model using covariate-balancing with propensity scores based on treatable mortality rates at the beginning of the time-series and the total number of General Practitioners in each CCG. Covariate balancing is an advanced matching method which can weight values to balance the model, accounting for differences in observations according to their value of a continuous treatment variable, in this case for-profit outsourcing (Imai and Ratkovic 2014). These analyses are all reported using cluster-robust standard errors with small-n adjustments (Pustejovsky and Tipton 2018). Finally, we conducted a multi-level random intercepts model, clustering local authority mortality rates within their geographically overlapping CCGs allowing the intercept to vary for each cluster to see whether CCG outsourcing explains mortality rates in their relative Local Authorities.

We also conduct analysis with two alternative response variables, raw numbers of treatable deaths and 'preventable mortality'. We use the average marginal effects from the former to predict how many extra deaths are attributable to increases in outsourcing since 2013 and plot a trend line of mortality were outsourcing to have remained constant since 2014. To check whether our results are

finding a relationship between outsourcing and some alternative cause of health outcomes, such as changes in social determinants of health, we also run our regressions on 'preventable mortality'- mortality due to causes which we would expect public health interventions to prevent and not necessarily treatable by the primary, acute or community health services funded by the CCGs (table S.9, in Appendix 1).

Sensitivity Analysis

Our analysis is run on novel data which has been produced using web scraping and algorithmic matching of contracts published in nonuniform formats. Despite multiple manual data verification checks, it is probable that a small amount of error exists in our outsourcing observations. To check whether potential error in the contract data influences our inferences, we synthetically replicate the effect of error on our findings. By running the regression results 50,000 times, each time multiplying the outsourcing values by random numbers we simulate how random error may impact the study's findings.

To account for potential bias in the main result from the choice of covariates in the model, we present a specification curve in Appendix 1 which is combined with the random error loops (figure S.11.-S.12). Finally, we sequentially dropped each CCG from our fixed effects model to test whether any individual CCG is driving a substantial amount of the average effect size (Appendix 1, S.10).

The funder had no influence on data collection, analysis, interpretation, writing of the manuscript and the decision to submit.

Results

It is openly debated as to whether the outsourcing of NHS contracts to private sector providers has increased since the introduction of the 2012 Health and Social Care Act, with many claiming that there is not enough granular data to know the changes in outsourcing (The King's Fund 2022a). We find statistically significant increases in for-profit outsourcing between 2013 and 2020 (see Appendix 1,

s.14.1). Figure 1 displays the changes in outsourcing since the beginning of our data in April 2013. Panel A uses a 365-day rolling average of total commissioning expenditure that is received by for-profit companies. It shows that overall levels of outsourcing to for-profit providers has consistently increased since 2013, rising to over 6% of total commissioner spend in England by 2020 (£323m/£4,999m for the first three months of 2020). It also shows that the majority of this outsourcing is received by healthcare companies, as defined by businesses with standard industrial classification divisions of 'human health activities' (ONS 2021b).

Panel B in Figure 1 explores these classifications further, showing the percentage increase for the ten most highly procured industries. Relative to their outsourcing between 2013-14, the largest increases are seen in spending on business support and IT support, with consistent increases in spend on healthcare businesses, social work, and transport companies. Panel C shows that the level of for-profit outsourcing can vary considerably by commissioner. Compare, for instance, East Berkshire CCG with Nottingham City CCG – both spending a total of £2.3bn on services between 2013 and 2020. East Berkshire spends around 2% on private companies – which is a total of £46m worth of outsourced contracts, however, Nottingham City, with its heavy use of the CityCare partnership, outsources over 20%, aggregating to over £450m. Counter to some claims, outsourcing from England's NHS commissioners to for-profit companies has steadily increased since 2013, with a total of £11.5bn worth of outsourced contracts received by for-profits between 2013-2020.

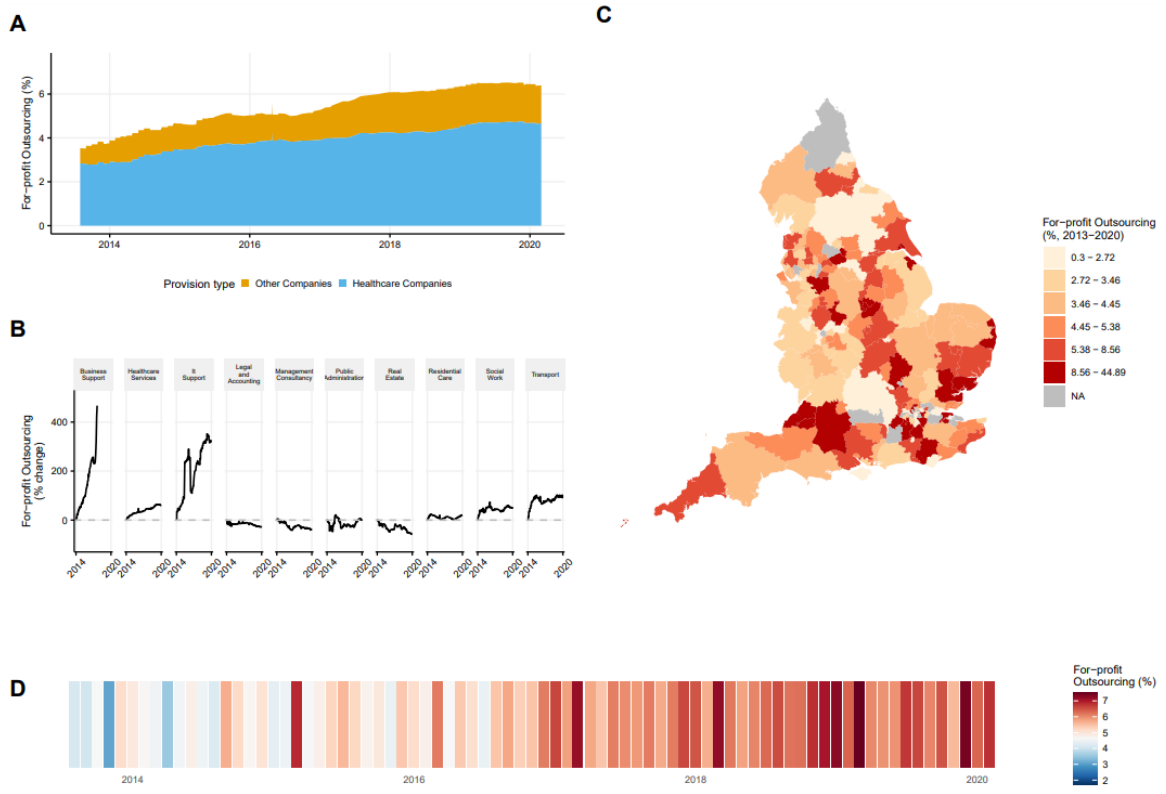


Figure 1: Levels of CCG outsourcing to for-profit organisations. Panel A reports the rolling percent of total spend on healthcare and other for-profits. Panel B shows the percentage change in the percent of total spend received by companies in different industrial sectors – based at zero for each sector's 2013-14 levels. Panel C shows total for-profit outsourcing over the entire time series for each CCG. Panel D represents the levels of for-profit outsourcing across all CCGs each month

Table 1 displays the main results from our statistical analysis assessing the relationship between outsourcing and mortality rates. Table 1 displays the results from a linear, two-way, fixed effects model, a first-differences model, two linear two-way fixed effects models with covariate balancing for the number of active GPs (1), and for treatable mortality rates in 2013 (2), and a multi-level model effects model regressing CCG outsourcing against Local Authority treatable mortality rates. The response variable is a log transformation of treatable mortality rates, and all models control for demographic characteristics (see Appendix 1, S.1, for full models).

We find in the fixed effects model that: an annual increase of one percentage point of outsourcing to the private sector is associated with an annual increase in treatable mortality of 0.38% or 0.29 deaths per 100,000 population (95% CI 0·22% to 0·55%; p= 0.0016) in the following year (See Appendix 1, S.3, for model without log-transformed mortality rates calculating absolute effect size). In each model we

find comparable effect sizes with statistically significant, positive associations between increases in outsourcing and increases in treatable mortality in the following year.

	Fixed Effects		First Differences		Covariate Balancing (1)		Covariate Balancing (2)		Multi-Level Model	
	ln. Treatable Mortality [95% ci]	p-value	ln. Treatable Mortality [95% ci]	p-value	ln. Treatable Mortality [95% ci]	p-value	ln. Treatable Mortality [95% ci]	p-value	ln. Treatable Mortality [95% ci]	p-value
For-profit Outsourcing (%)	0.0038 [0.0022, 0.0054]	0.0016	0.0046 [0.0030, 0.0062]	0.0005	0.0037 [0.0019, 0.0055]	0.0041	0.0039 [0.0021, 0.0057]	0.0028	0.0026 [0.0003, 0.0050]	0.0292
LA Spend (£000s per person)	0.0039 [-0.0364, 0.0442]	0.8612	-0.0023 [-0.0499, 0.0453]	0.9320	-0.0017 [-0.1252, 0.1218]	0.9793	-0.0054 [-0.1263, 0.1156]	0.9325	0.0202 [-0.0129, 0.0533]	0.2311
Total CCG Spend (£Ms)	0.0004 [-0.0009, 0.0016]	0.5809	0.0008 [-0.0007, 0.0022]	0.3162	0.0002 [-0.0011, 0.0014]	0.8010	0.0000 [-0.0012, 0.0011]	0.9378	-0.0001 [-0.0003, 0.0001]	0.4807
Population Size	0.4502 [-0.7243, 1.6247]	0.4619	0.7529 [-0.9707, 2.4764]	0.4026	0.5507 [-0.5896, 1.6911]	0.3541	0.6969 [-0.3965, 1.7903]	0.2240	0.0168 [-0.0176, 0.0512]	0.3384
Average Disposable H.hold Income	-0.1626 [-0.6383, 0.3130]	0.5098	0.3481 [-0.1463, 0.8424]	0.1821	-0.1546 [-0.7073, 0.3981]	0.5871	-0.1042 [-0.6509, 0.4424]	0.7108	-0.3634 [-0.4510, -0.2758]	0.0000
Num.Obs.	609	609	450	450	517	517	553	553	534	534
R2	0.040	0.040	0.048	0.048	0.896	0.896	0.893	0.893		
R2 Cond.									0.813	0.813
AIC					-1145.2	-1145.2	-1230.2	-1230.2	-962.6	-962.6
BIC					-516.4	-516.4	-552.7	-552.7	-894.1	-894.1
ICC									0.3	0.3
Log.Lik.					720.576	720.576	772.087	772.087		
F					21.720	21.720	21.468	21.468		
CCG Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographic Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table reports results from multivariate longitudinal regression models.

Outsourcing, LA Spend, and CCG Spend have a one year lag.

Tr. Mortality, Population and Income are log transformed, "Ln" denotes the natural log of outcome variable.

For full model expressions see supplementary material (S.2,p.4)

Robust Ses are clustered at CCG level and use a bias-reduced linearization estimator (CR2)

Satterthwaite degrees of freedom used in MLM

Demographic Control variables include: Degree education (%), Managerail or professional occupation (%), Ethnic minority (%), Unemployment rate (%) and Claimant Rate (%)

Table 1: Outsourcing and treatable mortality.

In table 1, the covariate-balancing models use non-parametric method with propensity scores (Imai and Ratkovic 2014). This weights the fixed effects model based on the number of active GPs (1) and treatable mortality rates in 2013 (2). The reason for running this analysis is to balance our model for the 'amount of health services' and the starting levels of the quality of healthcare services relatively. Results are robust to model specification, including full matching, choice of covariates and removing any individual CCG from the data (see Appendix 1, S.10.,S.11.,S.13).

Since 2013, the annual numbers of treatable deaths in England has increased, breaking the trend of decreasing mortality for the previous ten years. To calculate how much the increase in deaths is explained by outsourcing, we conducted a fixed effects regression on the absolute number of treatable deaths with the total spend on the private sector as the explanatory variable (Appendix 1, S.7). We find statistically significant positive associations: an additional £million spent on for-profit companies corresponds with average increases of 0.32 deaths for CCGs in the following year (p=0.0123, 95% CI = 0.07-0.57). Between 2014 and 2019 there were total yearly increases of £927m spent on for-profit providers. Using the changes in for-profit spend and observed changes in treatable deaths for each CCG, we calculate that 557 additional deaths (95% CI = 153-961) can be attributed to changes in private-sector outsourcing.

Figure 2 displays the changes in total treatable deaths since 2008. For the 83 CCGs which we have 5 years of consistent data, we can plot the observed total deaths before and after the introduction of the healthcare reforms in April 2013 and an expected trend had there been no change in outsourcing from 2014. Figure 2 shows that a considerable fraction of the increases in overall treatable mortality since 2013 can be attributed to the outsourcing of services to the private sector.

We conduct two analyses to test whether healthcare quality is determining this relationship. Firstly, we assess which types of outsourcing are associated with increases in mortality. We find that outsourcing to for-profit healthcare companies is the only type of outsourcing associated with increasing mortality suggesting that our results may be explained by the quality of service delivered by these companies (Appendix 1, S.4). Importantly, we also conducted our analysis changing the response variable from treatable mortality to 'preventable mortality' (Appendix 1, S.9). Preventable mortality are deaths that can be mainly avoided through effective public health interventions – not medical interventions – and should therefore be less related to quality of healthcare services. We find no statistically significant association between outsourcing and preventable mortality rates. Therefore, we can be more confident that our observed relationship between outsourcing and

treatable mortality is not a product of general health outcomes in the population but is more directly associated the quality of healthcare services.

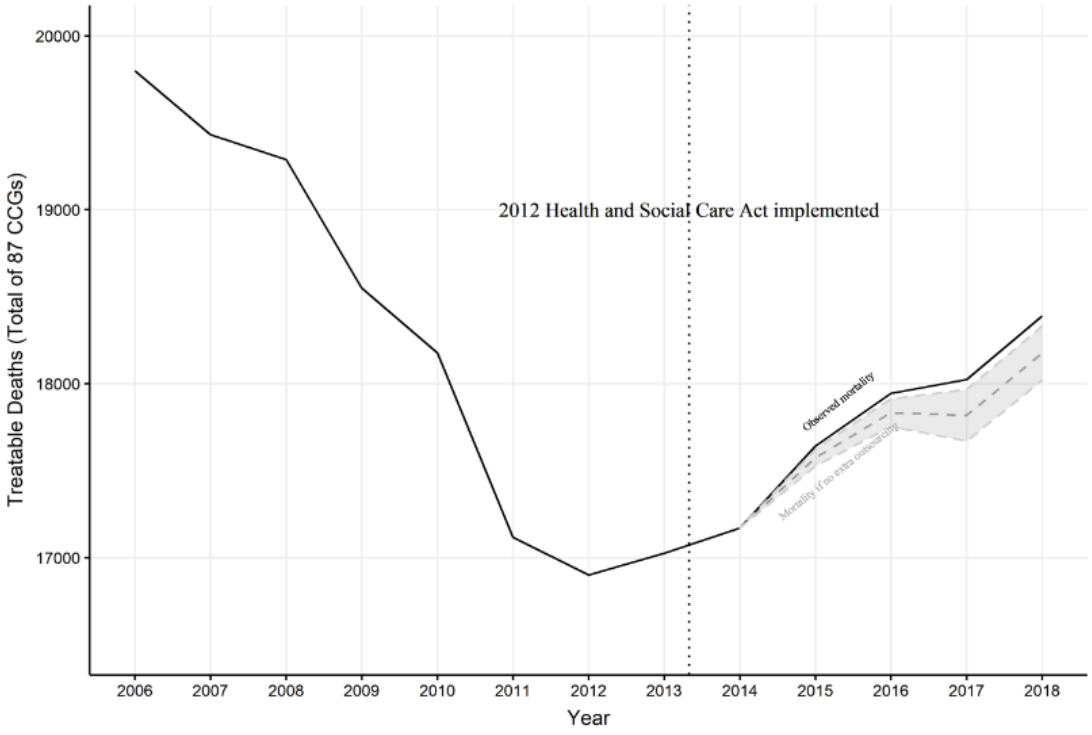


Figure 2: Treatable deaths since 2008. Dashed grey line represents expected number of deaths if there had been no change to outsourcing since 2014. The expected trend line is constructed by subtracting the calculated additional deaths attributed to outsourcing for each CCG each year from the previous years' synthetic death count adding observed changes of the numbers of deaths. Data trimmed to 2018 to maintain as many CCGs as possible as they need full observations of all variables for each year. Version up to 2019 available in supplementary material (S.8, p.12)

Figure 3 displays a sensitivity check to account for any potential error in the contract data. To be confident that our main finding is robust, we tested whether random error in the data would vary the finding substantially. We ran the linear fixed-effects model (Table 1, model 1) 10,000 times but multiplied each observation for outsourcing by a random number with a specified minimum and maximum limit. We then repeated this five times with different maximum error sizes, the largest of which was 50% (replicated by multiplying each value by a random number between 0.5 and 1.5) – far larger than we would expect to exist in the data. We then plotted the density of the resulting coefficients for outsourcing in each regression.

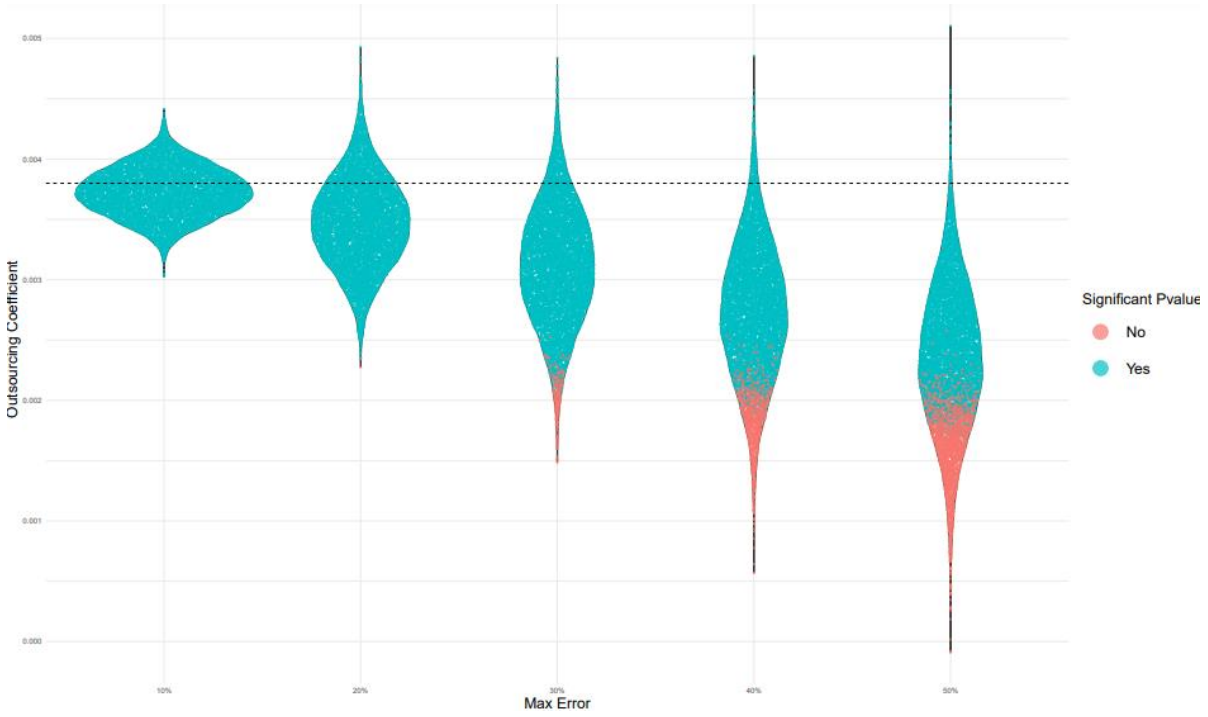


Figure 3: Synthetic random error. Plot shows the density of the coefficient for outsourcing on treatable mortality when running the regression 10,000 times with five different levels of random error.

Figure 3 shows that if the outsourcing data contains random error up to 10% of the magnitude of the values, we could expect our effect size of outsourcing on treatable mortality to vary from between 0.0030 to 0.0045. As the random error increases in magnitude we see an expected shift in the modal coefficient size towards zero and a wider distribution of coefficient sizes. However, even given very large levels of random error in the data, our finding is still comparable – in that the association between outsourcing and treatable mortality is almost always positive and trends close to our observed coefficient size of 0.004 and, in the majority of cases, is statistically significant.

In Appendix 1 (S.11.-S.12) we display how figure 2 combines with a specification curve. All possible specifications report comparable findings with positive associations between outsourcing and treatable mortality. Finally, we run the linear fixed effects regression (Table 1, model 1) 173 times, removing a different individual CCG on each loop (see Appendix 1, S.10). This was done to check whether any single CCG was primarily driving our overall result. We find that all regressions return a

statistically significant, positive result we can therefore be confident that our result is not considerably biased by any single CCG.

Discussion

The levels of outsourcing to for-profit healthcare providers from England's NHS commissioners has increased considerably since 2013, raising to over 6% of the total reported expenditure in 2020 - £323m out of £4,999m went to for-profit companies in the first three months of 2020. Using a novel dataset based on procurement contracts for 173 CCGs, we find that increases in outsourcing from CCGs in England are associated with a worsening in the quality of healthcare services, measured by higher mortality rates.

Since reforms to England's NHS in 2012, some measures of healthcare quality, as well as population health, have been worsening (Fransham and Dorling 2017). Many have attributed these phenomena to austerity policies, leaving public services underfunded and having direct consequences on the social determinants of health through welfare cuts (Alexiou et al. 2021; Watkins et al. 2017). We suggest in this paper that outsourcing to for-profit companies is another way that the reforms of the post-financial crisis era have impacted NHS service quality and mortality rates. However, with outsourcing being used as a mechanism for further austerity in some policy contexts, the relationship in healthcare deserves further attention (Bach-Mortensen and Barlow 2021).

The 'marketisation' of healthcare services is underpinned by beliefs that openness, competition and management autonomy can improve the efficiency and performance of state-funded services (Krachler, Greer, and Umney 2022). For decades these principles have dictated the organisation of England's NHS (Pollock 2005). However, our results find that these processes, manifesting in the outsourcing of healthcare provision, are not associated with improvements in service provision, and almost certainly have reduced quality, leading to increased deaths among patients.

There are two primary ways that outsourcing to for-profit providers may lead to increased mortality. First, the private providers receiving NHS contracts could simply be delivering worse quality care resulting in more health complications and deaths. For-profit providers tend to cut costs more than public providers – this can be through staff numbers and qualification levels or adherence to guidelines for correct medical processes (Chard et al. 2011). However, recent evidence finds no significant difference in the rate of deaths from surgeries in private and public hospitals in England – even if selection effects make this estimation difficult (Crothers et al. 2022a). The delivery of NHS surgeries by for-profit companies may be conducted under more stringent conditions than when done by NHS providers, however evidence is yet to find differences in health outcomes for those treated in NHS and for-profit providers.

A second reason for the Increased mortality rates could be that outsourcing leads to intensified pressure across the whole health system. Outsourcing can increase pressure on the wider system if profitable patients and services are 'cream-skimmed' by for-profit providers creating a concentration of difficult treatments in public providers – as was witnessed in the NHS outsourcing to private hospitals during the 2000s (Beckert and Kelly 2021a). Equally, increased competition for contracts could result in healthcare providers prioritising easily quantified outcomes such as waiting times at the expense of quality of care resulting in higher patient mortality – as identified in the NHS after the pro-market reforms during the 1990s (Propper, Burgess, and Gossage 2008b). The fact that we focus on a measure of healthcare service performance and that we found no association when using a measure of mortality from causes that are treated by public health interventions, suggests the overarching explanation is an aggregate decline in quality of care. At the same time, more research is needed, to unpack the precise mechanisms of worsening care in England since 2013, including assessing how private providers contribute to quality and safety data and systems of accountability. Another future avenue of research is the impact of outsourcing on health inequalities, perhaps at the neighbourhood level and thinking qualitatively about healthcare access.

These results have implications for the NHS privatisation debate, suggesting that for-profit provision of care services could be associated with worse population outcomes. In the case of England's NHS, our research raises doubts that the current extent of private sector use is optimal for the quality of care and suggests that further increases in for-profit provision would be a mistake. However, given the trends in the data, a change in direction and expansion in public sector provision seems unlikely without significant political intervention.

The findings of this research are timely as new commissioning structures (Integrated Care Boards) are about to replace CCGs entirely and, as in 2013, redraw the NHS' market. This creates a moment where once again the role of the private sector within England's NHS must be scrutinised. This historical analysis is also important given that, with only 42 Integrated Care Boards replacing CCGs, such an analysis will not be possible in the future as local variation and accountability will be lost. To the authors' knowledge, this is the first rigorous assessment of the relationship between private-sector outsourcing and the quality of healthcare provision following the 2012 reforms to England's National Health Service. It indicates that these reforms, encouraging private sector provision, have coincided with a worsening in the quality of care and additional treatable deaths.

Limitations of this study include the length of time the data is available for, given the creation of CCGs in 2013, considerable mergers made at the beginning of 2020 and no legal requirement for their predecessors to publish expenditure data, this limits our ability to measure outsourcing before 2013 precisely or conduct before/after analyses. The associational nature of our findings cannot rule out the possibility of residual confounding, consequently our findings should not be interpreted as necessarily evidencing a causal relationship between outsourcing and mortality rates. The expenditure data does not contain information on the specific services provided by the supplier, as such there remains further research needed to distinguish if some acute services are primarily causing the relationship we observe.

Similarly, the methods used in this paper do not rule out the possibility of reverse causality. However, we took several steps to test whether our results are likely a result of privatisation being driven by poor health rather than the other way around. First, we balanced our results on the mortality rates at the start of the period studied – so that if unhealthy places privatised differently, we would account for that by matching places against similar levels of treatable mortality in 2013. We also checked whether our results were picking up the relationship between areas privatising as general health declines – but we found no relationship with preventable mortality, making us more confident this was not the case. Future research should attempt to identify a longer period of analysis so that cross-lagged methods can be used to identify accurately the different directions this relationship works in.

Since the passing of the 2012 Health and Social Care Act in England, for-profit companies are providing an increasingly large share of NHS services. Concerns about the quality of care provided by for-profit companies appear to be justified as outsourcing is associated with higher rates of mortality from causes which could be treated by effective medical interventions.

Data Sharing Statement:

The extensive code library which accompanies this work can be found at https://github.com/BenGoodair/CCG-Outsourcing . We used R [Version 4.1.1] for all our analyses. The data that support the findings of this study are all publicly available, replication materials all available at https://github.com/BenGoodair/CCG-Outsourcing. Locations of raw data is detailed in Appendix 1, S.23, CCG expenditure data available from Rahal and Mohan (2022).

Paper 2: 'Accident and Emergency'? Exploring the reasons for increased privatisation in England's NHS.

Benjamin Goodair

Abstract

England's NHS is experiencing 'creeping privatisation' as services are increasingly being delivered by private healthcare providers. This has led to concerns about the supposed benefit of this process on healthcare quality. In-depth semi-structured interviews with 20 people involved in the commissioning process, sampled from 3 commissioning sites (regional health boards) are thematically analysed. Five key themes of reasons for outsourcing were identified: unmet need; the "choice agenda"; limited NHS capital; appetite for change amongst key individuals working at the commissioning body; and the impact of financial pressures. A new type of 'uncontrolled outsourcing' is defined to explain instances of privatisation in England's NHS. The study concludes that the experience of commissioners navigating the provision of healthcare with worsening social determinants of health and financial austerity means that decisions to use private providers based on anticipated quality are sometimes but not always possible – sometimes they constitute 'accidents', sometimes 'emergencies'.

Introduction

England's National Health Service has observed a 20-year period of privatisation through increases in outsourcing of healthcare provision to the private sector. Services are still funded by the NHS, paid largely out of general taxation and, mostly, free at the point of use – but delivered by a private company. Consecutive UK Governments have introduced national regulation to radically empower private companies to deliver treatments instead of NHS providers. In theory, the NHS is designed so that new private providers enter the 'market' once they are actively selected as the best quality alternative to provide healthcare – either through patients choosing their preferred provider or through the commissioning of services by regional health boards (named Clinical Commissioning Groups, CCGs, at time of research). This kind of state-funded and mix of public and privately-provided

service model is common in many country-contexts as instances of health and care services have frequently been 'outsourced' to the private sector.

The implementation of this form of 'privatisation via outsourcing' is founded on, and justified by, a theory that it *improves* their quality of services. A common underlying assumption is that the provision of services are gatekept by state-run organisations that actively select service providers on perceived quality. The two necessary conditions are therefore that a) commissioners of services have agency and power to choose between providers and b) that they use that agency to prioritise quality. However, there is little empirical evidence to test whether this applies in practice and therefore whether the privatisation of services is founded on correct theoretical assumptions. This paper provides the empirical basis for testing these assumptions, finding that these two conditions are not always met and describing the processes which result in them not being fulfilled.

'Accidents' or 'emergencies'?

Key to the processes of privatisation in England's NHS are three 'sites of power' and decision-making: 1) central government; 2) commissioners; and 3) patients.[1] Each play their part in deciding how much private sector outsourcing is conducted, through (1) government setting national guidelines and legal restraints on the procurement and provision of services; (2) commissioners selecting the available providers to deliver services for patients in that area; and (3) patients deciding which provider delivers their treatment.

If this process is to work as theorised, an important question exists for each site of power – whether the decision to increase the use of private providers has at its core the intention to improve healthcare quality. If this condition is not met at any one site then privatisation could have either occurred passively and unintentionally – as an 'accident', or because of a failure to incentivise or empower the key actors to prioritise healthcare quality – an 'emergency'.

'Accidental' privatisation could happen at each site, for example, (1) as an unintended outcome of policymaking in central government; (2) through commissioners having no power to actively determine the selection of providers; or (3) through the lack of information and provider choice for patients. In each setting, it is easy to see how such an 'accident' could be linked to the decisions made in the other settings.

'Emergency' privatisation could happen at each site too, for example (1) through a government prioritising cutting healthcare expenditure, or through effective lobbying of government; (2) through commissioners being incentivised to make decisions based on non-quality related priorities; or (3) through exploiting or misinforming patients. 'Emergency' privatisation at one site could well lead to an 'accidental' privatisation at another and vice versa.[2]

To better understand which scenario best explains recent privatisation developments in the NHS, this paper aims to provide an empirically informed discussion addressing whether privatisation is an active attempt to improve the healthcare in the English NHS; an 'accident' of unintended outcomes; or an 'emergency' which threatens to deteriorate healthcare quality due to misaligned incentives. This paper operationalises the perspectives and experiences of employees at one key site of power – healthcare commissioners – asking them why they perceive private providers to be used in the NHS.

The development of privatisation in the UK's National Health Service

What does privatisation in a famously state-run healthcare service look like? England's NHS was founded in 1948 when voluntary hospitals across the UK were taken into public ownership, services were to be paid out of general taxation and hospitals bills were largely eradicated for NHS patients. The involvement of commercial interests in delivering healthcare in England were never fully removed and the NHS's 'pure socialism' touted by the Health Minister in 1946, Nye Bevan, was perhaps undermined by the private ownership in primary care, the continuation of self-funded private provision for those that could afford it, and the omission of public health and social care services from the new nationalised service (Stewart 2002). However, with the foundation of the NHS, hospital care

was largely socialised, avoiding competition, and removing private ownership from the majority of the provision of secondary care in England – an achievement of the post-war Labour government which came to define the UK's welfare state.

Over the last 40 years, governments have made consistent claims that a process of privatisation will improve the quality of services delivered by the NHS in England. The first step on this process were periods of widescale marketisation – reforms that apply market structures such as splitting up purchasers and providers of services; giving 'consumers' choice over their services; and imposing performance targets – these changes have made up national regulation and been written into the NHS constitution, a document that outlines patient's rights and the NHS values (Department of Health and Social Care 2021; Krachler et al. 2022). One way that marketisation leads to privatisation is through the argument that it is beneficial for the quality of care to have a diverse pool of providers competing to win NHS contracts and patient choice (Allen et al. 2012; Krachler and Greer 2015). 'Diversity' from public providers usually means looking to the private sector for alternatives and it is the intention that the private providers will have 'innovative' behaviours which, as the argument extends, if regulated correctly, that the best and most efficient providers will be selected by patients and commissioners.

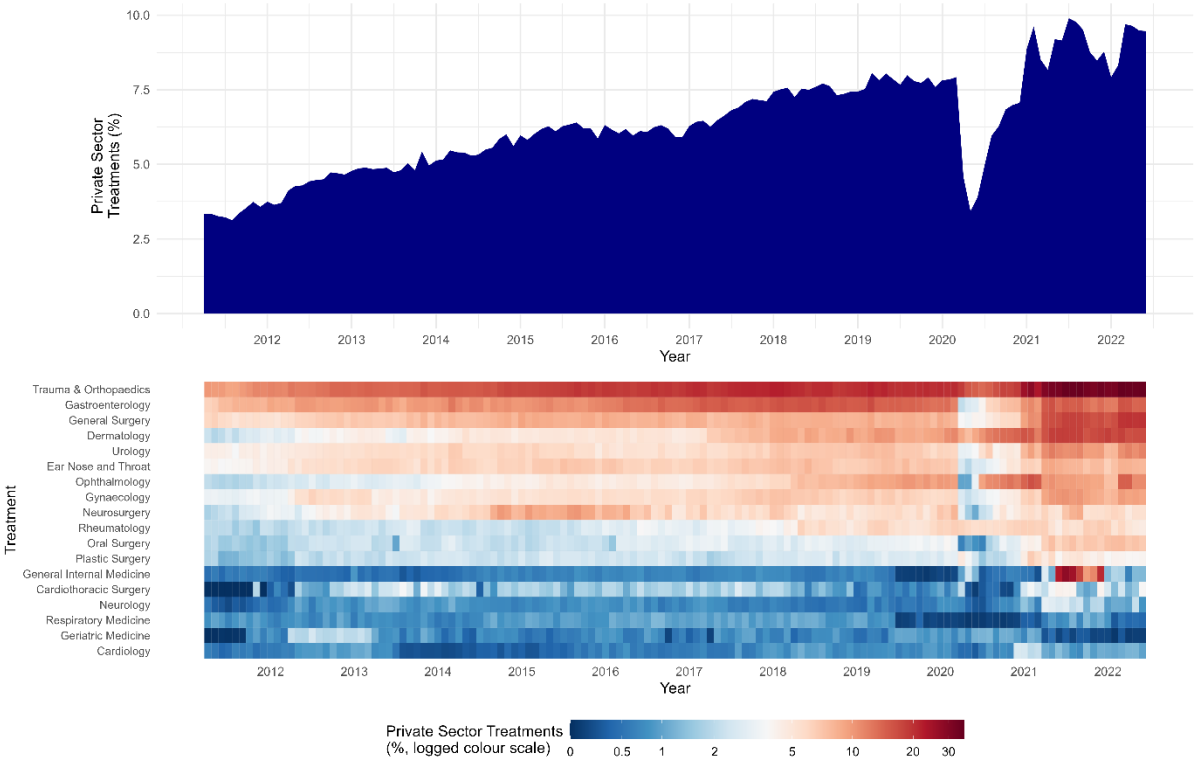
Indeed, David Cameron, former Prime Minister, noted in 2011 that the "*NHS has always benefited from a mixed economy of providers"* and that creating space for new private providers will only create *"more choice and competition"* and thereby *"raises standards and delivers values for money."* (Cameron 2011). Cameron was not alone. Such arguments were commonly made by Tony Blair during the early 2000s and Labour's 2001 manifesto read "*Where the quality is not improving quickly enough, alternative providers should be brought in. Where private-sector providers can support public endeavour, we should use them*." (Timmins 2001).

However, the most recent period of privatisation happened in a political context of austerity, when Cameron was making the case for increasing competition, he was speaking as part of a broader effort to reduce government spending. After the Conservative-led coalition came to power in 2010, they

implemented austerity cuts in most government departments, many of which have yet to recover to pre-2010 levels of spending. Healthcare budgets were not cut in absolute terms but the growth in spending was much slower than the preceding 50 years of NHS funding and, when viewed against increasing need for the service, this slow growth enacted austerity (The King's Fund 2022b). The period of austerity and underfunding overlapped much of the rises in NHS privatisation, neither of which should be entirely assessed in isolation given their intersecting implementation.

During the last decade the increases in private sector provision have been sizeable, figure 1 shows that increases in the number of private treatments have increased from 3% to 9% since 2011. Thanks to the development of transparency data in public bodies, and the dedicated work to harmonise these resources, we are now also able to trace public expenditure and link it to the individual suppliers (Rahal 2018, 2019; Rahal and Mohan 2022). This has enabled researchers to detail how expenditure on private sector suppliers has consistently increased over the last decade resulting in billions more pounds spent on private sector providers (Goodair and Reeves 2022b; Rahal and Mohan 2022).

Figure 1: Scale of increase in private provision of NHS services 2011-22



Data source: RTT waiting time data (NHS England, 2022). Replication materials available at https://github.com/BenGoodair/NHS_privatisation_treatments]. Colour scale logged to enable differences over time to be observed for treatments with small levels of outsourcing.

Varieties of privatisation: previous conceptions of NHS outsourcing

Varieties of privatisation are commonly viewed in terms of three distinct dimensions (Powell and Miller 2014). They constitute 'service funding' (is the state paying for the service?); 'service provision' (is the state providing the service?); and 'service decision' (is the state deciding who delivers the service?) (Andrews, Boyne, and Walker 2011b; Burchardt 1997a; Smithies 2005).

The process of privatisation of England's NHS is largely conceived as 'outsourcing' or 'contracting-out' (Andrews et al. 2011b; Iacobucci 2015; Powell and Miller 2014). This categorisation states that 'provision' is private but that the 'funding' and 'decision' is made publicly (Burchardt 1997a, 2013). But a clear categorisation of whether the important third dimension of decisions are public or private

is difficult given that the locale of power is much harder to measure than, for example, the locale of funding. For example, when a patient finally chooses who conducts their hip surgery other decisions have already been made to refer the surgery as well as define the available hospitals from which the patient can choose. When discussing elective care in the NHS, Reader and Buchardt (2023) concludes the decision is mostly public as the state regulates the amount of provision and constrains the viable alternatives – essentially that patients are not making the decisions themselves. However, how strong the constraint on alternatives is, and whether private actors other than the patients influence the amount of provision delivered is not clear – perhaps the decisions are not 'private' in the sense that they don't sit with an individual but, perhaps they are also not 'public' in that they do not meaningfully sit with a state-run body either.

It is these aspects of the 'decision' dimension of privatisation that the focus of this paper. There has already been important work on the 'funding' and 'provision' dimensions, in part because these can be measured and observed using publicly available data (see figure 1), but the 'decision dimension' is much harder to see in such this kind of data and so, as a result, I turn to qualitative interview data focussed on the process of privatisation. I use this data to test whether the current typologies are satisfactory to explain the process in England's NHS and argue that there are instances in which the decision of private provision are neither meaningfully with patients nor with commissioners and a new typology is needed which I term 'managed' vs 'uncontrolled' outsourcing. These refer to instances when commissioners have the power over decisions compared to when they do not. But before discussing how these data were collected and what I found, I first engage with the privatisation debate in general.

Does privatisation matter?

When it comes to debates about the impact of provider ownership on quality of care in England, there is no consensus. One body of evidence has analysed whether health outcomes for patients differ for those carried out in private hospitals compared to NHS hospitals. It tends to find little difference in

health outcomes or patient satisfaction between the sectors but always stresses that direct comparisons are hard to make given the different characteristics and health needs of patients in the different sectors (Crothers et al. 2022a; Moscelli et al. 2018; Pérotin et al. 2013).

When studied at an aggregate level, findings suggest that increases in outsourcing are associated with worse health outcomes in England (Goodair and Reeves 2022b). An association between increased for-profit provision and rises in mortality rates was also observed in Italy during a period of privatising reforms (Quercioli et al. 2013a). The benefit of these studies is that they are not prone to the issue of comparing providers which are performing different duties. However aggregate level studies cannot easily identify why privatisation is associated with higher mortality rates.

There are a few possible resolutions to this apparent tension, including different analytical set-ups. It could be the case that both findings are consistent if there are significant 'knock on effects' for the public providers of healthcare. Knock on effects on public providers from outsourcing could be severe if there is evidence of 'cherry-picking' – the practice of selective healthcare provision catered specifically to easy-to-treat patients, or imperfect quality measures allowing providers to focus on financial efficiency – regardless of ownership type (Pollock and Kirkwood 2009).

This debate can be contextualised within a much wider literature about the impacts of ownership on quality of service provision. In adult and children's social care services in England, a consistent trend indicates higher quality in publicly owned provision (Bach-Mortensen et al. 2022a; Barron and West 2017). Internationally a 'for-profit gap' in quality of healthcare is frequently observed in the USA (Kunz et al. 2020; Paul, Quosigk, and MacDonald 2020; Quercioli et al. 2013a). For non-clinical services in the NHS, negative outcomes have been associated with outsourced cleaning and management (Kirkpatrick et al. 2019; Toffolutti et al. 2017a).

There is, however, a very considerable gap in our understanding of the *process* of privatisation within healthcare services. In other words, why is it the case that NHS commissioners are increasingly using private providers? Answering this question is critical if we want to understand why privatisation might

be associated with some of the health harms outlined above. If, for example, NHS privatisation is not occurring in pursuit of higher quality then this might help us understand why such shifts have been associated with poorer outcomes in some instances. But, understanding the processes of privatisation within England's NHS also has implications for debates about privatisation in public services in general.

Methods

Participant Selection and Data Collection

To answer these questions, I followed a qualitative research design, conducting in-depth, semi-structured interviews with individual healthcare commissioners within three commissioning bodies. Three commissioning bodies (CCGs) were selected purposively with two CCGs which had high levels of private sector provision and one CCG with particularly low levels of private sector provision based upon analyses of commissioner expenditure data (Rahal and Mohan 2022). The range intended to return a variety of experiences with the private sector. After selecting key sites, a preliminary discussion was held at each site with a gatekeeper in a leadership position who subsequently helped recruit the individuals for interviews. I requested participants from each site who worked in different settings to attain insights from a diverse range of the commissioning process. Nine participants had leadership job roles, and nine participants were also selected from a low outsourcing commissioner setting. Further participant details are available in the appendix (Tables A1 and A2).

I conducted interviews from June to September 2022. The recruited participants worked at 3 CCG sites and interviews lasted 45-70 minutes. The semi-structured process loosely followed an interview guide. Most of the time was spent discussing responses to two open questions of a) perceived reasons for the NHS using the private sector to deliver health treatments and b) what they think explain variation in levels of private sector outsourcing among different CCGs. Some topics were included as prompts if not raised by the interviewees themselves. These prompts included questions such as whether private providers offered better or cheaper services than NHS providers; the role of commissioner

finances; and the impact of individuals in leadership positions at the commissioning site. Interviews were conducted until the data was saturated after 20 interviews (Saunders et al. 2018).[3]

One aspect of the data collection process that added a layer of complexity was the wider policy context. While interviews were being conducted, a key reform to CCGs was taking place as they were being merged into 'integrated care boards', the explicit aim being to work more collaboratively with providers, on a wider geographic scale. This process happened after participants had been invited to be interviewed and did not impact the selection process. I asked questions mostly thinking about historic experiences between 2013 and 2020 but the participants would often reflect on the future of integrated care boards and were reflecting from that context of reform and hindsight.

Ethics

In line with ethical approval from the University of Oxford the interviews took place via video call and established written informed consent by explaining the research process, data protection and rights to participants. One participant agreed to partake in the research but requested not to be directly quoted. Interviews were recorded with a voice recorder, transcribed, and transferred into Nvivo 12.6 software (QSR International Pty ltd 2020). Transcripts had information of individual names, locations, or company and organisation names redacted to achieve pseudonymity. Drafts of the findings were sent to all participants before publication to allow for any additional redactions.

Analysis

I conducted thematic analysis on the interview transcripts (Braun and Clarke 2006). Initial codes were created underneath the two broad categories, which were defined a priori, of 'why use private providers' and 'why would private usage vary between commissioners'? Organising themes were then inductively produced from the basic codes in the data. The results are presented with a section for each organising theme and a table linking basic codes to organising themes, with an example quotation. This can be found in table 1 and in the appendix (Table A3).

Reflexivity, use of language and researcher positionality

In this paper, I will refer to the levels of private sector provision of NHS treatments as 'private sector provision'. This reflects language used in the literature, but interviewees would often refer to 'independent sector providers' to talk about the same actors. I began the interview process using the term 'outsourcing' but adapted to language more in line with what commissioners used, using terms such as 'procurement' or 'provision'. Both 'outsourcing' and 'private sector' are being used in this paper to make it the most understandable to a broader audience. I will refer to the process of increased private sector provision as 'privatisation'. This term is taken from the academic literature describing the process of private sector outsourcing, although the interviewees largely avoided using this term.

Interviews were conducted over video calls and the dynamic was that of an outsider researcher interviewing expert participants. I would try not express personal normative views about levels of private sector involvement in the NHS though participants often expressed normative opinions in varying ways on the topic and I would not challenge them. My own positionality was rarely asked about by participants, although I perceived a pre-interview discussion at each commissioning site as a check that I was open-minded to their experiences. I was specifically asked by one participant as to who was funding my research and I inferred that to be a check of whether I had any corporate interests.

At the time of conducting interviews, I was simultaneously publishing a research paper finding that outsourcing corresponded with higher mortality rates. The paper was never referenced in interviews but the research did shape my thinking about the potential consequences of this policy direction as I began to think about how outsourcing could produce the results of my previous paper. For instance, I would be more likely to express an interest in private sector abuses than general discussions of 'innovation'. To protect against this, the participants all received a draft of this paper and feedback

was encouraged. However, the findings of this paper are certainly produced by a combination of the knowledge, experience and values of the researcher and participants.

Results

Success of NHS providers in meeting demand: the private sector as 'a release valve'

One perceived reason for outsourcing to the private sector was when the quantity or quality of services were not being achieved in the NHS providers. This type of outsourcing puts agency with the commissioners and describes situations of pro-active outsourcing. For example, participants reported that if waiting times increased for NHS providers, the private sector would receive more NHS treatments to bring that time back down. Participants M (CCG setting #3) and E (CCG setting #3) explain why it is primarily used to tackle unmet quantity of treatments.

> *"Participant M: How it works at the moment, more often than not, is it's a release valve, it's a supplier side release valve for demand that has become unmanageable."*
>
> *"Participant E*: *If your NHS services were not able to meet demand, that would be a good reason, and was largely the reason for the inception of the policy under the Labour administration. So to produce capacity quickly, to get to 18 week waiting time targets. That was the inception of the independent sector, but that still holds true."*

The metaphor of a 'release valve' suggests that the power lies with commissioners to 'switch-on' and, importantly, 'switch-off' private sector usage. It was clear that there are some types of outsourcing and some participants which perceive this process as a primary way the private sector is used, whereas other participants which would stress how their hands were tied by the market, competition regulation and insufficient NHS provision.

Some participants suggested that the quality of the NHS service, as indicated by regulator feedback might also determine a shift to the private sector. Participant A (CCG setting #3) said: *"Some of it depends on the quality of services. So if you're concerned, or if there's been CQC* [independent health regulator] *issues of serious incidents or complaints"* then *"you are much more likely to go procure for a new service".* And participant P (CCG setting #3) outlined in an example how poor quality NHS services could directly result in the outsourcing of a community equipment and wheelchair provision:

> *"*[the services] *they were getting were not necessarily as bespoke or as technical as maybe they'd hoped or expected... We can see from some of the data that we've got an issue here, people waiting a lot longer, which results in deterioration in conditions, maybe even shortening of lifespans... And so based on all of those factors, we decided to go out to an open an open tender."*

When discussing these processes of active procurement, financial reasons were often discussed in the same breath as quality and quantity. Participant P went on to say:

> *"You can't get away from the fact that price was a big factor, whether that's because they were able to procure equipment, at a better rate, because they're obviously buying at scale compared to a you know, individual NHS organisation"* and *"The simple fact is that their staff are paid, were paid less."*

There were also many times where 'quality' and 'quantity' were hard to distinguish. It was very common for quality to be measured through the metric of waiting times rather than patient feedback or patient outcomes.

> *"Participant N (CCG setting #3): where quality tables were poor. Again, NHS managers would be saying, 'What are you doing about this? The big shiny hospital isn't doing the service well enough, you need to challenge them. Put it out to another provider to get your waiting times down.'"*

'It depends what's on your plot – build another lane on the M25 and people will drive on it': Private hospital locations, the choice agenda and predatory providers

A common response to the question of 'why does private sector usage vary between regions?' was that it would depend on whether there were private healthcare providers 'on your patch'. This theme of responses highlighted how subject the decisions of commissioners were to the available 'market' of providers. Participant N (CCG setting #3) discusses the procurement of services and explains that:

> *"I think probably the biggest reason is location. And the number of providers around you. You know, it is a hell of a lot easier [to put a] service out for procurement when you've got a massive population and a lot of different providers."*

The rurality of the CCG was generally addressed as something which led to a dearth of private sector providers and would result in low levels of private sector provision. Participant D (CCG setting #1) said:

> *"Trying to attract an independent provider. Because we are in such geographical corner is quite challenging. It is relatively unique to [this area] because there's very few major cities that are so far away."*

One of the perceived causes of private provider availability in any geographic area were the centrally agreed NHS contracts for private provision promoted by the mid-2000s New Labour's Government termed *Independent Sector Treatment Centres* which were frequently cited as key in developing the relationships required between commissioner and provider. Participant M (CCG setting #3) described it as "*a national procurement exercise which drew in international capacity and capability*". If an area had an independent treatment centre contract in 2006, it was perceived they might still have higher levels of outsourcing as a result even 15 years later.

Underpinning many of the discussions on provider location was how 'the choice agenda' meant that commissioners were sometimes obliged to fund a variety of providers for patients to choose from. For some commissioners this was discussed in a neutral or positive light and often justified based on it being in the NHS constitution. For example, Participant O (CCG setting #1) said "*you have the right choose"* because of "*the skills you want, or based on waiting times*" and that "*it's written in the constitution… it's fundamental".* Several participants also reported that they thought patients generally preferred private options when offered for a range of reasons which included the upkeep of facilities and a middle-class 'aspiration' for private providers.

However, this framework has also enabled some more problematic practices in the views of the interviewed participants. Commissioners reported that private providers could create a demand for treatments by aggressively advertising the services or they could simply treat more people by exploiting contracts with wider specifications on the services. A similar practice of 'direct-to-consumer' advertising for healthcare is common in the USA and is of concern to many suggesting it may work against the goal of improving healthcare quality (Schenker, Arnold, and London 2014). At its worst for the participants, the direct-to-consumer advertising in England led to patients being treated who it was perceived did not need a procedure. Cataracts surgeries were often cited as a key treatment that commissioners were feeling was exploited by private providers and not always in the best interests of the patient or the broader health service. Participant F (CCG setting #2) said:

"some of these companies do a lot of marketing. So we've had leaflets sent to just about every household, and some of them are linked as well to primary care services to have a direct link through…"

This was explained as being potentially problematic because it impacts the finances of the CCG and also has the potential to put patients at risk of surgery-related issues without being properly advised about those risks.

"Participant F: There are some people though, that will have problems with their vision afterwards. Or also, if the cataract is very marginal, the benefit that they're getting versus the risk that they're taking might not be right until a bit later on or a few years' time."

Participant F went on to say:

"*We had quite a lot of anecdotal feedback from people that had been through those services that said, 'I didn't even know I had a cataract', but they had it operated on."*

Participant L, located at a different CCG site (setting #3) shared experiences of aggressive eyecare providers exploiting the choice agenda framework. For them, they had experienced the eyecare providers using contracts with much wider specifications (lesser required conditions for treatment) than they would have otherwise agreed to. Central to this theme is the feeling that legally, the commissioners cannot challenge this activity. Whilst trying to improve the health of patients the commissioners are worried that, by challenging risky practices of private private providers, they might break competition laws.

"Participant L: But that they have really pushed the choice agenda and the edge of legality... And what they're doing is, they're using specifications from somewhere else in the country where they've got a contract, and then just pulling up and saying, 'you've got to give us this activity, you've got to put us on your choice menu'… We have to by law, then give them a contract. And they just come to us and say 'we're doing half a million quids worth of work, you under the regulations have to give us a NHS contract.'"

'If the NHS is simply not there': Accessing capital, service specialisms and workforce.

A quick, often throwaway line, made by commissioners was that private sector services would be used if the NHS was 'not there' or 'don't want the service'. This was often the first response of commissioners before moving on to market dynamics or metrics used in procurement decisions. For instance, when asked why services are outsourced to the private sector, participant A (CCG setting #3) put it that:

"Yeah, and it's something that it's just not, you know, the NHS isn't interested, I guess?"

Similarly, participant E (CCG setting #3) said that this was rare and represented very specific services:

> *"Exceptionally, I suppose you might look to the independent sector if they offered something that the NHS didn't, and that's, in broad terms typically falls to mental health, learning disability, specialized children's services."*

Some commissioners expanded on the ability of private providers to access capital in a way that the NHS could not, meaning that healthcare expansion was often filled by private providers. Participant E (CCG setting #3) said of the private sector:

> *"If you're an independent sector provider, you can go and look to a venture capitalist company for your start-up monies you can buy or build a property and you can be up and running very, very quickly. Whereas in the NHS, it's a bit of a slow burn. So there is lots of money to be made."*

As well as general expansion, participants would often describe the private sector as more 'flexible', 'innovative' or offering 'specialist services'. Participant N (CCG setting #3) said *"private providers are able to be more flexible and create new ways of working more easily than traditional hospitals".* These comments would often reflect an idea that the private market is able to adapt its offering to the commissioner's demands in a way the public sector might not be able to, perhaps because of financial restraint, stricter regulation, or built-in cultures of working.

Another form of capital raised by several participants was the availability of the workforce. Some suggested that workforce was the limiting factor in any attempt to expand public sector provision:

> *"Interviewer: is there no way to expand public sector provision from the commissioner's point of view?*
>
> *Participant F (CCG setting #2): So the biggest challenge for us is, is workforce…"*
>
> *Participant E (CCG setting #3): "we, over the past 12 years have had very restricted access to capital. So new building would be pretty much out of the question. And our ability to grow the workforce, has been, it's not been there really"*

'Leadership appetite' and personal relationships

Participants regularly expressed the importance of leadership from individuals in the commissioning organisations in whether private sector providers would be used for NHS treatments. Across multiple sites and participants the term 'appetite' was used, in similar ways to express a desire to push back

against the status quo of NHS provision. It was perceived as a difference of opinion about the best way to meet needs of the population – a kind of philosophy of healthcare provision.

> *"Interviewer: But I wonder for you, what are the sort of main reasons that you might see a variation [in private sector usage]?*
>
> *Participant J (CCG setting #2): I don't think you can underestimate individual personalities. So although it might sound like a really silly reason actually, an individual chief exec, or individual chief finance officer, that is quite happy to accept an independent provision in their area could in and of itself make a massive difference".*

Participants from one setting often expressed how their leadership had an appetite which was different to other parts of the country and deeply connected to trying to overcome the poor health outcomes tied to the high levels of deprivation in their area.

> *"Participant B (CCG setting #1): That was about somebody being brave and innovative. But I think, yeah, in some of the instances, we can do more of the same, or we could, we can really test the market. And I think that [redacted CCG name] from the commissioner's point of view, we've actually been quite strong in saying, 'let's not shy away from doing something different and taking a risk…*
>
> *"…something like nine out of 10 of our wards are in the in the bottom decile or whatever for their deprivation nationally, you know that there's a huge amount of poverty. And some money comes with it, but that's what inspired us to do different, be brave, make some decisions that's not usual."*

The stressing of 'bravery', 'innovation' and being 'not usual' in the above quotation, suggests that not all CCGs in highly deprived areas have taken the same approach, but that this was particular to this setting and required a particular type of leadership to bring about.

Beyond the attitudes towards private provision of the individual leaders, several raised working cultures and relationships between the leaders and providers as a possible determinant of outsourcing levels. Some mentioned relationships with Local Authorities (Local Government), which were more explicitly political in their actions. More common was discussing the relationships between the NHS commissioners and NHS providers which will be tested by outsourcing of services.

> *"Participant N (CCG setting #3): If you're going to start procuring service, to the private sector, you're going to upset colleagues who you may have gone to medical school with, colleagues with whom you've worked, colleagues with whom you write to on a weekly basis about patients. And so as a leader you've got to have a very thick skin to deal with the*

criticisms from some colleagues, sometimes from GPs, particularly if they're pals with consultant colleagues and sometimes with other colleagues who feel that this procurement will knock-on to their specialty."

Sometimes this personal dynamic was described as an attempt to 'provoke' the NHS providers. The same participant said:

"[redacted CCG leader] did threaten the hospital with quite a lot of procurement at the very start of [redacted pronoun] tenure, I think that was pushed to shake the hospital up a bit. And to some extent that you can play a bit of tactics, and you can play politics with people, as a leader to try and, well I guess, manipulate essentially...

Sometimes, you know, the hospital were so frustrated with a bunch of colleagues in the hospital themselves, that they quietly said to our senior leadership, why don't you put this out to procurement, that'll really shake this department up".

The Austerity Paradox: 'we have no money, we can't outsource' vs 'we have no money we have to outsource'

Participants disagreed about the likely overall relationship between levels of CCG funding and the propensity to use the private sector. Some considered it necessary for financially constrained CCGs to procure from the private sector to save money.

"Participant A (CCG setting #3): I think because if you're a financially challenged CCG, which [redacted CCG name] has been for a long time. We've used procurement to try and secure the best value and potentially make savings so potentially we'll have a budget. Top slice it a little bit and say that's how much is available. Is there a market out there to provide that service?"

Whereas other commissioners reported that additional resources were required for increased use of the private sector:

"Participant E (CCG setting #3): [During 2000's Labour government] *We had so much money that we couldn't spend it all... And we could commission as much independent sector capacity and NHS capacity as we wanted to achieve that [shorter waiting time targets] because we had the money."*

However, it was clear from the participants that these were very different processes in private sector procurement. Under strict budgets, it was mostly major procurement processes, often for core services, that were put out for competitive tender. Participants also reported that these procurement

processes often meant that the NHS provider would win the contract they already held but at a reduced rate.

> *"Participant L (CCG setting #3): It's not like we were doing it every week. But I can think of two major ones... unfortunately, in [redacted CCG name] it has been a major tool for actually trying to create savings."*
>
> *"Participant N (CCG setting #3): I think it depends on the commissioners financial position, and whether they had enough money to run services well. When you're in financial deficit, and you're struggling to balance the books, the NHS bosses above the, commissioning chiefs, they are always on to saying, 'hey, gotta save money, you need to cut this service, to put this out to the private sector'."*

Whereas for the commissioners who perceived the opposite relationship (that additional funding enabled private sector outsourcing), the process was about finding providers who could provide 'enhanced services' to deliver better and more accessible health services or about increasing the capacity when additional resources are available.

> *"Interviewer: Just so I understand what you're saying: if you had a CCG that was really financially constrained, they would procure fewer, like add-on, the sort of peripheral services, which are more likely to be provided by the independent sector?*
>
> *Participant C (CCG setting #3): Yeah, yeah. Yes, because those are the ones that you have the flexibility on, if you see what I mean, although they might be the most important… The add-on services that you might have looked at in a basket of private procurement. And that could include some enhanced services that came through into general practice. You might just say, I can't do that anymore. You know, in general practice, we see that we see some enhanced services used to go just get cut year by year… the likelihood is that the most important things [being cut]."*

To understand why fiscal constraints might lead to varied private sector usage, I would ask whether private companies offered commissioners cheaper services on average. Commissioners would often respond by saying it was dependent on certain contexts, services or procurement procedures whether there were savings to be found in the private sector. Participant A (CCG setting #3) said *"I don't think it is something you can generalise"* sometimes if the private provider can act differently such as having online appointments rather than face-to-face, then *"they would inevitably, be cheaper and more flexible".* But there were many times where competitive tenders would be won by NHS providers because they offered the cheapest services because *"They've already got the network; they've already*

built up those contractual relationships" and they had heard of examples when a private provider was used but *"they just didn't last long. You know, they underestimated how much it would cost."* Similarly, participant D (CCG setting #3) said:

> *"I would say it's not a generalization, it may appear cheaper, but it's because they take less complex patients, which are cheaper anyway, whether you're in their full NHS service or not. So, I think it being cheaper is more of an illusion."*

Discussion

The results of this paper suggest private sector outsourcing can be grounded in a motivation to improve quality, but that it can also occur as an 'accident' and an 'emergency', from the perspective of commissioners. In this discussion I will explore which themes provided by the commissioners might represent each scenario, and touch on when there were findings which were clearly reactions to decisions or actions from the other two key sites of power – central government and patients.

One driver of privatisation was individual leaders in the commissioning bodies. Never was it suggested that any alternative personal incentives existed for leaders than to provide the best quality healthcare services for their population of patients. Similarly, this is held true too for times when commissioners detailed a specific service which they thought could be better delivered by a private sector provider. This process often involved a mix of patient feedback and measures of quality and often applied to very specific, siloed type of service, such as the provision of wheelchair and community equipment.

But beyond individual leaders, there were two broader processes which might prompt privatisation: 'accidents' and 'emergencies'. 'Accidents' were clearly described by the commissioners when the location and imposition of private providers meant that they could not control the process of healthcare delivery. The example given of ophthalmology providers pushing the choice agenda regulations to the limit when delivering cataracts operations highlighted a powerful way that privatisation was uncontrolled by commissioning bodies. It also highlighted a key moment of 'emergency' for patients, who, it was suggested, might have been exploited to drive demand and were sometimes given rushed or ill-advised treatments. Commissioners were not always actively selecting

the best quality providers sometimes it was out of their control and this uncontrolled outsourcing may be one way in which privatisation is not improving quality of care.

Commissioning in a period of healthcare austerity – the key source of privatisation 'emergencies'.

Many of the results in this paper reflect a period of study where the service is underfunded and starved of the required resources by central government. The NHS budget has been increasing at an annual 1.4% adjusting for inflation since 2009, which is considerably lower than the 3.7% average increases over its lifetime and commissioners have been provided budgets that under evaluate the expected increases in need. (Gainsbury 2017b; The King's Fund 2022b). Robertson et al. (2017) show that NHS organisations' responses to financial pressures can directly impact on patient care. These include creating thresholds for patients to need to meet to receive treatment, delaying care and deflecting services to other parts of the system – some of these strategies were reported by participants of this study.

The conditions of austerity appear to play a large part in how privatisation could worsen quality of care. The findings of this paper suggest that the inadequate funding levels might induce increased privatisation in three ways. Firstly, the impact of austerity on providers was apparent when the private sector is used as 'a release valve' when waiting times become unmanageable for NHS providers. Underlying this expansion into the private sector is the inability to commission additional public sector capacity and difficulties with workforce recruitment. Fiscal constraints, and the consequent impact on the ability to meet the demand of patients, may result in increased privatisation in ways that does not centre quality of care, but rather, meeting an increased quantity of demand.

Secondly, when commissioners experienced limited budgets, they reported putting services out to competitive tender in search for 'efficiency savings'. This pathway confirms findings by other research that fiscal constraints may lead to more competitive tenders (Calovski and Calnan 2020). This search for cheaper provision through the procurement process, was explained in terms of relying on cheaper

workforce outside of the NHS, which again is not clearly grounded in a pursuit to improve the quality of care.

A potential third route for austerity to lead to increased privatisation in a way that does not centre quality of care is through the direct creation of demand for healthcare services. Given that austerity cuts have been evidenced to correspond with higher mortality rates, increased need for social care and worse healthcare outcomes, it seems likely that austerity cuts will also have created higher demand for NHS services (Alexiou et al. 2021; Watkins et al. 2017; Webb 2021). Future research should assess the extent to which the relationship between austerity and outsourcing is mediated by increased need for healthcare. The ways that austerity may lead to increased private provision may compromise the quality of care received by patients given that the quantity and cost of treatments is the underlying rationale for changing the provision rather than a direct search to improved health outcomes.

Varieties of privatisation: A typology of NHS privatisation through 'managed' and 'uncontrolled' outsourcing.

What type of privatisation does the NHS' represent? For lots of the private provision the 'contracting out'/ 'outsourcing'/ 'delegation' typology seems to fit well. An active public body (NHS CCG or NHS Trust) oversees the private service provision, decides on which private provider delivers the publicly funded service – or which set of providers are offered to the patients. What is key here is the active 'management' from the commissioner as the location of the decision-making power is lying with public bodies. The findings of this paper indicate that referring to this as 'managed outsourcing' is important to communicate the public decision because there are procurement processes that differ greatly from this controlled private sector usage.

The opposite also exists, and this paper presents evidence that there are instances in which the public bodies have no control over this process and in which the service is provided against the wishes of the public commissioning body. In this instance, previous conceptions of 'outsourcing' are inadequate as

a typology of privatisation because the decision is not made by a state-run body. Instead, there are private sector intermediaries deciding the referral process and providers legally allowed to advertise, increase demand and simply invoice the local NHS commissioning body. This represents 'uncontrolled outsourcing' where the power effectively lies in the hands of private companies who are entitled to provide services regardless of public decision makers.

The reason it is important to differentiate between 'uncontrolled and 'managed' outsourcing is because these were experienced by NHS commissioners as fundamentally different processes. In instances of 'uncontrolled outsourcing' commissioners could not guarantee that the process was in public interest, either for the performance of the wider system or for the patients receiving the services.

Table 1 illustrates how this typology applies to processes of privatisation in England's NHS by presenting the themed findings of this paper and providing a short description of whether they represent 'managed outsourcing' or 'uncontrolled outsourcing'. This categorisation is based on whether the decision to outsource sits primarily with the commissioning bodies or elsewhere. Table 1 also categorises each theme based on whether they could represent 'accidental privatisation' or 'emergency privatisation' given their location of power and grounding in healthcare quality.

Table 1 – Varieties of privatisation in England's NHS

Organising Theme	**Basic Theme**	**'Managed' or 'Uncontrolled' outsourcing?**	**'Accidental' or 'Emergency' privatisation at the commissioner level?**
Success of NHS providers in meeting demand	Longer waiting times increase use of private sector.	Managed – the metaphor of 'a release valve' suggests it can be turned on or off – the decision is with commissioners.	'Emergency' – often prioritises quantity of provision, rather than quality. Enforced by limited NHS capacity.
	Varying population demographics would alter need for, and uptake of, private sector.	Could be either – managed when commissioners responding to population need, uncontrolled when outsourcing is driven by 'aspiration' of middle-classes.	Could be 'accidental' for commissioners but this theme often identified power in the hands of the patients.

	Quality metrics and user feedback may lead to use of competitive procurement process.	Managed – often using procurement procedures responding actively to data – the decision is with commissioners.	Neither – prioritises quality and locates power with the commissioners.
Private provider locations and the choice agenda	Privatisation driven by locations of private hospitals.	Uncontrolled – suggests the decision is with the 'market' of providers.	'Accidental' – commissioners do not have the power to control the healthcare market.
	New Labour reforms created the situ of private hospitals through ISTC contracts.	Uncontrolled – suggests the decision is with the central government and cannot be changed by commissioners.	'Accidental' at the site of commissioners but the key site of power was central government in this theme.
	Rural commissioners have limited access to private provision.	Uncontrolled – suggests the decision is with the 'market' of providers.	'Accidental' – commissioners do not have the power to control the healthcare market.
	'The Choice Agenda' and predatory providers empower private providers.	Uncontrolled – the decision is with individual providers who bypass commissioners entirely.	'Accidental' – No power with the commissioner to dictate the provision. It was suggested this could be an 'emergency' at the patient level through direct-to-consumer advertising.
NHS capital	Absence of NHS provision, often for siloed services.	Uncontrolled – commissioners had no choice if there was no available NHS provision.	'Accidental' – power lies with 'the market' of provision.
	Workforce availability limited NHS expansion.	Uncontrolled – suggested their decision-making power was constrained due to workforce limitations.	'Accidental' – power lies with central workforce policies.
Commissioning Leadership and Politics	Leader's appetite for alternatives.	Managed – individuals within the commissioning body used the commissioner's decision-making powers to influence outsourcing.	Neither – always with the aim of improving quality of care and locates power with the commissioners.
	Outsourcing to challenge NHS provider cultures.	Managed – commission decision-making power used to purposefully outsource services.	"Emergency" – not clear that the cultures being challenged were primarily about health service quality.
Consequences of Financing and Austerity	Stringent budgets induce outsourcing	Managed – sometimes uncontrolled if pressured into outsourcing by central administration – but mostly actively 'searching for efficiencies'.	Emergency – prioritises finances.
	Stringent budgets constrain outsourcing	Managed – decisions made about which services to cut or constrain.	Emergency – prioritises finances.
	Prices of comparable services don't generalise by sector of provision	Managed – discussed as part of competitive procurement process.	Emergency – prioritises finances.

Limitations

This paper uses an analysis of commissioner perceptions and experiences to answer why the NHS increasingly uses private providers to deliver treatments. The paper focuses on commissioners because they sit in a position to oversee the mixed market across a region of England but this focus will inevitable miss experiences of people working in providers, central policymakers, and patients. These other actors may have other insights and experiences leading to alternative explanations of why the NHS uses private providers. A further methodological limitation lies in the solo-coding of the interview data, however peer feedback was received from presentations of the findings in seminars and conferences.

This paper also generates evidence based on 3 key commissioning sites. The findings should be tested for generalisability across the entirety of the NHS in England in future research using quantitative methods. A similar limitation lies in quantifying the extent of each theme and reason for increased privatisation. It was not the aim of this paper to evaluate how much of the increases in privatisation are due to eg. Inadequate levels of NHS funding, compared to the driving of demand by aggressive private providers. Again, future research should use quantitative analysis to explore what the largest reasons are for increases in privatisation.

Conclusion

The NHS in England is seeing increased levels of privatisation as private providers deliver more treatments year on year. The reasons for this phenomenon in the short-term can often be linked to a deteriorating ability, during an extended period of underfunding, for NHS providers to meet the demands required by the population. In the longer term, marketisation reforms have created a service in which private providers are sometimes not restrained from the NHS and enabled to force the further increases in privatisation.

Paper 3: 'Two sides of the same coin?': Comparing the health impacts of NHS privatisation and fiscal austerity in England.

Benjamin Goodair, Anders Bach-Mortensen, Aaron Reeves

Abstract

The 2010s in England saw two important shifts in the delivery of healthcare services: 1) an increasing privatisation of the National Health Service (NHS) and 2) austerity cuts to public funding. Privatisation and austerity are both known to correspond with deteriorating population health and worsening public services. Yet, it remains unclear how these similarly occurring trends are themselves related. One possibility is that privatisation is a direct response to austerity cuts. With increasing demand and limited public sector expansion, commissioners have been encouraged to outsource services to the private sector to cope with this deficit in funding. Privatisation may thus connect the causal pathway between austerity and health outcomes. Alternatively, the impact of privatisation on health may be entirely confounded by levels of funding. We provide novel evidence to these shifts in health care delivery by investigating whether regional levels of privatisation can be explained by their levels of funding in England. We find no association between privatisation and austerity. We also find no evidence that the effect of privatisation on mortality rates varies according to government funding levels, nor that the relationship between austerity and mortality is mediated by privatisation levels. We conclude that NHS privatisation is not a direct response to austerity. The deteriorating health outcomes associated with privatisation should therefore be considered as a distinct concern to the disastrous health effects of austerity policies.

Introduction

Following the financial crisis of 2008 and the election of a Conservative-led coalition in 2010, the UK's government decided on a programme of major state retrenchment. The government took a two-pronged approach: a) restricting funding flows for services and welfare and b) outsourcing the delivery of a range of health and social services to the private market (Griffiths 2020). The stated intention of

the austerity measures was that a reduction in funding would compel existing services to become more efficient to maintain the same level of provision, and that families and individuals would be forced to be less wasteful, or increase their income from the labour market, to make ends meet. Instead, public services became worse and deprivation among low-income families grew (Loopstra et al. 2015; Stuckler et al. 2017; Webb 2021).

Meanwhile privatisation, via the outsourcing of state-funded services to for-profit providers, was supposed to be a tool through which health and social care commissioners could cope with the fiscal austerity imposed upon them (see. Department of Health and Social Care, 2010). In the NHS, it is frequently argued, if seldom evidenced, that competition from the private sector would result in better quality care at cheaper cost to the taxpayer (Department of Health and Social Care 2010; Le Grand 2007a; Levaggi and Levaggi 2020). The aim from the government in 2010 was to open the NHS to the private sector via the 2012 Health and Social Care Act and limit the growth in NHS funding. The anticipated effect of this was that funding reductions would be made up by outsourcing services. However, there is no empirical research to date measuring the association between funding cuts and privatisation, and if commissioners used privatisation as a tool to adapt to austerity. As such, it is unclear if these two similarly occurring trends are associated, and whether a potential connection between austerity and privatisation can be used to understand the deteriorating health outcomes in the UK.

The significance of this puzzle is twofold. Firstly, there are large regional differences in the levels of NHS privatisation, but the reasons for this regional inequality are not well detailed (Goodair and Reeves 2022b). If funding levels and privatisation are correlated, it would suggest that increased privatisation is driven by regional differences in austerity levels, which would be a large contribution to our understanding of the motivations for outsourcing. The second reason why it is important to examine the relationship between austerity and privatisation relates to the ways they impact on health outcomes. Both austerity and privatisation have been evidenced to correspond with declining

quality of care and worsening health outcomes (Alexiou et al. 2021; Goodair and Reeves 2022b, 2024b; Watkins et al. 2017). If austerity and privatisation are related, the association between privatisation and health could be entirely confounded by levels of funding. Alternatively, it could be the case that privatisation connects the causal pathway between austerity and health outcomes, or finally, that these events happen independently of each other. Unpacking these associations is key to understand a) how austerity impacts health, and b) how privatisation impacts health.

This paper unpacks the relationship between NHS privatisation and government funding to see whether areas worst affected by austerity have higher levels of healthcare outsourcing. Further, it analyses whether regional levels of NHS funding alter the relationship between privatisation and mortality rates. We find that levels of government funding are not associated with rises in NHS privatisation. We find that privatisation is not likely to sit along the causal pathway from austerity to health outcomes. We also find that the impacts of privatisation on mortality are not confounded by levels of funding. This leads us to conclude that privatisation is not a necessary response to austerity, and that the impact of privatisation and austerity on increased mortality rates are likely independent of each other.

Retrenching the state: the privatisation-austerity nexus of the 2010s

The policy debate surrounding healthcare privatisation has been long-standing in England. Consecutive governments have implemented reforms to, step by step, introduce private sector provision into the National Health Service (NHS). Thatcher's 1990 marketising reforms were part of a concerted long-term privatisation plan, but aimed, in the short-term, to make the NHS more 'business-like' and responsive to 'customer' needs (Lewis 2020). Then, New Labour's privatisation – via the agreements with 'Independent Sector Treatment Centres' – were framed in terms of the highly target- and performance-driven policymaking which, for the NHS, often centred on waiting-times: *"in order to sustain lower waiting times while continuing to treat patients according to clinical need, a*

permanent structural increase in the volume of health care services delivered to patients would be required." (Department of Health 2006).

The incoming conservative-led government in 2010 leveraged the 2008 financial crisis to justify many of its reforms, including reforms that were designed to outsource NHS services (Speed 2016). As well as repeating the previous political rhetoric of making the NHS more responsive to consumers and improving performance, a new argument was introduced for outsourcing services: the 'necessary' cuts to public funding. For example, in a speech about the NHS, David Cameron stated: *"we need to make the supply of healthcare more efficient - which is why we are opening up the system to new providers...*"(Cameron 2011).The potency of this political paradigm rationale was evident, even in local NHS documents (Kendrick and Mackenzie 2023).

In the 2010s privatisation and austerity were a political nexus, and the narrative designed in a way that enabled politicians to use both concepts to legitimise and reinforce one another. The prevalent political discourse justified increasing outsourcing through the necessities of austerity. Meanwhile, austerity was enabled by the financialisation, commercialisation and deregulation of certain public services (Bach-Mortensen and Barlow 2021; Dowling 2017). Privatisation and austerity were implemented in the 2010s with a shared objective – to retrench the state. The burden of the financial crisis was privatised – both in terms of individual families dealing with lower social security payments, but also in terms of companies willing to deliver the poor-quality public services for which the public sector could not stomach claiming responsibility.

How would austerity increase NHS privatisation regionally?

There are two possible reasons why areas may respond to government-imposed austerity through privatisation. 1) Areas with worse financial resources are under the most pressure to cut costs by politicians and commissioners. In a push to find 'efficiencies' in delivering the same level of healthcare, commissioners have been encouraged to turn to the market (Calovski & Calnan, 2020; Goodair, forthcoming). Through outsourcing processes, competition is supposed to enable them to find

providers who will perform the same services for less cost. 2) Austerity creates and intensifies needs which cannot be met in the public sector due to service delivery gaps or funding backlogs (Krachler and Greer 2015).

This second explanation for austerity causing privatisation is that it has inflated the need for healthcare. Lower levels of public funding and worsening social determinants of health since 2010 have been strongly linked to worse population health in England (Alexiou et al. 2021; Stuckler et al. 2017; Watkins et al. 2017). The cuts to welfare and local authority services may then drive privatisation as some areas have had increased demand above and beyond what they would have expected, thus exceeding what can be delivered by a constrained public sector.

Is an association between austerity and privatisation important?

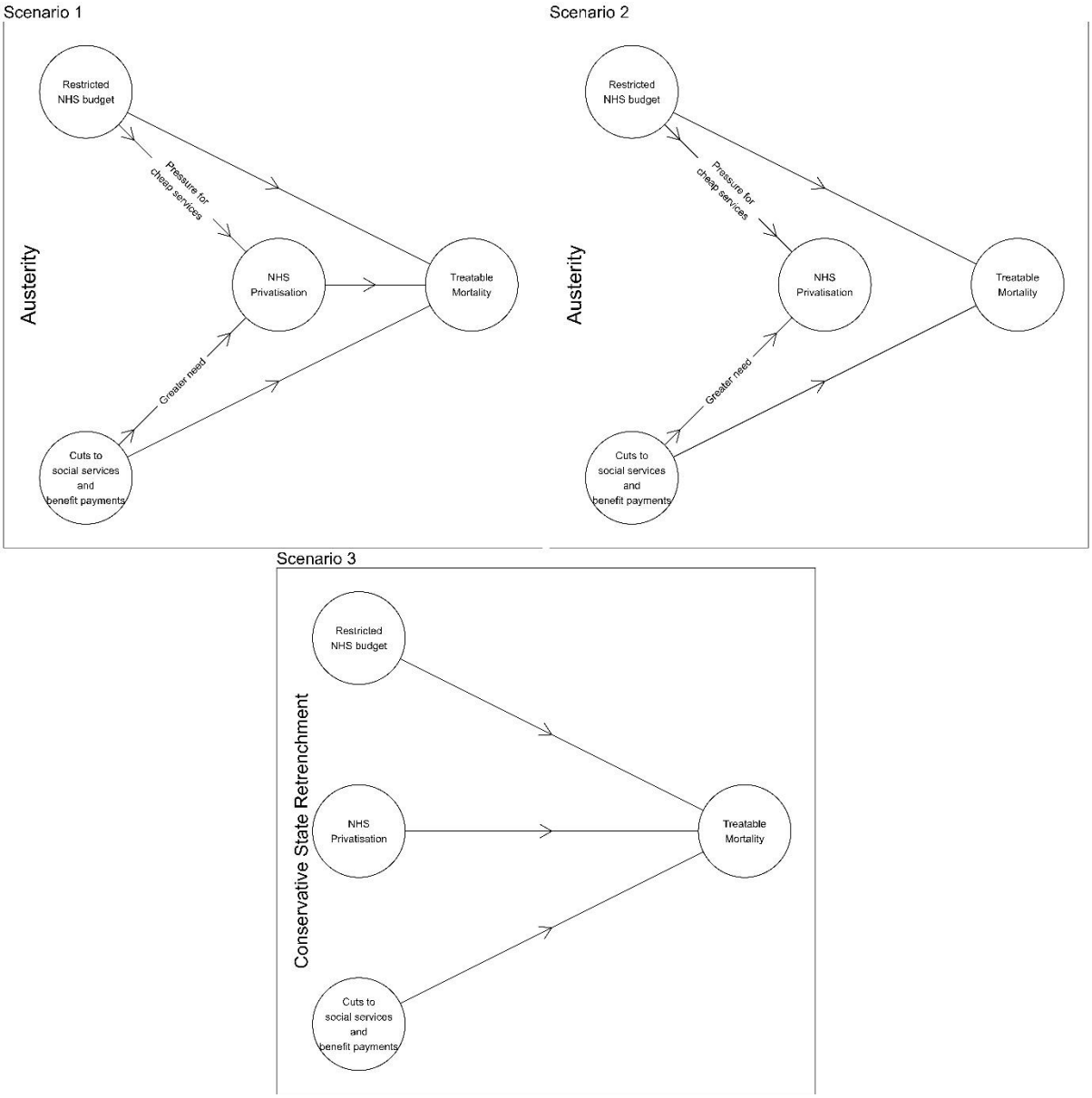
The policy implications of the association (or the absence of one) between austerity and privatisation are significant. We will briefly discuss the implications of the existence and absence of this relationship through 3 possible scenarios.

If austerity is associated with higher privatisation, we might be observing the intended implementation of privatisation policies by the Conservative government. Outsourcing is used by commissioners who are experiencing the most financial pressure. This would help explain why levels of privatisation vary substantially among regions. Unpacking this relationship will enhance our understanding of the impacts of NHS privatisation. Evidence suggests that privatisation corresponds to higher mortality rates in regions with the most for-profit outsourcing (Goodair and Reeves 2022b; Quercioli et al. 2013a). The conclusion of these studies is that, on average, privatisation is associated with worse quality of care among service users. However, the causal pathway though which privatisation impacts quality of care is unclear and contested, especially given the observed null differences in outcomes between public and private hospitals in England (Moscelli et al., 2018). If austerity drives an increase in privatisation, it may suggest that the aggregate associations between privatisation and health outcomes are not representative of the impacts of increased for-profit

healthcare, and that it is in fact driven by austerity cuts. More technically, the conclusion would be that privatisation and its relationship on health is confounded by austerity cuts. In evaluating the promise of pro-market reforms going forward, it is therefore of key importance to evaluate the extent to which outsourcing relates to austerity, and whether the effect of privatisation is independent or explained by shifts in funding.

Figure 1 details the three potential causal pathways which might be occurring. In scenario 1 austerity causes increased privatisation and mortality rates are impacted by both privatisation and austerity. In scenario 2, we see that the relationship between privatisation and health outcomes is confounded by the levels of government funding – so that once accounting for austerity, you no longer see a relationship between privatisation and health. In scenario 3 austerity and privatisation are not related, and each has their own independent relationships with health outcomes.

Figure 1: Diagram of potential causal pathways



Methods

Data

This paper constructs three novel datasets detailing the levels of austerity between 2010 and 2020 over unprecedented time periods and at the scale of health geographies, using allocated budgets from

central government for NHS commissioners, Local Authorities and welfare benefits. Our independent variables of interest is the per-capita constant prices funding of NHS commissioners, Local Authorities, and welfare benefits (universal credit and the components it replaced). Note that the NHS and Local Authority variables are the funding allocations, whereas the social security variable is a value of actual expenditure (as funding levels are the same given the level of need). All data is built up to the NHS commissioner's geographic scale using best fit lookups where required.

The paper also utilises a database of monthly expenditure files, curated between 2013 and 2020 for each NHS commissioner for which the data was available (for details see. Rahal & Mohan, 2022). The data builds on work done to make available procurement data from individual government bodies (Rahal 2018, 2019). This database allows us to track the percent of expenditures being spent on for-profit companies by regional healthcare commissioners, which is the measure of privatisation in this analysis.

The paper uses regional mortality rates of amenable causes from the ONS (ONS 2021a). The measures used in this paper are the age-standardised rates of death per 100,000 in the population – aggregated to the CCG regional scale. We primarily use rates of treatable mortality. Treatable mortality is defined as "causes of death that can be mainly avoided through timely and effective healthcare interventions" (ibid.). For example, treatable mortalities include causes such as respiratory diseases, certain types of cancer like Hodgkins disease, and 'misadventures' to patients during care. We may expect healthcare privatisation and healthcare funding to primarily impact treatable mortality through declining quality of healthcare interventions, whereas other forms of austerity may be more likely to impact preventable mortality through worsening social determinants of health (see page 94 for definitions). It is for this reason that we conduct our analyses on all three measures.

The analyses are conducted on 173 clinical commissioning groups in England over a 7-year period from 2013 to 2020 – these are the areas which expenditure data is available. A full description of the data building process, missing data and potential limitations can be found in supplementary material A1.

All data and code to reproduce the analyses, in their entirety, is published openly at https://github.com/BenGoodair/austerity_and_privatisation.

Analysis

The paper performs three stages of analysis. First, the paper analyses whether there are longitudinal regional associations between the independent variable of levels of austerity and dependent variable of levels of NHS privatisation. We conduct two-way fixed effects regressions and control for population size. This analysis is intended to understand whether increases in for-profit outsourcing correspond with the varied decreases in public funding over this period. This analysis is supposed to test the connection between austerity and privatisation assumed in scenarios 1 and 2 in Figure 1.

For the next stages of the analysis, we recreate the linear two-way fixed effects regressions from Goodair and Reeves (2022) which indicate that increases in privatisation correspond with increases in treatable mortality. We test whether this relationship is confounded by austerity, and we systematically control for each form of NHS, LA, and benefit austerity. We also assess whether the relationship between privatisation and mortality is moderated by austerity by using interaction effects (see Appendix A5). These analyses are supposed to test the line between privatisation and mortality in the scenarios in figure 1, and whether the line in scenario 3 between privatisation and mortality might be moderated by austerity.

Our third main analysis tests for the relationship between austerity and mortality, before assessing whether this is mediated by NHS privatisation. To do this we construct dynamic panel models using generalised methods of moments to account for dynamic endogeneity bias – as health needs are likely to impact future levels of benefit receipt – and serial correlation of mortality rates (Blundell, Bond, and Windmeijer 2001; Wooldridge 2001). We test the relationship between austerity and a range of mortality outcomes and assess whether the association is impacted by controlling for levels of privatisation. This analysis is intended to analyse which scenario from Figure 1 is more likely by testing whether privatisation drives the causal impact between austerity and health.

One requirement underlying this analysis is that austerity has large regional variation. Such variation exists and has already been exploited to understand the health effects of austerity reforms (Alexiou et al. 2021; Gray and Barford 2018). Consequently, comparisons in changes to outcomes for areas with heavy impacts of austerity compared to areas with low impacts can identify the likely impact of these reforms. The key limitation of this approach is that there is no 'control group' which experienced zero austerity.

This paper has three key theoretical estimands:

1. The changes to regional expenditure on private providers realised in one geographic region given the changes in the levels of government funding.
2. The changes to the statistical association between increased privatisation and increased mortality given changes in levels of government funding.
3. The changes to the statistical association between levels of government funding and increased mortality given changes in levels NHS privatisation.

Robustness checks

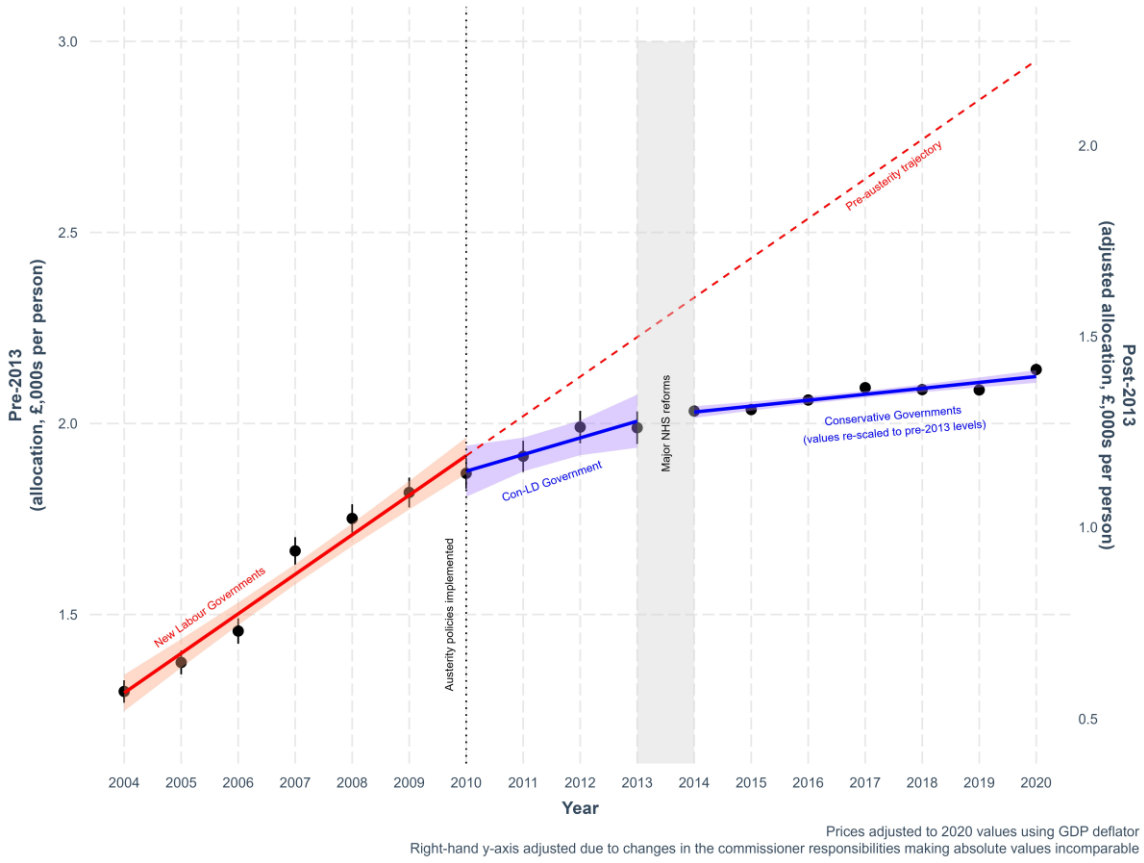
We perform several robustness checks, including using alternative measures of austerity, privatisation and mortality. We run our regressions using changes to the reported end of year balance in CCG accounts, as these might better identify the experience of restricted budgets rather than the impact of central government decision-making on allocations per se (Appendix A7). We also conduct the analyses using the percent of acute treatments delivered by independent providers instead of the expenditure on for-profit companies, as this measure might better identify the pathways indicated by increased need (Appendix A8). Finally, we run the regressions to changing our outcome measure from treatable mortality to 'avoidable mortality'. This is a measure of mortality which includes causes which have public health solutions such as lung cancer, sexually transmitted diseases and traffic incidents (a full list of the treatable and preventable causes of mortality is available in the appendix A.1.6). This

measure might better capture the deaths from causes linked to deteriorating social determinants of health (Appendix A6).

Results

Figure 2 shows the level of funding allocated to NHS commissioners between 2004 and 2020. It shows that funding had real terms increases after 2010, but that the increases were much lower than the previous period. For the NHS, 'austerity cuts' represented a reduction to the funding increases, which did not match the increasing need for the NHS – consequently demanding cuts from the service (Gainsbury 2017b). When plotting Local Authority and welfare benefits, we see real terms reductions in the levels of government expenditure (see appendix A3).

Figure 2: Impacts of austerity period on NHS allocations



Even though there were real terms increases in fundings, the reduced NHS growth has been reported to impact the accessibility of NHS services in England through strategies of delay, denial, deflection, selection, deterrence and dilution (Robertson et al. 2017b). Meanwhile the reduced growth to allocations for NHS commissioners have also corresponded with increases to avoidable mortality rates (Martin et al. 2021; Watkins et al. 2017). Our data finds some variation in whether different NHS commissioners received increases in funding since reforms to the organisations in 2013-14. For example, a handful of London-based CCGs had real terms cuts like Tower Hamlets, Camden and Central London Westminster. Camden had a £1550 per capita in 2014 which had reduced to £1370 by 2019 (all prices are adjusted to 2020 prices). Compare this to Bradford City, which started on a similar £1530 in 2014 but had that increased to £1790 by 2019. See appendix A2 for a full description of funding levels by CCG.

Figure 3 plots the variation in changes to funding levels against the changes in levels of privatisation in those areas. Along the x-axis is the increases in for-profit expenditure by NHS commissioners between 2014 and 2020 and the y-axis reports changes to different types of government funding. It shows that there is little relationship between austerity and privatisation levels at a geographic scale. The areas with the biggest increases in privatisation are not the same places most impacted by austerity cuts in terms of real changes to funding. The figure also visualises the severe cuts to Local Authority and welfare benefits over this time period.

Figure 3: relationship between austerity and privatisation

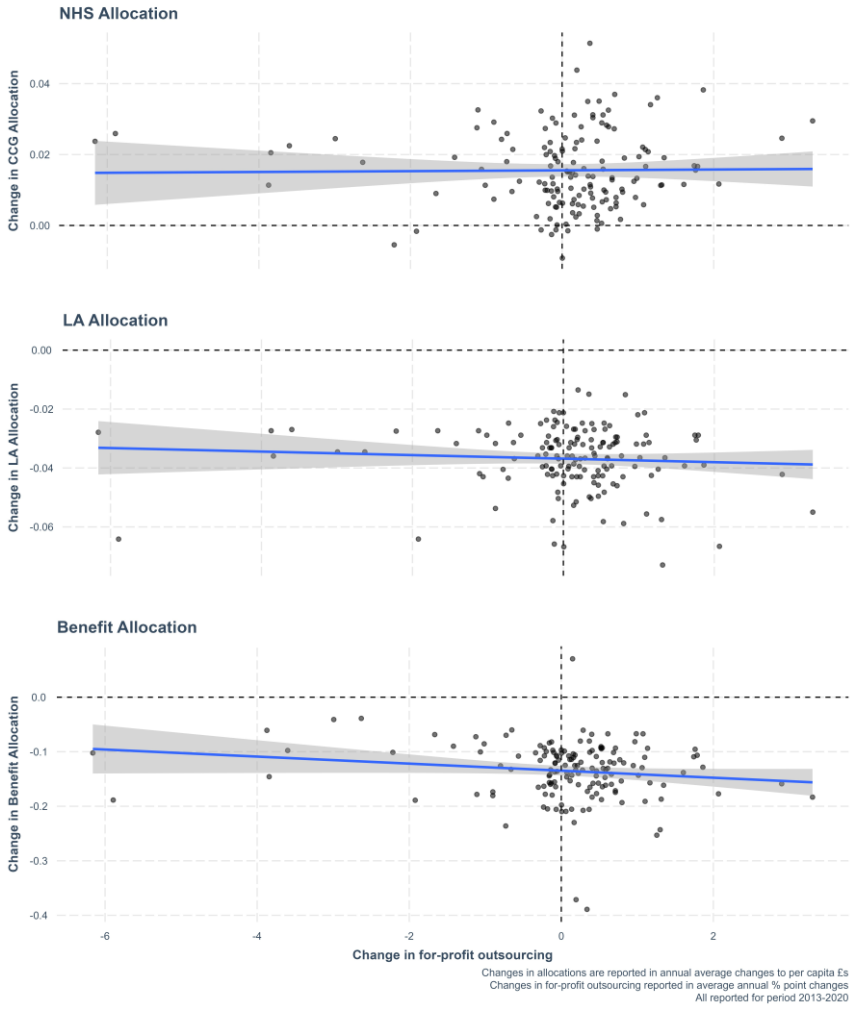


Table 1 assesses the same associations as in figure 3, but using panel regression models whilst controlling for population size and total CCG expenditure. The results in table 1 show that an decrease in £1000 per capita of NHS funding corresponds in an decrease in 4.41% points (95% CI -2.40 to 11.21) of for-profit expenditure. This finding is statistically insignificant at the p=0.05 level, suggesting that the relationship is not strong enough, the sample size not large enough, or the variation too wide to identify a meaningful relationship between austerity and privatisation. The effect size is also small. An increase in £1000 per capita would represent a doubling of NHS allocation for many CCGs, but this would not correspond with a radical change in the % of for-profit outsourcing. Results are similar for the allocation of nearby Local Authorities and expenditure on benefits.

Table 1: Association between austerity and privatisation

	For-profit Outsourcing (%) [.95 ci]	p-value	For-profit Outsourcing (%) [.95 ci]	p-value	For-profit Outsourcing (%) [.95 ci]	p-value
CCG Allocation (£000s per capita)	4.4060 [-2.4012, 11.2133]	0.3488				
LA Allocation (£000s per capita)			-3.4317 [-9.0118, 2.1484]	0.3003		
Benefit Allocation (£000s per capita)					5.4118 [-16.1126, 26.9362]	0.6818
Num.Obs.	608	608	785	785	784	784
R2	0.002	0.002	0.002	0.002	0.005	0.005
R2 Adj.	-0.374	-0.374	-0.291	-0.291	-0.288	-0.288
CCG Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes	Yes

Table reports results from multivariate longitudinal regression models.

Robust Ses are clustered at CCG level and use a bias-reduced linearization estimator (CR2)

Lag of one year applied to allocation variables which are also log transformed

Control variables are total commissioner spend and population size

Table 2 recreates the finding from Goodair and Reeves (2022) that for-profit outsourcing corresponds with higher mortality rates. Column 1 shows that an increase of 1 percentage point of for-profit outsourcing is associated with an increase in 0.39% (95% CI 0.2 to 0.58) more treatable deaths per 100,000 in the population. Table 2 then tests whether this relationship is confounded by government austerity by controlling for funding levels. When controlling for CCG funding, LA funding and benefit spend, the effect size between privatisation and mortality rate remains the same, and the statistical significance of this relationship increases (becomes even more significant with lower p-value and narrower confidence intervals). For full regression models see appendix A4.

Appendix A5 presents results from similar analyses to see if the relationship between privatisation and mortality is moderated by levels of government funding. Similarly, we find no statistically

significant relationship for the interaction between austerity and privatisation. The relationship between privatisation and mortality rates does not vary according to the experiences of austerity.

Table 2: Assess confounding of privatisation and mortality relationship.

	Ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value
For-profit outsourcing (%)	0.0039 [0.0020, 0.0058]	0.0058	0.0038 [0.0020, 0.0056]	0.0052	0.0039 [0.0019, 0.0058]	0.0064	0.0040 [0.0021, 0.0058]	0.0045	0.0039 [0.0021, 0.0057]	0.0048
CCG Allocation (£000s per capita)			-0.1964 [-0.5349, 0.1421]	0.2625					-0.2085 [-0.5565, 0.1396]	0.2475
LA Allocation (£000s per capita)					0.0514 [-0.2411, 0.3439]	0.7328			0.1350 [-0.1816, 0.4517]	0.4097
Benefit Allocation (£000s per capita)							-0.0460 [-0.1220, 0.0300]	0.2649	-0.0521 [-0.1326, 0.0285]	0.2412
Num.Obs.	502	502	484	484	502	502	502	502	484	484
R2	0.049	0.049	0.049	0.049	0.049	0.049	0.051	0.051	0.052	0.052
R2 Adj.	-0.357	-0.357	-0.359	-0.359	-0.361	-0.361	-0.358	-0.358	-0.362	-0.362
CCG Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table reports results from multivariate longitudinal regression models.

Robust Ses are clustered at CCG level and use a bias-reduced linearization estimator (CR2)

Lag of one year applied to allocation variables

Tr. Mortality and allocation variables are log transformed, "Ln" denotes the natural log of outcome variable.

Control variables are household income, total commissioner spend and population size

Table 3 displays the results from a dynamic panel models which regresses the regional expenditure on social security payments against amenable mortality rates. The first row of the table represents the association between benefits expenditure and amenable mortality in the following year. It shows a consistent negative relationship. For example, a £1000 per capita increase in benefit expenditure correspond to a decrease in 2.6% (95% CI 0.3 to 4.9) of avoidable mortality in the following year.

Columns 4-6 in table 3 control for the rates of for-profit outsourcing. The main relationship between benefit expenditure and mortality rate does not change in interpretation. The effect size becomes very slightly larger and the strength of the association slightly more significant. The results also identify the same relationship between privatisation and Increased treatable mortality displayed in table 2. The results of table 3 suggest that the declines in benefit expenditure may have corresponded with higher mortality rates on top of the increases associated with higher NHS privatisation. It also shows that each these relationships are not confounded by the other.

Table 3: Assess mediation of austerity and mortality relationship.

	Treatable Mortality		**Preventable Mortality**		**Avoidable Mortality**		**Treatable Mortality**		**Preventable Mortality**		**Avoidable Mortality**	
	Estimate [95% ci]	**P-value**	**Estimate [95% ci]**	**P-value**	**Estimate [95% ci]**	**P-value**	**Estimate [95% ci]**	**P-value**	**Estimate [95% ci]**	**P-value**	**Estimate [95% ci]**	**P-value**
Lag Benefits Allocation [1]	-0.0361 [-0.0803-0.008]	0.1089	-0.0319 [-0.05—0.0139]	0.0005	-0.0261 [-0.0488—0.0033]	0.025	-0.044 [-0.0817—0.0064]	0.0218	-0.0337 [-0.0495—0.018]	<0.001	-0.0309 [-0.0502—0.0116]	0.0017
Lag Benefits Allocation [0]	0.0266 [-0.041-0.0942]	0.4398	0.0199 [-0.0042-0.044]	0.1053	0.0089 [-0.0151-0.0329]	0.4659	0.036 [-0.0234-0.0953]	0.2349	0.0215 [-0.0028-0.0458]	0.0829	0.0127 [-0.0083-0.0338]	0.2364
Lag For-Profit Outsourcing % [1]							0.0051 [0.003-0.0072]	<0.001	0.0014 [-0.0016-0.0043]	0.3624	0.0021 [0.0004-0.0039]	0.0149
Lag For-Profit Outsourcing % [0]							0 [-0.0027-0.0026]	0.9712	0.0009 [-0.0006-0.0025]	0.2404	0.0005 [-0.0008-0.0018]	0.4386
Lag Mortality [2]	-0.1797 [-0.3776-0.0183]	0.0752	-0.3214 [-0.5923—0.0506]	0.02	-0.3292 [-0.6254—0.033]	0.0294	-0.1627 [-0.3554-0.0299]	0.0979	-0.3322 [-0.5951—0.0693]	0.0133	-0.3332 [-0.593—0.0733]	0.012
Lag Mortality [1]	-0.3838 [-0.7591—0.0085]	0.045	-0.9433 [-1.4566—0.43]	0.0003	-0.9078 [-1.5689—0.2468]	0.0071	-0.329 [-0.6846-0.0266]	0.0698	-0.9686 [-1.4545—0.4826]	0.0001	-0.8974 [-1.4752—0.3197]	0.0023
N	319	319	319	319	319	319	319	319	319	319	319	319

[a] Table represents results from a 'Generalised Methods of Moment' dynamic panel model

[b] Cis are calculated using robust Ses

[c] Benefit allocation and mortality rates are log transformed

Appendices A9 and A10 repeat this analysis for NHS and LA allocations and find null associations between our other austerity measures and mortality rates. However, all the results of these analyses, including those presented in table 3, should be interpreted with caution given the small n which are inevitable because of including multiple lags and the short time-period available for analysis. Furthermore, the null results of LA and NHS allocation might be because we are limited to the post-2013 period due to the privatisation data. These indicators have been shown to be associated with increased mortality when analysing the data from 2010 onwards, when the austerity cuts first came in (Alexiou et al. 2021; Martin et al. 2021; Watkins et al. 2017).

Discussion

The results of this paper suggest there was no geographic association between the level of public funding and NHS outsourcing. Moreover, our results suggest that the impact of outsourcing appear to be distinct from the harm caused by austerity, suggesting that privatisation policies caused additional harm to service users, rather than alleviate it. This has several large implications for our understanding of how privatisation functions and its potential impacts on the quality of care.

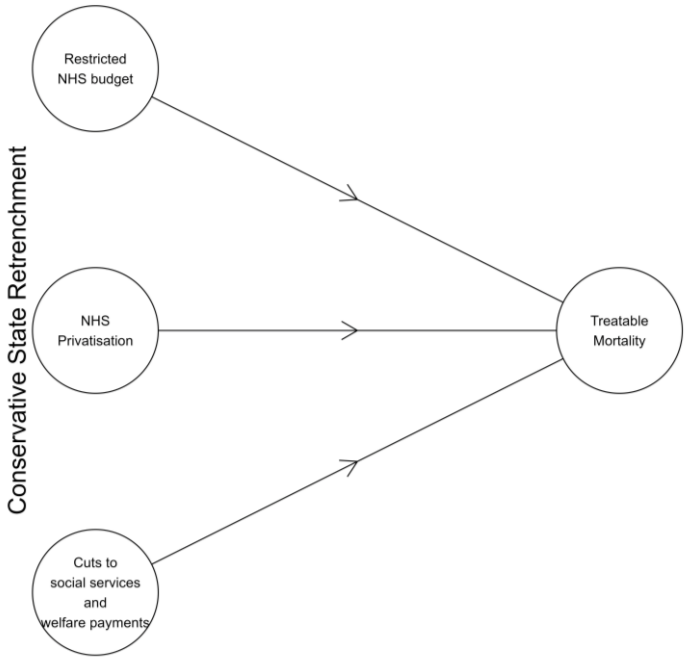
NHS privatisation in England is associated with more people dying of treatable causes regionally; a trend that has coincided with government austerity programmes that have since been coined as the 'lost decade' or 'the decade that broke Britain' (Farnsworth 2021; Toynbee and Walker 2020). Cuts to public services and benefits are widely evidenced to cause worse health outcomes for the population (Stuckler and Basu 2013). Privatisation was meant to alleviate this harm by enabling commissioners to uphold quality at reduced costs, but the evidence in this paper suggests that not only are austerity and privatisation unrelated, but they each seem to have directly and independently exacerbated mortality outcomes.

The pathways to harm related to austerity cuts are well documented (Loopstra et al. 2014, 2015; Stuckler and Basu 2013). But there is less research that explains how privatisation can be thought to cause poorer healthcare outcomes. Opponents of privatisation suggest that this is explained by a) quality differentials between for-profit and public providers, meaning that privatisation simply introduces more poorly performing providers into the NHS; or b) 'knock on effects' of privatisation – the idea that outsourcing services might impact on the ability of public hospitals to maintain quality standard given changes to their income and patient case-mix (Goodair and Reeves, forthcoming). Further research is urgently needed to tease out these mechanisms empirically and evidence the causal pathway from privatisation to deteriorating patient health.

These findings are timely as both the Conservative and Labour parties are planning further privatisation of services (Department of Health and Social Care 2023; Streeting 2022). The absence of a relationship between funding levels and outsourcing are particularly noteworthy, in that it questions the potential of privatisation as a tool to improve quality and costs, even if more money was available to healthcare commissioners.

Figure 4 describes the consequential causal pathways suggested by our investigation. Privatisation, NHS spending cuts and cuts to social services and benefits are all associated with higher levels of amenable mortality at the regional level – but they do so independently of each other.

Figure 4: Diagram of suggested causal pathway following investigation.



A final implication, which is worthy of further investigation is that, in a period of severe financial strain, for there to be zero relationship between average financial burden and outsourcing – suggests that privatisation has not been implemented because NHS commissioners are dealing with the conditions of underfunding. This leaves open the question as to whether cheaper services are available in the private sector. Previous research finding little differences in the productivity of public and private hospitals (Kruse et al. 2018a; Tynkkynen and Vrangbæk 2018). However further research should test whether the privatisation of services results in cheaper services on aggregate.

The intention of this paper is not to suggest that the two policies have no relationship. Politically, they have been introduced as connected policies that are both designed to retrench the state. Importantly, it was the 'austerity politics' of the 2010s - as opposed to financial austerity – which enabled policies such as those which increased NHS privatisation (Farnsworth 2021). Their common political roots mean that we can and should scrutinise effects they have had together. Our results indicate that that

each policy has contributed independently to the deterioration of the NHS, and that privatisation was not systematically associated with austerity cuts.

The null relationships identified between finances and privatisation in healthcare may not hold for other services like social care – where the cuts to the commissioners (Local Authorities) have been much more severe and the increases in outsourcing much higher (Bach-Mortensen et al., forthcoming). The more regulated healthcare sector in England may have protected the sector against inverse provider incentives, compared to other public services, even if we still see associations with worse health outcomes.

Conclusion

It is inherently difficult to analyse the impact of public service reforms in England in the 2010s separately from the underlying austerity programme in which they were implemented. The same goes for NHS privatisation, which was introduced in an attempt to cut costs in healthcare without compromising quality. This paper is the first to test whether the impacts of NHS privatisation are dependent on levels of government funding. In finding that funding levels largely do not impact privatisation, our results suggest that the impacts of privatisation are likely independent and thus serve as an additional source of harm on top of that caused by austerity. Consequently, privatisation and austerity cuts should be treated as distinct concerns to the disastrous developments experienced by the NHS.

The results of this paper have important implications for the continued privatisation of healthcare provision in England. In a scenario in which fiscal austerity is alleviated, it might be expected that privatisation would not have harmed healthcare quality. The findings in this paper would suggest otherwise and that the privatisation of healthcare services has similarly poor effects on health outcomes regardless of the fiscal environment.

Paper 4: What is the impact of healthcare privatisation on the quality of care?

Benjamin Goodair and Aaron Reeves

Abstract

Over the last 40 years, many healthcare systems that were once publicly owned or financed have moved toward privatising their services – primarily through outsourcing to the private sector. But what has the impact been of privatisation on the quality of care? One key aim of this move is to improve quality of care through increased market competition along with the benefits of a more flexible and patient-centred private sector. However, there was political opposition to these reforms on the grounds of concerns that these reforms would result in worse care at the system level, in part because it is easier to reduce costs rather than increase quality. Many of these reforms took place decades ago and there have been a number of studies which have examined their impact on the quality of care received by patients. We narratively review this literature, focussing on the impact of outsourcing healthcare services in high-income countries. We find that hospitals converting from public to private ownership status tend to make higher profits, primarily through the selective intake of patients and reducing staff numbers. We also find that aggregate increases in privatisation are frequently corresponding with worse health outcomes for patients. There are very few studies evaluating this important reform and many gaps to the literature. However, based on the evidence available, our review provides evidence challenging the justifications for healthcare privatisation and concludes that the scientific support for further privatisation of healthcare services is weak.

Introduction

Healthcare privatisation is a policy of transferring the provision of public services to private individuals or companies. Many nationalised healthcare services have pursued privatisation since the 1980s in the hope that mixed markets and the inclusion of private sector interests, can improve the quality of care at a cheaper cost. While many forms of privatisation exist, including the shifting of funding from the state to individuals, one popular form of privatisation is the 'contracting-out' or 'outsourcing' of

services.(Burchardt 1997b) In this model, a publicly funded service maintains decision-making powers but contracts a private organisation to fulfil an agreed service. While this model of service provision is intuitively appealing and remarkably popular, its desirability is still heavily contested.

Advocates of using the private sector argue that financial accountability compels private companies to ensure patients' well-being, seek innovation, and eliminate unnecessary bureaucracy. This would give these firms a competitive edge over the public sector, which is often constrained by rigid cultures, regulations, and lack of incentives to innovate.(Bosanquet 1999; Le Grand 2013) Private sector providers may also bring with them competition effects, improving performance across the board as all providers are forced to deliver better quality if they are to win the custom of the commissioning bodies (especially when prices are relatively fixed, which often happens when there is a single purchaser, such as central government).(Le Grand 2007b; Niemietz 2015)

However, the profit motive may not always result in desired outcomes. Encouraging private providers to prioritise care quality is challenging for public bodies, as quality may be difficult to observe and rationally prioritise. Information asymmetry arises as commissioners struggle to identify quality and performance levels among providers.(Besley and Malcomson 2018) Competitive markets may even discourage providers from revealing service quality information. In such cases, observable outcomes like service cost might become prioritized, especially when improving quality compared to competitors is challenging. Thus, in certain healthcare systems, the relationship between competition and care quality is much less measurable.(Gaynor, Ho, and Town 2015) In the absence of correct incentives for private providers to prioritise care quality, they may act in ways that make – what are perceived to be – marginal sacrifices in quality in return for large reductions in cost, such as reducing staff, lowering staff pay, cherry-picking profitable patients, over-prescribing services, or discharging patients prematurely.

Previous reviews on this topic have tended to focus on the impacts of hospital ownership on quality cross-sectionally – comparing outcomes in public and private providers.(Herrera et al. 2014; Kruse et

al. 2018b) These studies can help us understand how private sector providers behave differently than public sector providers – and whether, therefore, more of them being folded into a healthy service might improve the quality of their offering. Such evidence is inconclusive, however, for two reasons. First, cross-sectional analyses of ownership often struggle to identify a comparison group which conducts similar services to similar types of patients. More specifically, the private sector frequently treats healthier case-mixes in mixed markets. Indeed, evidence suggests that those accessing privately provided healthcare tend to have more resources and better health (Beckert and Kelly 2021b; Crothers et al. 2022b). Consequently, comparing outcomes in public and private hospitals will be difficult to control for the bias of healthier patients being selected in private hospitals and having better outcomes, not because of the quality of care, but because of their underlying health status. the impact of ownership is only part of the justification for privatisation.

Second, focusing on ownership status overlooks a major reason for privatisation – that competition between providers should produce positive spillover effects on the quality of care among public providers. If outsourcing is to work as theorised by its proponents, public providers will improve their quality of care by learning from the innovative private sector providers, or because of intrinsic motivation to avoid losing contracts to the private sector. Competition will, in theory, also allow commissioners to be more demanding in the contracting process. Consequently, any differences between public and private providers may be biased and not adequate to understand the full impacts of increased outsourcing.

We address these limitations in some of parts of the existing literature by focussing this review on longitudinal studies, which have meaningful comparison groups or try to account for bias and measure aggregate effects of increases in outsourcing.

Methods

Search strategy and selection criteria

The purpose of this review is to aggregate and summarise the existing evidence about healthcare privatisation. We searched PubMed for journal articles evaluating the impact of outsourcing written in English from any publication year. We made several decisions about our inclusion criteria for material which are reported in table 1, our full search string used to identify articles is available in Supplementary material A1.

Table 1: Inclusion and exclusion criteria

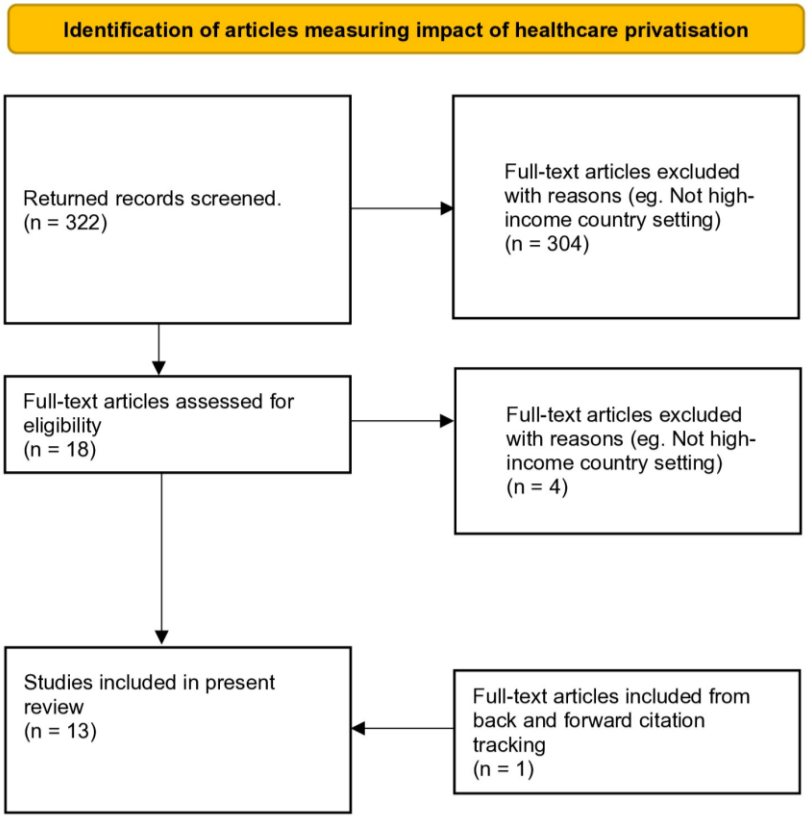
Inclusion Criteria	Exclusion Criteria	Justification
High income country setting (Identified by OECD countries)(OECD 2023)	Low- and middle-income country setting	The reasons for privatisation differ greatly between high-income and low-income contexts where outsourcing might be aiming for greater healthcare coverage as opposed to quality of care.
Analyses privatisation of healthcare services	Analyses social care services. Analyses healthcare services not related to privatisation.	Social care services are often subject to different marketisation policies, different measures of quality and are worthy of their own reviews.
Transition from public to private (either for-profit or not-for-profit).[1]	Transition from one type of private provider to another. Increase in private and public.	The type of privatisation of interest is the relative increase in private providers compared to public providers.
Longitudinal analysis	Cross-sectional measures	Longitudinal analyses can better control for selection effects
Quantitative analysis	Only qualitative analysis	For the sake of this review, we are interested in measuring a quantity of effect size.
Measure of quality of care (taken from (Donabedian 2005; NHS England 2022)) (eg. health outcomes such as mortality rates; healthcare intensity such as length of stay; healthcare provision such as	Solely financial analyses	Our interest is on the quality of care – ultimately on people's health outcomes.

[1] While many of the theoretical reasons for expecting privatisation to impact quality of care – in either direction – centre on the 'profit-motivation' in the private sector, we include outsourcing to the third sector because it is not necessarily the case that the two sectors are perfectly distinct and that profit motivation doesn't exist in the third sector (see for example, Jones et al).(Jones, Propper, and Smith 2017) Most studies also differentiate between the two allowing us to differentiate the effects between each sector.

staffing ratios; or healthcare accessibility such as waiting times).		
Focus on 'contracting out'/ 'outsourcing' type of privatisation	Analysis of private financing of health	We are interested in the popular reforms of mixed markets delivering a publicly funded health service.
Include a comparison group	Analysis of before/ after trends without comparison to units with less or zero privatisation.	Comparison groups are important to measure relative trends of the privatised and non-privatised units of analysis.

Our search returned 322 articles, of which thirteen were identified as fulfilling our inclusion criteria after screening and assessment. Figure 1 shows the number of articles returned and the process taken for screening a full list bibliography of included studies is available in Supplementary material A2.

Figure 1: Prisma chart of articles searched and excluded.



Synthesis strategy

We follow a process of 'synthesis without meta-analysis' (SWIM) designed for complex interventions.(Higgins et al. 2019) The reason for this approach is that answering whether privatisation impacts quality of care requires careful analysis of quantitative studies – but

privatisation is often implemented in a piecemeal and incremental way meaning studies are not comparable enough for meta-analysis.

We extracted data on publication information, country of study, intervention type, methods, key findings, outcomes, effect direction and sizes. We performed a critical appraisal of each study using the risk appraisal tool: Cochrane ROBINS-I for non-randomised studies of interventions.(Sterne et al. 2016) The results of this risk of bias appraisal are presented in supplementary material A3. Given the small number of studies included we inductively created two categories based on the two identification strategies which were used in the methods of the articles.

Findings

Two types of papers came through our search and screening process – those which assessed the impact of hospitals converting from public to private status and those which conducted longitudinal regressions at an ecological level on variation in the levels of privatisation.

We begin with the articles which track the quality of care (measured in various ways) received by patients before and after a hospital converts from public to private ownership status (Table 2). 3 of these studies were from the USA, 2 were from Germany, and there was one paper on Croatia, Canada, and South Korea each. Methodologically, 5 of these papers used difference-in-differences models or fixed-effects regression models (which control for time-invariant variables). The range of outcomes included in their models were diverse but 3 focussed on staffing levels, 1 examined patient mix by insurance type, while the rest explored a rage of quality-related outcomes, such as workload for doctors and other employees, the number of services provided, and injuries among hospital employees.

The overriding theme of these studies was that privatised hospitals tended to search for more financial efficiencies by changing the case mix of patients and by reducing the levels of staffing. Some of the papers concluded that this could have negative implications for the quality of care. One notable

exception was from the only article to study primary care conversions, which found improvements in how patients received their appointments.

Table 2: Outcomes associated with hospitals converting from public to private.

Study	Country	Treatment	Method	Sample size	Findings summary	Outcome	Sub-group	Direction
Ramamonjiarivelo et al., 2021(Ramamonjiarivelo, Weech-Maldonado, et al. 2021)	USA	Hospitals converting from public to private	fixed-effects regression	29 hospitals to FP, 75 to NFP, 388 no change public	After privatisation, hospitals changed their case-mix taking on more (lucrative) Medicare payers and fewer (less lucrative) Medicaid payers in FP conversions.	Medicare payer mix	FP	↑
							NFP	↑
						Medicaid payer mix	FP	↓
							NFP	↔
Heimeshoff, Schreyögg & Tiemann, 2014(Heimeshoff, Schreyögg, and Tiemann 2014)	Germany	Hospitals converting from public to private	matched diff-in-diff	66 hospitals to FP, 22 to NFP, 73 no change public	After privatisation, hospitals decreased their staffing levels, particularly in for-profit conversions.	Total staff	All	↓
							FP	↓
							NFP	↔
						Physicians	All	↔
							FP	↔
							NFP	↔
						Nurses	All	↓
							FP	↓
							NFP	↔
						Other clinical	All	↓
							FP	↓
							NFP	↑
						Admin	All	↓
							FP	↓
							NFP	↔
						Other non-clinical	All	↓
							FP	↓
							NFP	↔
Ramamonjiarivelo, Hearld & Weech-Maldonado, 2021(Ramamonjiarivelo, Hearld, and Weech-Maldonado 2021)	USA	Hospitals converting from public to private	fixed-effects regression	247 hospitals to FP; 641 to NFP	After privatisation, hospitals hired fewer nurses, particularly the highest qualified nurses.	Registered Nurses	FP	↓
							NFP	↓
						Licensed Practical Nurses	FP	↔
							NFP	↔
						Nursing Assistive Personnel	FP	↔
							NFP	↓
						Total Nurses	FP	↓
							NFP	↓
						Total Nurses (subsample)	FP	↓
							NFP	↓
						Registered Nurse ratio	FP	↔
							NFP	↔
						Registered Nurse ratio (subsample)	FP	↔
							NFP	↔
Tiemann & Schreyögg, 2012(Tiemann and Schreyögg 2012)	Germany	Hospitals converting from public to private	matched diff-in-diff	99 hospitals to FP, 33 to NFP, 128 no change public	After privatisation, hospital efficiency increased. (efficiency defined as number of inpatient treatments per spending on supplies and staff time). Efficiency was achieved as staffing levels were decreased.	Hospital efficiency	FP	↑
							NFP	↔
						Physicians	FP	↔
							NFP	↔
						Nurses	FP	↓
							NFP	↔
						Clinicians	FP	↓
							NFP	↔
						Administrative	FP	↔
							NFP	↔
						Non-clinical	FP	↓
							NFP	↓
						Supplies	FP	↓
							NFP	↔
						Inpatient occupancy rate	FP	↔
							NFP	↔
Hebrang et al., 2002(Hebrang et al. 2003)	Croatia	Hospital conversion to private	chi squared test	96 hospitals converting, no control group compared	After privatisation, GPs generally improved their accessibility to primary care – giving more precise times and more services like telephone follow-ups after working hours.	Visits to practice after hours		↔
						Telephone advice available after working hours		↑
						Practitioner estimated time spent in waiting room		↓
						Appointment time honoured		↔

						Precision of appointment time		↑
Siganporia et al., 2016(Siganporia et al. 2016)	Canada	Hospital outsourcing services to private companies	Longitudinal negative binomial regression	1509 injuries in outsourcing hospitals	After outsourcing cleaning and catering services, some claims for injuries by employees decreased. Qualitative follow-up interviews suggest underreporting is more common in outsourced settings.	Short term disability injuries	cleaners	↔
							food service workers	↓
						Length of injury	cleaners	↓
							food service workers	↔
						Cost per injury	cleaners	↓
							food service workers	↔
Oh et al., 2011(Oh et al. 2011)	South Korea	partial conversions to private hospital	descriptive statistics	3 converted hospitals, 9 public hospitals	Employment conditions in privatised hospitals descriptively declined – with more short-term contracts, higher workload, and more unequal pay between physicians and other workers.	Workers' wages		↓*
						Doctors' wages		↑*
						Outpatients per staff		↑*
						Inpatients per staff		↓↑* (some hospitals increased, some decreased)
						Temporary employment contracts (%)		↑*
						Revenue per patent		↑*
Villa & Kane, 2013(Villa and Kane 2013)	USA	Hospitals converting from public to private	diff-in-diff and changes before/after with t-test	22 hospitals converting to private, control group unknown	Privatised hospitals increased their profit margins, they decreased the duration of patient stays, and experienced increased occupancy rates. They also reduced accessibility by cutting services and increasing price markups.	Occupancy rate of staffed beds		↔
						Patient length of stay		↔
						Inpatient expenses per admission		↔
						Charity care %		↓*
						Uncompensated care %		↓*
						Patient debt %		↓*
						Number of types of services provided		↓*
						Margin (profit)		↔
						Operating margin (profit)		↑
						nonoperating margin (profit)		↔
						Mark-up ratio		↔

* Refers to no statistical test for significance

Another group of studies looked at aggregate effects of privatisation by assessing changes over time in outsourcing and some outcome to represent quality of care. There were 5 studies in this group. 2 of these studies were based in the UK, 1 in Sweden, 1 in Italy, and 1 in the USA, although the study from the USA is slightly distinct in that it examines the privatization of healthcare services offered to prison inmates. 4 of these papers used fixed-effects regressions (controlling for time invariant variables) and 1 used an interrupted time series design. 3 of these papers used a measure of avoidable or treatable mortality (chosen to focus on deaths that should have been preventable with appropriate care), 1 focused on MRSA infections, and 1 focussed on mortality of prison inmates.

Most of these kinds of studies identified negative associations with increased outsourcing corresponding with worse quality care. One study found that a privatising reform improved care

across the entire sample – but that places with the highest levels of private provision had relatively worse outcomes.

Table 3: Ecological studies of impacts of outsourcing

Study	Country	Treatment	Method	Sample size	Findings summary	Outcome	Sub-group	Direction * Refers to no statistical test for significance
Mosquera et al., 2021(Mosquera et al. 2021)	Sweden	high private provision	Interrupted Time series	672 region-years	After a privatising reform, avoidable hospitalisations decreased across the country. However, areas with the most private providers saw relative increases and there was no difference between areas with intense privatisation and non-intense.	Avoidable hospitalisations		↑
		early reform						↔
		intense reform						↔
		before after reform						↓
Goodair & Reeves, 2022(Goodair and Reeves 2022c)	England	For-Profit expenditure (total)	FE reg	609 region-years	Increases in regional health expenditure on for-profit companies correspond with increases in treatable (medically curable) mortalities.	Treatable Mortality		↑
		For-Profit expenditure (%)						↑
Quercioli et al., 2013(Quercioli et al. 2013b)	Italy	For-Profit expenditure (total)	FE reg	209 region-years	Increases in spending improve mortality rates but increases in for-profit spending do not. Further increases in % of money going to for-profit providers increases mortality	Avoidable Mortality		↔
		For-Profit expenditure (%)						↑
Toffolutti et al., 2017(Toffolutti et al. 2017b)	England	Outsourced cleaning services	FE reg	582	Hospitals with outsourced hospital cleaning services had higher rates of in-hospital bacterial infections. Satisfaction with the services was also lower as was the staffing and expenditure on cleaning services.	MRSA hospital infection rate		↑
				446		Satisfaction with clean room		↓
				446		Satisfaction with clean toilets		↓
				362		Handwashing availability		↓
				446		Cost of service		↓
				442		Staffing		↓
Bedard & Frech, 2009(Bedard and Frech III 2009)	USA	Outsourced prison healthcare (percent of staff contracted externally)	FE reg	750 prison-years	Increases in contracted-out healthcare workers correspond with increases in inmate mortality.	Inmate mortality		↑

Impacts on health outcomes.

At an ecological level, higher rates of privatisation and outsourcing were almost always corresponding with worse health outcomes in the studies included in this review. Two papers looked at regional levels of privatisation for an entire country and both find that increases in the percent of outsourcing corresponds with higher avoidable mortality rates.(Goodair and Reeves 2022c; Quercioli et al. 2013b) The only other paper assessing mortality rates, did so in incarcerated populations – also finding increases as the proportion of outsourced healthcare rises.(Bedard and Frech III 2009) Meanwhile, outsourced cleaning services corresponded with higher rates in inpatient infection.(Toffolutti et al. 2017b) More nuanced results were found in Sweden when outcomes in avoidable hospitalisations improved across the country after a privatising reform to primary care – however there were null

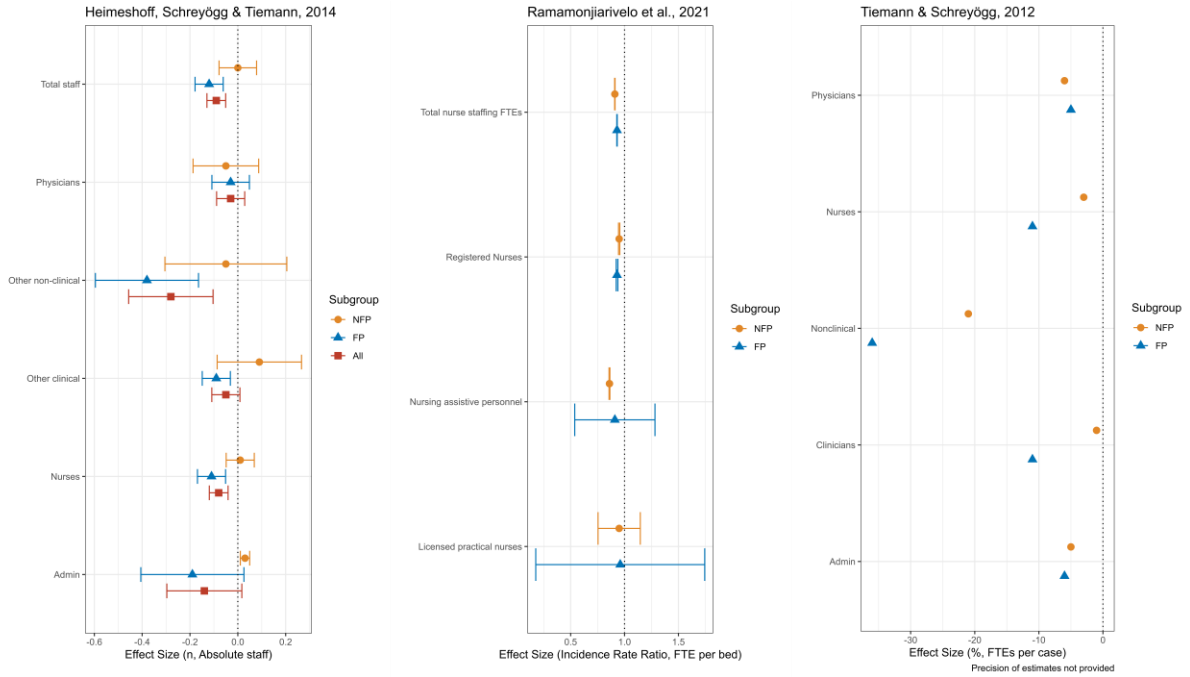
differences between intense or early takers of the reform compared to other areas and places with the most private provision had relatively worse outcomes.(Mosquera et al. 2021) No studies in this review found that relative rises in privatisation correspond with better health outcomes for patients.

None of the papers assessing hospital conversions included health outcomes – an important gap in the literature identified in this review.

Impacts on staffing.

Studies assessed staffing either as an intrinsic measure of the likely quality of care received by patients or in terms of the employment conditions experienced by staff. Several papers specifically measured the relative difference in staffing rates before and after hospital privatisation. Figure 2 summarises the outcomes identified in these studies. Generally, studies found that outsourcing corresponded with fewer staff employed per patient.(Heimeshoff et al. 2014; Ramamonjiarivelo, Hearld, et al. 2021; Tiemann and Schreyögg 2012) This was true too, of cleaning staff.(Toffolutti et al. 2017b) However, the effect did vary between type of staff. For example, it was only the highest qualified nurses which had reduced numbers in the USA. Whilst in the two studies which measured it, physicians were not reduced after privatisation where most other staffing categories were.

Figure 2: Effect of hospital conversion on staffing ratios



Other articles looked at employee outcomes such as wages, contracts, and health of employees. In Canada the outsourcing of food and cleaning services corresponded with some examples of fewer work-related injuries and shorter periods been taken for each work-related injury (as well as some null changes).(Siganporia et al. 2016) Interestingly, a qualitative follow-up suggested that the likelihood of under-reporting of these incidents after privatisation made interpreting the data difficult – and unsure about whether privatisation really improved employment conditions or just supressed data reporting. A separate paper assessed, descriptively, changes in wage inequality, job security and workload in South Korea, finding worsening results of privatised services on all those dimensions compared to non-privatised.(Oh et al. 2011) The sample was too small in this paper, however, to conduct inferential statistics.

Impacts on accessibility of healthcare.

Three papers assessed some form of healthcare accessibility with mixed results. On the one hand, two papers assessing hospital conversions from public to private in the USA found that hospitals became less accessible for different reasons: either because the case mix shifted towards more profitable

patients or because the number of services provided were cut.(Ramamonjiarivelo, Weech-Maldonado, et al. 2021; Villa and Kane 2013)

Alternatively, conversions to private ownership status in primary care practices in Croatia, meant that patients started receiving more precise appointment times and opportunities to access healthcare through new means, such as out of hours phone calls.(Hebrang et al. 2003)

Overall, the results suggest that accessibility of care might be impacted in different directions, with more precise appointment time and less waiting but with impacts which could disadvantage some groups – particularly those whose treatments are less profitable to the private sector.

Impacts on financial performance.

This review was not attempting to assess the impact of privatisation on cost-effectiveness – which is related to but different from the question of the quality of care. Consequently, the results in this review are partial – and studies focused solely on financial outcomes might have different conclusions. However, there was a trend – among the papers which reported some measure of healthcare quality – that profit margins of hospitals which converted to for-profit status tended to rise. However, it was also the case that hospitals which converted to for-profit status had, on average, much worse financial performance than the public hospitals which remained public, therefore it is possible that there is a selection effect here. More work needs to be done on this question.

Discussion

In this paper, we narratively review the evidence on the impact of outsourcing health services on the quality of care, focusing on those studies that provide stronger evidence relatively to other work in this field because they used longitudinal data which enabled them to track change over time. Taken together, it paints a picture of reforms which frequently change the provision of healthcare, reducing the comprehensiveness and the generosity of care. Unfortunately, these efficiency gains do not seem to be benign, with our studies suggesting that outsourcing tends to worsen health outcomes. The

overwhelming majority of results in this review suggest that privatisation reduces the quality of care and worsens the health outcomes of patients subjected to it.

What does this mean for the future provision of healthcare? As governments consider how to respond to the fallout of the COVID pandemic on the healthcare system – as well as the longer-term responses to aging populations and constrained budgets, they may look for a silver bullet which promises better quality care at cheaper cost (Streeting 2022). However, the evidence in this review suggests that there is a risk that governments seek short-term reductions at the expense of long-term outcomes in part because privatisation via the outsourcing of services to the private sector does not seem to deliver both better care and cheaper care.

Our review also potentially has implications for the broader theoretical arguments made in favour of privatisation in many areas. The evidence compiled here does not unambiguously align with the expectations of mixed markets, namely that they would improve quality by increasing competition. This does not undermine the basic theoretical mechanism per se but rather suggests that some areas of the welfare state, such as education and healthcare, may be structured in ways which make them less susceptible to the kinds of incentives that operate in other markets. For example, finding innovations which improve quality in the healthcare setting or even education may be harder to find than in some areas of the economy and this may diminish the incentives to compete on quality (Arrow 1963). Appreciation of this variation may give governments pause before they pursue costly, time-consuming, and often demoralising reforms in sectors where the scope for quality improvements are potentially small in the short-run.

The findings of this review focus on conversion from public services to privately delivered services. However, this process is often not entirely as clear cut as the full transition to private services – and subtle forms of privatisation such as public-private partnerships may harder to evaluate. For example, a distinction is frequently in the studies made between for-profit and not-for-profit private organisations. In the studies included in this review it is typically the case that transitions to for-profit

provision result in larger declines in the quality of care – but that transitions to not-for-profit private organisations also frequently results in declines in healthcare quality. One of the reasons for this may be that not-for-profits can behave in similar ways to for-profit organisations (Needleman 1999). Alternatively, we may have found greater differences between other categories of ownership had the studies included these subcategories – for example the particularly poorly performing private equity owned healthcare providers (Borsa et al. 2023).

There are some limitations to this review worth considering, including that no study on privatisation has been conducted in a randomised trial, meaning that results are necessarily open to potential biases in their internal validity – for example when changes to legislation also change financial reporting, payment systems and reimbursement processes simultaneously, or whether there is a loss to services that occurs alongside privatisation. It is worth noting that such an RCT is very unlikely to ever happen in practice and even if there was a government willing to embed randomisation in the roll-out of a privatisation reform it would be hard to ensure the randomisation process was not violated in some way. In other words, the 'gold standard' research designs able to address this question are likely quite different from more individual-level reforms or interventions, and we would argue that this should alter how we view the evidence compiled here. This is not just the best evidence we have right now but many of these studies will likely remain among the best evidence we are ever able to collect in this area.

Similarly, the evidence in this review comes from a relatively small number of high-income countries – just eight. Our results obviously do not apply to middle and low-income countries and it is possible that these processes look very different in those contexts, especially where the baseline for public provision is not as well-resourced as it is in some of the high-income contexts included in this review. On top of this, while systematic reviews tend towards uncovering the 'true' effect of an intervention the effect of privatisation will very likely be contingent on the social and institutional background in which those reforms occur. It would be premature to say that privatisation never works (indeed our

included studies suggest some positive impacts in some specific settings) and we need more research to understand when outsourcing might improve quality and not just cut costs.

There are lots of gaps in this literature worthy of further research. The most obvious is the impact of hospital conversions on patient health outcomes, but there is also much more room for analyses of ecological level research on outcomes beyond mortality rates. Another gap is that very few studies focus on healthcare other than inpatient care – community, primary and ambulatory care is largely omitted. Many of the studies focus on staffing levels, which is only one of a wide range of dimensions in which we might consider 'quality of care' experienced by patients – and particularly missing is public and patient perceptions of the services provided. The studies do not disaggregate outcomes by sex or gender – and the impact of healthcare privatisation on health inequalities is an important avenue for future research. Finally, we primarily consider the impact of 'outsourcing' or 'contracting-out'. Other forms of privatisation exist – such as the shifting of healthcare funding from the state to individuals which have not been analysed in this review. One such example is the shift to private funding in the US via the privatisation of the Medicare program which has resulted in more expensive plans but unclear impacts on the quality of care (MedPAC 2023).

Conclusion

There is a surprisingly small number of studies addressing the impact of privatisation on the quality of care offered by healthcare providers and yet within this small group of longitudinal studies we find a fairly consistent picture. At the very least, healthcare privatisation has almost never had a positive impact on the quality of care. But outsourcing is not benign either. It can reduce costs but seems to do so at expense of quality of care. Overall, our review provides evidence challenging the justifications for healthcare privatisation and concludes that the scientific support for further privatisation of healthcare services is weak.

Discussion

"*RedRum, that's how the money's made…*
Trace it back to the bank where you put your wage"
Jehst - *England*

The thesis put forward in this document is simple: NHS privatisation kills. That outsourcing of healthcare services to the private sector is likely to lead to a deterioration in the quality of healthcare - resulting in worse health outcomes for patients. The work I have produced to support that argument inevitably falls short of proving such a statement as scientifically undeniable. But the research does further our understanding relating to this incredibly important argument.

This project also aimed to answer three specific puzzles in the literature of healthcare privatisation in England: 1) how much is the NHS being privatised, 2) why is outsourcing increasing, and 3) what impact is it having on healthcare quality. I will now summarise the contribution this thesis has made to those three debates before detailing some theoretical contributions and wider contributions.

To the first puzzle, this thesis has cleaned and assessed the levels of NHS privatisation using two data sources rarely used in the literature – reported in papers 1 and 2. The first dataset identifies an increase in the expenditure of NHS commissioners on for-profit companies. The extent of outsourcing will not surprise many – with around 6% of spend going to for-profits. However, the trends and the variation were more surprising. Almost every month represents an increase in privatisation relative to the last. This consistent trend upwards goes against the official reporting from the Department for Health and Social Care. The variation is also staggering – some areas spending almost half their budget in the private sector, other areas close to nothing. These findings were supported by the second data source, that of the number of consultant-led treatments in the private sector – which also show a consistent increase month by month and large variations. This thesis helps solve the puzzle and finds that privatisation is increasing, around 1 in 10 treatments are conducted in the private sector and around 1 pound out of every 15 is spent on for-profit companies.

The thesis provides several answers to the second puzzle of why privatisation is increasing. Papers 2 and 3 tackle this question, first asking commissioners the question directly, second by testing one hypothesis quantitatively. It finds that commissioners perceive a range of reasons for outsourcing – many of which are outside of their control. The local environment, the policy landscape and the performance of NHS hospitals all take the decision to privatise out of the hands of those who are supposed to gatekeep the service. One hypothesis is that privatisation is a necessary response to austerity and underfunding – however paper 3 finds this is apparently not the case.

Papers 1 and 4 tackle the third puzzle of what is the impact of privatisation – both suggest that privatisation, often, worsens the quality of care received by patients. The first paper finds, starkly, that increases in outsourcing correspond with higher avoidable mortality rates, the fourth suggests that this is not an isolated finding, and that at a localised level, hospitals which are privatised often cut the number of staff even within a year of the takeover.

Then, the resolution to those puzzles this project has reached is that privatisation in England is increasing year on year; often without the proactive decision-making of commissioning decisions; and often with a negative consequence for patient outcomes.

Wider academic contributions

"Yout's are cutting like a shredder
But the greed is in the centre"

- Isatta Sheriff, *Moving On*

This work has attempted to shift the wider academic conversation forwards in several ways. The first is to centre the health outcomes and quality of care in debates of service performance. There were times during the project when outcomes such as financial performance or hospital efficiency could have been used as indicators of success. The reasons for focusing on quality of provision and the outcomes experienced by patients is a belief that these are the key domains on which the social policy discipline – and the subdiscipline of policy evaluation – should be focussed. Part of this is an attempt to measure 'quality' where commissioners find it hard to do so – another part is an effort to avoid a situation in which a price is placed upon health or even mortality.

Another effort is to focus ownership and 'privatisation' within the competition and marketisation debates. By the start of the 2010s a policy consensus has been reached that 'competition' is beneficial for the provision of public services. The reforms to health and social care services in England which have enabled steady privatisation could be framed as a search for competition between providers – largely ambivalent to the sector – indeed the language of the Health and Social Care Act 2012 is specifically trying to make the NHS 'sector-blind'. This research hopes to challenge that assumption and hopes that across other services similar focus is applied to the role of for-profits in delivering public services. Underlying this focus is the implicit argument that ownership matters and can be conceived categorically. While there is compelling intuition to a 'publicness' framework in which publicly owned bodies can have dimensions of privateness and vice versa, categorical measures do also appear to have meaning to them – on average.

This work sits somewhere within or between the disciplines of public health and social policy. The inherently political nature of the work – and the assumption of this work that health is political – is not something frequently shared in the public health discipline. Indeed, health economists and public health specialists have seemed confused by the focus of the research I conduct. "Why not try to

explain all mortality" or "isn't alcohol consumption more important?". As I enter these spaces, I'm more and more aware that I need to make a strong argument for why researching policy and political decisions is important. And why their comments about health are, too, political. Equally, some audiences in the policy world need convincing that health outcomes are an important measure of success. "But is it cheaper?". One day I want to do some financial analysis so that I can respond to that question with an estimate of the price put on someone's life.

Contextualising the research – two-tiered systems, COVID-19, and health policy

All the best shit's got scratches on the surface
What's a flight without turbulence?
A life without circumstance? Boxing without another stance?
Country with no coat of arms? Estate with no dogs that bark?
A club with no cunts who laugh at people tryna have a laugh?

- Slowthai, *NHS*

NHS privatisation in the context of a two-tiered system

The work of this thesis describes an NHS in decline – in terms of capacity, quality and patient satisfaction. Only part of that story is explained by privatisation. Under funding, exclusionary migration policies and welfare cuts all add to the context in which policies are having negative implications for the NHS during this period. Therefore, the NHS' quality is not fully explained by the research in this thesis.

But neither is privatisation. Other forms of privatisation exist, such as the transfer of funding from public to private spheres. Indeed, we are seeing this in England's NHS. By the time this thesis was submitted, the number of people paying for healthcare treatments was rising to highest levels since data began (PHIN 2023). The deterioration of the NHS may well lead to further privatisation – not necessary via outsourcing but via privately financed care as individuals are forced to make a choice between receiving care or spending their own money.

Of course, this trend has large equity implications in the access to healthcare. Were the two-tiered system to swing towards people increasingly paying for services out of their pockets, this would inevitably exclude people from receiving equal levels of healthcare – no longer 'each according to their needs' (Delamothe 2008).

One of the largest arguments for the NHS being a comprehensive and universal service – rather than targeting to the poorest whilst others pay is that it ensures high quality and equal care for all. Rather than a service that can be left to diminish as those with political power do not need it (Brady and

Bostic 2015; Korpi and Palme 1998). As the NHS is privatised and worsened, it may be resulting in a wider privatisation of healthcare as people are forced to turn to the private sector and pay for their healthcare. A rich avenue for further research and development of data.

NHS privatisation in the context of COVID-19

Important too is to understand the implications of this thesis for the response to COVID-19 and the shock placed on healthcare services since.

Firstly, reports on pandemic preparedness have been very critical of the decade of austerity, resulting in a public sector not ready to respond to the emergency (Bambra and Marmot 2023). This thesis contributes to this debate too by suggesting that privatisation might also have worsened the preparedness of the NHS to respond to COVID-19. Similar results in social care services might suggest similar implications there too (Bach-Mortensen et al. 2021).

Secondly, COVID-19 also represented an opportunity for the further nationalisation of care in England. In the emergent response, hospital beds were purchased from private hospitals. Not dissimilar to moment in 1947 when voluntary hospitals were taken under public ownership, the mass centralisation and public ownership was deemed imperative to have the best response to the public health emergency. However, the appetite to maintain this after the lockdowns ended – even when the health emergency continues – is apparently very small.

COVID-19, as with many shocks, reveal an underlying system for what it was. Deaths in private care homes; failings of outsourced COVID apps and PPE supply chains, and finally, evident political relations at the heart of contracting were all made very apparent during the COVID-19 pandemic – but really reflect the status quo of healthcare and health policy in the UK.

The 2022 Health and Care Act

The research conducted in thesis overlapped another major reform of the NHS. As is to be expected, the role of the private sector was front and centre of the parliamentary, academic and policy debates

surrounding the reform (Puntis 2021; Roderick and Pollock 2022). I'll briefly discuss the policy and what it means for further privatisation, and further research on privatisation.

The narrative of the Health and Care Act, as first put in NHS England's long-term plan – was a radical departure from the narrative of the early 2010s. Competition was placed in history, whilst collaboration was the new modus operandi. *"We believe collaboration, rather than competition, as an organising principle, is a better way for the NHS and the wider health and care system to respond to today's challenges"* (DHSC 2022). Front and centre of this change is much more room for commissioners to decide on who to procure services from without necessary competitive contracting processes. This is indeed a radical departure but what it means for privatisation is less obvious.

Whilst competition is one aspect of outsourcing, there is impressively little on the other aspect – ownership. The policy material produced in light of the reforms only refers to social enterprises and third sector organisations (ibid). Not recognising the role of for-profit organisations in delivering NHS services is both a concerning effort to hide their existence and also a concerning reflection of the lack of effort to curb increasing privatisation.

Then going forward – NHS outsourcing might no longer be competitive, but it is still expected to be a frequently used method of healthcare deliver. Does that change its extent, type, and impacts on quality of care? We don't know.

Policy Recommendations for England's Healthcare

"And the government will smother us in blasphemy
Take the tax money make a bomb and drop it casually"
Chester P – *Rocks Bottom*

1 - De-commodify healthcare and end privatisation

In some ways the first policy recommendation is simple to reach: given the argument that NHS privatisation has resulted in more people dying from treatable conditions – the steps to reach a pejorative position on the policy of privatisation are relatively straight forward. The harder decision to make is whether privatisation can be done better? The answer is of course it can be done better and research in social care sectors suggests it can be done much worse too. So why not 'do privatisation better'? The reason to de-commodify healthcare is that this is the most certain way to protect patients from profit motives. Banning profit-making; encouraging social enterprises; stricter regulations on NHS licences might all improve the types of private provider delivering healthcare. But there is no evidence to suggest this is a better alternative to public ownership – and plenty of evidence to suggest that third sector and social enterprise providers can function as 'wolves in sheep's clothing'.

2 – Remove the internal market

Given the findings in paper 2 of this thesis that lots of outsourcing is happening without active decision-making, there will continue to be a concerning trend of privatisation so long as the NHS is an open competitive market. This is something the Scottish Government enacted very soon after being awarded devolved healthcare powers – with some indicators of success (Dayan and Edwards 2017). Some argue that marketisation is completely distinct to privatisation, but the evidence of the last 30 years suggests that one tends to lead to another.

3 – Increase the value and reduce restrictions of universal credit payments

In the third paper of this thesis, I present a preliminary finding which I will continue to develop in the hope it can be the main result of a separate publication. The finding suggests that spending on Universal Credit is negatively associated with mortality rates. That is, cuts to the welfare spend after

2010 corresponded with more people dying in the places hardest hit. The austerity cuts introduced in 2010, appeared to have an additional effect to privatisation on increasing mortality since 2010. Then, we should not ignore the impacts of austerity and reverse those cuts, along with the policy of NHS privatisation.

Limitations

"Flashing lights calling out to you on Regent Street,
I can't help it if the sale sign weakens me"

- Shay D, *Get money*

Each paper had its own limitations section, I will not repeat them here but rather discuss the limitations of the thesis as a research project.

I think this work is meaningfully lacking lived experiences of the effects of privatisation – even of poor health. Lived experience can improve all stages of the research process, from conceptualisation to dissemination (Scher et al. 2023). Part of the reason for non-participatory methods being used in this thesis was the COVID-19 pandemic, where logistic and ethical constraints were applied on the collaboration of certain health workers in research which was not related to the immediate resolution of the COVID-19 pandemic. However, a project with more resources, time and experience would have found a way to incorporate lived experiences of privatisation in the formulating of ideas and research designs.

Another methodological limitation is the difficulty in identifying causal relationships. A major trend in social policy research has been the implementation of causal inference methods first applied in the economics discipline. Trying to estimate a counterfactual by identifying control groups not experiencing the effects of a policy by exploiting quasi-experimental settings has been a huge shift in the way through which academics can make a claim to the impact of a policy. This thesis did not make major efforts to follow such a path. On the one hand it is difficult to find such quasi-experimental settings and the effects of privatisation in the NHS might not be best measured with such tools. On the other hand, I could have, for example: conducted a difference-in-difference design isolating specific outsourced contracts at a time between 2010 and 2020; or attempted to construct a synthetic control from the Scottish NHS; or worked more with cross-lagged effects. I am happy with the statistics in the thesis - in that I think they provide the bases for rich interpretation, but I must accept that the findings could all be biased by residual confounding from unobserved variables. This is part and parcel of the work I have produced.

The project's primary empirical work focuses on England's NHS. Given the trends in NHS privatisation in England, there are good empirical justifications for analysing this context as a 'case' of privatisation. The findings of paper 4 suggests that the findings of this paper may also apply in other contexts too. However, one limitation of this thesis is that much of the empirical work has not tried to ensure external validity outside of England. Another methodological approach would be to compare England's privatisation to the experiences of other contexts which might deliver different insights.

One of the purposes of this thesis, as well as to produce research identifying the impacts of privatisation, is to give me the skills and qualifications necessary for a career in research and academia. Consequently, this project has also been shaped by the demands of the job market, research funding and journal publishing. For example, I studied health in part because a former supervisor advised me 'there is money in health research'; the time given was limited to three years, so I have completed this thesis alongside a full-time job; and the papers in this thesis are also shaped to fulfil journal and peer-review demands of publications.

In total, over the three years of study, I signed 15 different fixed-term contracts or employment agreements with the University of Oxford and its associated colleges to be conducted on the side of my full-time PhD. For the most part, these pieces of research or teaching all improved my work and skills and were positive, enjoyable experiences, but of course also significantly took away my time from writing more papers on the NHS. In some ways I have been well protected from the worst aspects of employment practices in academia – as well as the deeply entrenched structural biases - and I have been well funded and supported by a team of wonderful people. But I am also conscious that I have been an unexpectedly willing and committed member of the 'academic gig economy'. Churning out papers, having 4-5 jobs at a time, working on the weekends, accepting geographic displacement, and performing unquantifiable amounts of unpaid labour in return for a line on the CV or some credit in the social-relations-bank. The work in this thesis would undoubtedly be more developed, well

considered and better conducted had I been employed without these additional expectations, even if willingly internalised.

A practical limitation of this thesis is the relatively little it has done to benefit others in my research community. I have learned and borrowed from so many people but have yet to use this work or the potential next grants to build up the skills and careers of others. I look up to other doctoral candidates who have won small grants to hire researchers or collaborated meaningfully with other PhD students. Rather, my collaboration has been either as a paid assistant myself or through charitable work in the community. I think this project would have benefitted from joint work with other PhD students – even if the doctoral requirements are often individually minded.

Remaining puzzles and future research agenda

"Read it yourself instead of asking the Government why
'Cuz then the Cause of Death will cause the propaganda to die."

- Immortal Technique, *the Cause of Death*

To my mind there are two urgent puzzles which come out of this research: if we think privatisation is reducing healthcare quality: 1) how is this happening and 2) who is suffering as a result?

The first puzzle is that the mechanisms for why privatisation might worsen quality of care are not yet well evidenced. There is evidence about specific services being worse when privatised and that staffing levels and qualifications are often worse in the private sector. But whether aggregate outcomes are more impacted by this versus 'knock-on effects' or profiteering practices is unknown.

Understanding how privatisation is impacting health is incredibly important for both policy change and scientific confidence. Policy impact often requires a convincing narrative about how a policy might be having its effects felt. I'm not sure such a strong narrative is there for privatisation yet. People might have theories why, but I don't know we have the empirical evidence to suggest which pathway is most likely – which makes the narrative much less impactful. The second reason that this puzzle is important to resolve is that in the absence of very easy ways to test the causal inference of

the impacts of privatisation, being able to test for the mechanisms which we might expect were the effect causal can be a useful way to move us towards a more convincing scientific basis for claiming that privatisation might cause worse quality care. Both combined, if we had evidence on the mechanisms of impact it would make it harder for a journalist for a private healthcare magazine to ask the question of me that '*isn't this just a correlation that no one can explain*'.

The second puzzle is that we are yet to understand whether privatisation has specific problems for social justice and equality. It is easy to think that two-tiered systems, exploitative providers, and worse health outcomes are likely to have worse impacts for people with less cultural power, socioeconomic backgrounds, or people who are prejudiced against because of their race, class or sexual and gender identities. The NHS, as many welfare state services, already largely benefits middle class populations disproportionately (Hills 2017). Understanding if privatisation is worsening that would give new grounds for opposing outsourcing.

There is also value in furthering the kinds of research I have conducted in this thesis evaluating the outcomes of privatisation. For instance, understanding the impact of private equity in general practices; privatisation in mental health services; or for specific services like cataracts operations. Even if we might expect negative outcomes, understanding the scale of the impact and adding to the weight of existing research is important for policymakers in their efforts to improve health policy going forward.

My short-term research agenda is to tackle the two puzzles of how privatisation impacts quality and who suffers in the contexts of England's health and social care services. My hope is, one way or another, to split my time between two co-PI positions, one project on the NHS and one on adults and children's social care services – funding dependent of course.

In the long-term, I hope to continue this vein of research, applying it to new country contexts, new care settings and novel data sources. I feel very lucky to have this opportunity to build a reputation and a portfolio of work that I find exciting, political, and important outside of academia.

"Your public service die a death
The World Bank and IMF isn't… Freedom.
The kleptocracy orchestrate
And subjugate the corporate state that isn't… Freedom.
Theresa's a terrorist
We could be standing at the precipice of… Freedom.
…
I heard 'em say the
Revolution won't be monetised
But it could be wrapped up
Packaged and commodified.
…
Sycophants, grippin' flags
Tell you that they're on your side
Sell off your services abroad
Who do they prioritise?
…
Inspired to be alive,
in this powerful moment
No more will these cowards sell
Us out to their donors."

Lowkey – *The death of Neoliberalism*

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Appendices

Appendix Paper 1

Supplementary Material

Main Findings

S.1. Full Models of Main Finding

Our main findings regress levels of outsourcing on the age standardised rate of treatable mortality. Here we present out full findings with an additional decimal place.

	ln(T. Mortality)				
	FE	**FD**	**CBPS (1)**	**CBPS (2)**	**MLM**
For-profit Outsourcing (%)	0.00382***	0.00458**	0.00372**	0.00390***	0.00265*
	(0.00083)	(0.00082)	(0.00092)	(0.00090)	(0.00121)
	[0.00163, 0.00601]	[0.00184, 0.00733]	[0.00142, 0.00602]	[0.00162, 0.00618]	[0.00027, 0.00503]
LA Spend (£000s per person)	0.00390	-0.00231	-0.00168	-0.00535	0.02022
	(0.02058)	(0.02427)	(0.06302)	(0.06169)	(0.01689)
	[-0.05147, 0.05927]	[-0.05996, 0.05534]	[-0.09739, 0.09404]	[-0.09991, 0.08921]	[-0.01288, 0.05333]
Total CCG Spend (£Ms)	0.00036	0.00077	0.00016	-0.00005	-0.00008
	(0.00065)	(0.00074)	(0.00063)	(0.00059)	(0.00012)
	[-0.00070, 0.00142]	[-0.00050, 0.00203]	[-0.00107, 0.00139]	[-0.00119, 0.00109]	[-0.00031, 0.00015]
Claimant Rate (%)	0.01312	-0.00004	0.01168	0.00981	0.10356***
	(0.01768)	(0.01731)	(0.01756)	(0.01709)	(0.01008)
	[-0.01507, 0.04131]	[-0.02453, 0.02446]	[-0.01806, 0.04143]	[-0.01919, 0.03880]	[0.08380, 0.12333]
Population size	0.45023	0.75287	0.55075	0.69691	0.01680
	(0.59924)	(0.87935)	(0.58182)	(0.55785)	(0.01755)
	[-0.61794, 1.51839]	[-1.09082, 2.59656]	[-0.57719, 1.67869]	[-0.39847, 1.79230]	[-0.01760, 0.05120]
Unemployment Rate (%)	0.00236	0.00429	0.00227	0.00229	-0.00216
	(0.00317)	(0.00363)	(0.00323)	(0.00315)	(0.00306)
	[-0.00352, 0.00825]	[-0.00164, 0.01022]	[-0.00384, 0.00838]	[-0.00370, 0.00828]	[-0.00815, 0.00383]
Ethnic Minority (%)	0.00204	0.00352	0.00107	0.00135	0.00773***
	(0.00207)	(0.00187)	(0.00206)	(0.00202)	(0.00084)
	[-0.00221, 0.00628]	[-0.00081, 0.00785]	[-0.00340, 0.00555]	[-0.00301, 0.00571]	[0.00609, 0.00937]
Degree Education (%)	-0.00047	-0.00140	-0.00005	0.00000	-0.00314***
	(0.00160)	(0.00163)	(0.00164)	(0.00148)	(0.00093)
	[-0.00345, 0.00250]	[-0.00470, 0.00191]	[-0.00329, 0.00320]	[-0.00304, 0.00305]	[-0.00496, -0.00133]
Average Disposable H.hold Income	-0.16263	0.34805	-0.15460	-0.10422	-0.36340***
	(0.24267)	(0.25223)	(0.28198)	(0.27891)	(0.04471)
	[-0.70864, 0.38338]	[-0.08845, 0.78455]	[-0.78957, 0.48037]	[-0.72355, 0.51512]	[-0.45104, -0.27576]
Managerial/Professional occupation (%)	-0.00224	-0.00164	-0.00111	-0.00125	-0.00073
	(0.00183)	(0.00176)	(0.00157)	(0.00150)	(0.00113)
	[-0.00553, 0.00105]	[-0.00505, 0.00177]	[-0.00473, 0.00250]	[-0.00470, 0.00221]	[-0.00294, 0.00147]
SD (Observations)					0.28188
Num.Obs.	609	450	517	553	534
R2	0.040	0.048	0.896	0.893	
R2 Adj.	-0.342	0.026	0.854	0.852	
R2 Marg.					0.717
R2 Cond.					0.813
AIC			-1145.2	-1230.2	-962.6
BIC			-516.4	-552.7	-894.1
ICC					0.3
Log.Lik.			720.576	772.087	
RMSE					0.08
CCG Fixed Effects	Yes	Yes	Yes	Yes	No
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Outsourcing, LA Spend, and CCG Spend have a one-year lag.

Tr. Mortality, Population and GDHI are log transformed, 'Ln' denotes the natural log of outcome variable.

For full model expressions see supplementary material (sX)

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

Satterthwaite degrees of freedom used in MLM

An ICC of 0.3 suggests a low level of the variation in LA mortality rates is explained by clustering at the CCG level. Given the imperfect nature of overlapping CCG and LA boundaries a low ICC may be expected.

S.2 Full Model Specifications

Our primary model 1 is a fixed effects model with fixed effects for year and CCG. The model is:

$$MORT_{it} = \beta OUT_{it} + \beta LASPEND_{it} + \beta CCGSPEND_{it} + \beta CLAIM_{it} + \beta POP_{it} + \beta UNEMP_{it} + \beta ETHMIN_{it} + \beta DEG_{it} + \beta INC_{it} + \beta OCC_{it} + \alpha_i + \mu_{it}$$

Where i is a given CCG, t is a given year, MORT is treatable mortality rate, OUT is for-profit outsourcing, LASPEND is Local Authority expenditure per person, CCGSPEND is total CCG expenditure, CLAIM is the claimant rate, POP is the CCG rough geographic area population, UNEMP is the unemployment rate, ETHMIN is the percent of population who are ethnic minorities, DEG is the percent of population with qualification level 4 or above, INC is the average gross disposable household income, OCC is the percent of the working population who are in managerial or professional occupations, a_i is the unobserved time-invariant individual effect and u_{it} is the error term.

The second model is a first-differences model. The full specification of which is:

$$\begin{aligned} MORT_{it} - MORT_{it-1} &= \beta(OUT_{it} - OUT_{it-1}) + \beta(\mathrm{LASPEND}_{it} - \mathrm{LASPEND}_{it-1}) \\ &+ \beta(\mathrm{CCGSPEND}_{it} - \mathrm{CCGSPEND}_{it-1}) + \beta(\mathrm{CLAIM}_{it} - \mathrm{CLAIM}_{it-1}) \\ &+ \beta(\mathrm{POP}_{it} - \mathrm{POP}_{it-1}) + \beta(\mathrm{UNEMP}_{it} - \mathrm{UNEMP}_{it-1}) \\ &+ \beta(\mathrm{ETHMIN}_{it} - \mathrm{ETHMIN}_{it-1}) + \beta(\mathrm{DEG}_{it} - \mathrm{DEG}_{it-1}) + \beta(\mathrm{INC}_{it} - \mathrm{INC}_{it-1}) \\ &+ \beta(\mathrm{OCC}_{it} - \mathrm{OCC}_{it-1}) + (\alpha_i - \alpha_i) + (\mu_{it} - \mu_{it-1}) \end{aligned}$$

The third and fourth model are fixed effects models, where the observations are weighted based on the number of GPs in each CCG in model 3 and the treatable mortality rate in 2013 for model 4. We use the non-parametric covariate balancing using propensity scores method advocated by Fong, Hazlett and Imai (2018). In which the weights, $w_{i,}$ for observations are (stabilized) inverse generalized propensity score weights. They are specified as

$$w_i = \frac{\mathrm{f}(\mathrm{T}_i^*)}{\mathrm{f}(\mathrm{T}_i^* \,|\mathrm{X}_i^*)'}$$

In which T is our treatment of for-profit outsourcing and X is our covariates of number of GPs and treatable mortality rate in 2013. $\mathrm{f}(\mathrm{T}_i^*)$ represents the marginal distribution of treatments and $\mathrm{f}(\mathrm{T}_i^* \,|\mathrm{X}_i^*)'$ represents the generalised propensity score.

The final model, model 5, is a random intercepts multilevel model where the individual, i, is Local authority, within a group of CCGs denoted as j at time t.

$$MORT_{ijt} = \beta OUT_{jt} + \beta LASPEND_{ijt} + \beta CCGSPEND_{jt} + \beta CLAIM_{ijt} + \beta POP_{ijt} + \beta UNEMP_{ijt} + \beta ETHMIN_{ijt} + \beta DEG_{ijt} + \beta INC_{ijt} + \beta OCC_{ijt} + \alpha_{jt} + \mu_{ijt}$$

Where α_{jt} represents the CCG random effect residual and μ_{ijt} the individual LA effect residual.

S.3. Models without log transformations of Treatable Mortality

To calculate an absolute change to mortality rate associated with changes in outsourcing, we run our models without any log transformation to the treatable mortality rate. We present the results below

	T. Mortality				
	FE	**FD**	**CBPS (1)**	**CBPS (2)**	**MLM**
For-profit Outsourcing (%)	0.291**	0.340**	0.281*	0.297**	0.193*
	(0.074)	(0.066)	(0.082)	(0.082)	(0.095)
	[0.094, 0.488]	[0.092, 0.587]	[0.067, 0.495]	[0.087, 0.508]	[0.007, 0.379]
LA Spend (£000s per person)	0.891	-0.066	1.222	0.879	1.847
	(1.872)	(2.258)	(6.223)	(6.085)	(1.318)
	[-4.107, 5.889]	[-5.258, 5.125]	[-7.678, 10.122]	[-7.850, 9.608]	[-0.737, 4.430]
Total CCG Spend (£Ms)	0.030	0.068	0.017	0.003	-0.007
	(0.057)	(0.072)	(0.058)	(0.054)	(0.009)
	[-0.066, 0.126]	[-0.045, 0.182]	[-0.097, 0.131]	[-0.103, 0.108]	[-0.025, 0.011]
Claimant Rate (%)	0.460	-0.183	0.290	0.130	8.347***
	(1.867)	(1.817)	(1.953)	(1.904)	(0.786)
	[-2.085, 3.004]	[-2.389, 2.023]	[-2.476, 3.056]	[-2.546, 2.807]	[6.807, 9.888]
Population size	33.259	53.357	40.020	52.708	0.643
	(53.052)	(72.599)	(54.743)	(52.729)	(1.367)
	[-63.164, 129.681]	[-112.665, 219.379]	[-64.867, 144.908]	[-48.407, 153.823]	[-2.036, 3.323]
Unemployment Rate (%)	0.325	0.426	0.332	0.338	-0.111
	(0.282)	(0.331)	(0.304)	(0.297)	(0.238)
	[-0.207, 0.856]	[-0.108, 0.960]	[-0.236, 0.900]	[-0.215, 0.891]	[-0.577, 0.355]
Ethnic Minority (%)	0.100	0.238	0.036	0.062	0.675***
	(0.185)	(0.168)	(0.184)	(0.179)	(0.065)
	[-0.283, 0.484]	[-0.152, 0.627]	[-0.380, 0.452]	[-0.341, 0.465]	[0.548, 0.803]
Degree Education (%)	-0.034	-0.101	0.003	0.000	-0.276***
	(0.137)	(0.143)	(0.142)	(0.128)	(0.072)
	[-0.303, 0.235]	[-0.399, 0.196]	[-0.298, 0.305]	[-0.282, 0.281]	[-0.417, -0.134]
Average Disposable H.hold Income	-15.709	30.010	-17.041	-12.325	-25.750***
	(20.903)	(23.372)	(25.146)	(24.667)	(3.489)
	[-64.997, 33.579]	[-9.296, 69.316]	[-76.087, 42.005]	[-69.496, 44.845]	[-32.588, -18.911]
Managerial/Professional occupation (%)	-0.163	-0.115	-0.111	-0.116	-0.040
	(0.136)	(0.141)	(0.133)	(0.126)	(0.088)
	[-0.460, 0.134]	[-0.423, 0.192]	[-0.448, 0.225]	[-0.435, 0.203]	[-0.212, 0.131]
SD (Observations)					2.486
Num.Obs.	609	450	517	553	534
R2	0.029	0.037	0.890	0.889	
R2 Adj.	-0.357	0.015	0.847	0.845	
R2 Marg.					0.715
R2 Cond.					0.815
AIC			3541.4	3774.6	3566.6
BIC			4170.2	4452.2	3635.1
ICC					0.4
Log.Lik.			-1622.724	-1730.320	
RMSE					5.91
CCG Fixed Effects	Yes	Yes	Yes	Yes	No
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Outsourcing, LA Spend, and CCG Spend have a one year lag.

Population and GDHI are log transformed.

For full model expressions see supplementary material (sX)

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

Satterthwaite degrees of freedom used in MLM

S.4. Standard Industrial Class

S.4.1 Division Groupings

We check whether this association is driven by outsourcing to companies with specific Standard Industrial Classification divisions. We aggregate divisions which may form a similar type of business. We find that outsourcing to companies classified as 'Human health activities' are statistically significantly associated with increases in treatable mortality rates.

In the below table: 'Human Health' refers to SIC division 86; 'Professional Services' refers to SIC divisions 70, 82, 62, 69, 74, 63 and 86; 'Building construction and maintenance' refers to SIC codes 68 and 41; 'Social Care' refers to SIC divisions 87 and 88; 'Foundational services' refers to SIC codes 49 and 56; and 'Other' refers to all other SIC codes combined. Control variables are just excluded from the table, included in the models.

	ln(T. Mortality)					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
For-profit Human Health Outsourcing (%)	0.005**					
	(0.001)					
	[0.001, 0.008]					
For-profit Professional services Outsourcing (%)		0.003				
		(0.002)				
		[-0.002, 0.008]				
For-profit 'Other' Outsourcing (%)			0.002			
			(0.002)			
			[-0.005, 0.009]			
For-profit Building construction and maintenance Outsourcing (%)				0.006+		
				(0.003)		
				[0.000, 0.012]		
For-profit Social Care Outsourcing (%)					-0.001	
					(0.012)	
					[-0.020, 0.018]	
For-profit Foundational Services Outsourcing (%)						0.006
						(0.002)
						[-0.006, 0.017]
Num.Obs.	609	609	609	609	609	609
R2	0.031	0.017	0.015	0.021	0.014	0.016
R2 Adj.	-0.354	-0.374	-0.377	-0.368	-0.378	-0.375
CCG Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Outsourcing, LA Spend, and CCG Spend have a one year lag.

Tr. mortaility, Population and GDHI are log transformed, 'Ln' denotes the natural log of outcome variable.

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

S.4.2 Classes

We also analyse the lowest level of SIC within the 'Human Health' division to see if there are very specific types of healthcare business whose services are associated with mortality rates. At this scale

the distinction between some of the classes is not entirely obvious and many businesses have multiple SIC codes which will include several within the human health division.

We find that "General medical practice activities" have a statistically significant positive association with treatable mortality rates:

	ln(T. Mortality)					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
For-profit Hospital Outsourcing (%)	0.006					
	(0.003)					
	[-0.003, 0.015]					
For-profit Dental Outsourcing (%)		-0.110				
		(0.265)				
		[-0.486, 0.266]				
For-profit Medical Nursing Homes Outsourcing (%)			-0.040			
			(0.018)			
			[-0.100, 0.019]			
For-profit Specialist Services Outsourcing (%)				-0.032		
				(0.020)		
				[-0.079, 0.016]		
For-profit General Medical Outsourcing (%)					0.005*	
					(0.002)	
					[0.001, 0.009]	
For-profit Other health Outsourcing (%)						0.003
						(0.003)
						[-0.003, 0.010]
Num.Obs.	609	609	609	609	609	609
R2	0.018	0.015	0.018	0.018	0.026	0.016
R2 Adj.	-0.372	-0.377	-0.373	-0.373	-0.362	-0.375
CCG Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Outsourcing, LA Spend, and CCG Spend have a one year lag.

Tr. mortaility, Population and GDHI are log transformed, 'Ln' denotes the natural log of outcome variable.

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

Satterthwaite degrees of freedom used in MLM

S.4.3 Removing General Medical Practices

To be sure that our entire finding is not driven by a spurious relationship between General Medical Practices and Treatable Mortality, we remove these observations from the overall outsourcing data and rerun the main regression. We find consistent results and can conclude that the relationship is not entirely explained by expenditure on general medical practices.

	ln(T. Mortality)
	(1)
For-profit Outsourcing (General Medical Practices removed) (%)	0.00308***
	(0.00057)
	[0.00131, 0.00484]
Num.Obs.	609
R2	0.040
R2 Adj.	-0.342
CCG Fixed Effects	Yes
Time Fixed Effects	Yes
Clustered Standard Errors	Yes
Control Variables	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Outsourcing, LA Spend, and CCG Spend have a one year lag.

Tr. mortality, Population and GDHI are log transformed, 'Ln' denotes the natural log of outcome variable.

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

S.5 Time Fixed Effects

Our main results include fixed effects for year and CCG. Here we present the coefficients of the fixed effects for year and the intercept in the full model. '2014' will be treated as reference categories – bearing in mind we regress 2013 outsourcing against 2014 mortality rates, so we do not have a 2013 year.

	ln(T. Mortality)
	FE
(Intercept)	0.60057
	(7.69460)
	[-13.10224, 14.30338]
	[-0.00554, 0.00105]
factor(year)2015	0.00871
	(0.02100)
	[-0.03026, 0.04767]
factor(year)2016	0.00814
	(0.02489)
	[-0.03855, 0.05482]
factor(year)2017	-0.01279
	(0.03109)
	[-0.06981, 0.04422]
factor(year)2018	-0.00775
	(0.04286)
	[-0.08641, 0.07091]
factor(year)2019	-0.05880
	(0.05233)
	[-0.15362, 0.03602]
Num.Obs.	609
R2	0.890
R2 Adj.	0.846
AIC	-1322.7
BIC	-550.7
Log.Lik.	836.361
CCG Fixed Effects	Yes
Time Fixed Effects	Yes
Clustered Standard Errors	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Outsourcing, LA Spend, and CCG Spend have a one year lag.

Tr. Mortality, Population and GDHI are log transformed, 'Ln' denotes the natural log of outcome variable.

For full model expressions see supplementary material (sX)

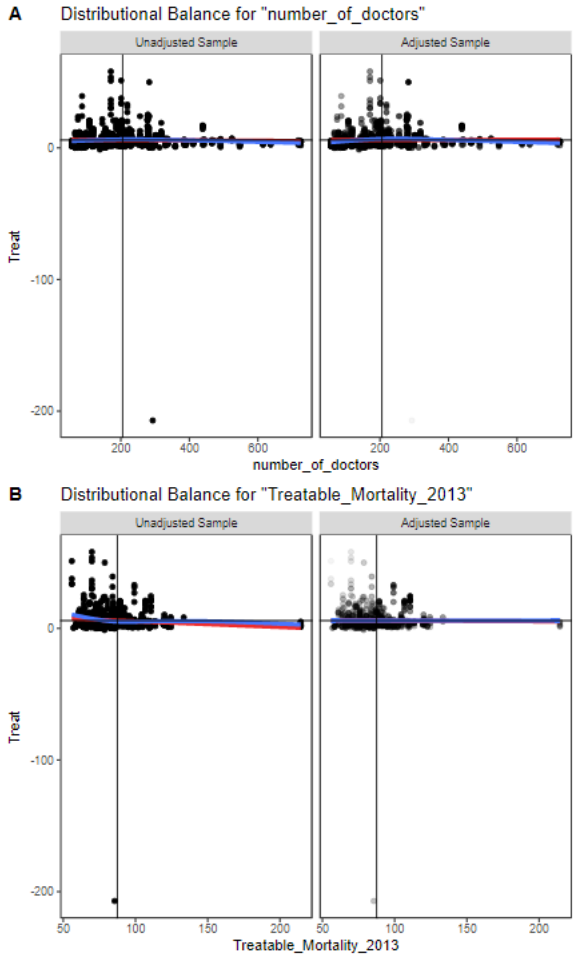
Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

S.6. Nonparametric Covariate Balancing using Propensity Scores

In our main results we present two models (models 3 and 4) which include covariate balancing using propensity scores. The idea of these models is to balance the sample based on key variables – as would be done were analysis to be done on a treatment and control group – but with a continuous 'treatment' of for-profit outsourcing.

We conduct analyses using the CBPS package in R. Covariate balancing is an advanced matching method which can weight values to balance the model, accounting for differences in observations according to their value of a continuous treatment variable, in this case for-profit outsourcing.

We balance our sample firstly on the number of doctors in any given CCG and secondly on the treatable mortality rate at the beginning of our time series in 2013. Below we present the balance plots of how the weights are applied by the propensity scores. 'Treat' refers to the 'treatment' of for-profit outsourcing (%).



S.7. Regression on absolute numbers of deaths

We are interested in finding out how many additional deaths can be attributed to changes in outsourcing. To do this we need to run models on the number of treatable deaths - as opposed to the age-standardised rate per 100,000 population. In these models we control for age (% aged over 70) as the dependent variable is no longer age-standardised – and treatable deaths are only counted for people aged 0-74.

For calculating our additional deaths, we need to work out annual additional deaths attributable to for-profit outsourcing. When creating about cumulative changes, calculating additional total spend is more meaningful than the cumulative additional % of spend so we run a model with total spend on absolute deaths.

In the table below model 1 shows our full model regression for-profit outsourcing against number of deaths. Model 2 presents the same model but changing the independent variable of interest to absolute expenditure on for profit companies. Model 2 will have some additional variation in the expenditure variable because we have two partial years of data. This means the change from 2013 to 2014 is not accurate. Consequently, in model 3 we drop our expenditure data years of 2013 and 2020 for which we have partial observations. The coefficient and confidence intervals in model 3 is what we use to create figure 2 in the paper.

	Treatable Deaths (n)		
	(1)	**(2)**	**(3)**
For-profit Outsourcing (%)	0.5689**		
	(0.1375)		
	[0.1486, 0.9892]		
Private sector spend (£ms)		0.2886*	0.2910*
		(0.1002)	(0.1066)
		[0.0635, 0.5138]	[0.0513, 0.5306]
Num.Obs.	609	609	519
R2	0.049	0.047	0.032
R2 Adj.	-0.332	-0.335	-0.441
CCG Fixed Effects	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes
Control variables	Yes	Yes	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

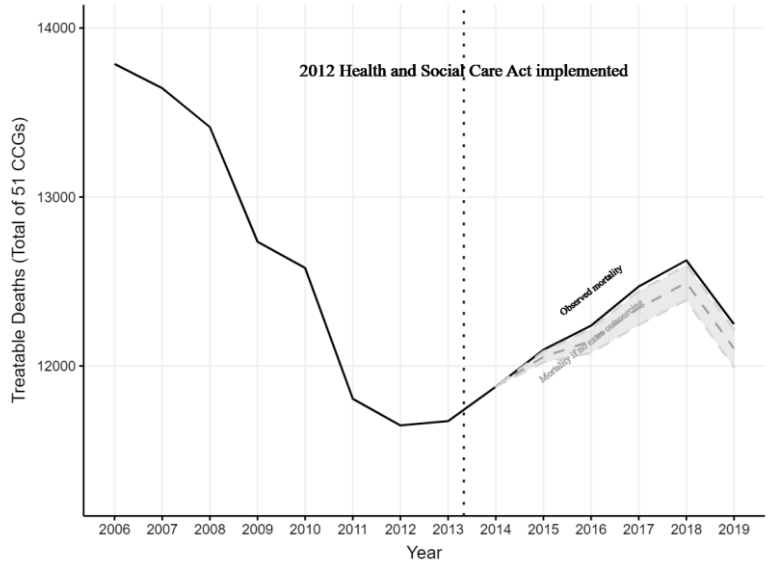
Outsourcing/Spend, LA Spend, and CCG Spend have a one year lag.

Population and GDHI are log transformed

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

S.8 Additional deaths plot

In the paper we present figure 2 which is plots the additional deaths attributed to for-profit outsourcing. In the main paper we crop this to 2018 to keep as many CCGs included as possible. We do have data to extent this to 2019 but we lose observations because the mortality data is only available for CCGs which existed after the significant mergers in April 2020. We cannot extend it to 2020 because we only have partial expenditure data for 2020, so additional rates of for-profit expenditure are all negative superficially. Below we present the figure up to 2019 with the 51 CCGs which we have consistent data for. We see that treatable mortality declined severely in 2019. 2020 data appears to show a rise back to 2018 levels so this may not be a sustained improvement (COVID-19 itself is not considered a 'treatable' cause of death but undoubtedly had a huge effect on health service performance).



Sensitivity Checks

S.9. Falsification test

To ensure that our findings are not measuring some overall population health, rather than healthcare quality, we run our regressions with the outcome variable of preventable mortality – deaths from causes that are possible to be avoided through public health intervention. We find no statistically significant results and can be more confident our main finding represents changes to some form of healthcare quality rather than an association with societal breakdown.

	ln(P. Mortality)				
	FE	**FD**	**CBPS (1)**	**CBPS (2)**	**MLM**
For-profit Outsourcing (%)	0.0013	0.0021+	0.0009	0.0009	0.0017
	(0.0008)	(0.0015)	(0.0008)	(0.0008)	(0.0013)
	[-0.0006, 0.0031]	[-0.0002, 0.0045]	[-0.0010, 0.0028]	[-0.0011, 0.0028]	[-0.0009, 0.0043]
LA Spend (£000s per person)	0.0214	0.0344	-0.0222	-0.0127	0.0340+
	(0.0282)	(0.0151)	(0.0369)	(0.0380)	(0.0184)
	[-0.0248, 0.0676]	[-0.0149, 0.0837]	[-0.1024, 0.0579]	[-0.0928, 0.0675]	[-0.0020, 0.0700]
Total CCG Spend (£Ms)	0.0006	0.0013*	-0.0002	0.0001	-0.0001
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0001)
	[-0.0003, 0.0015]	[0.0002, 0.0024]	[-0.0013, 0.0008]	[-0.0009, 0.0011]	[-0.0003, 0.0002]
Claimant Rate (%)	0.0057	0.0084	0.0076	0.0042	0.1309***
	(0.0093)	(0.0117)	(0.0107)	(0.0104)	(0.0109)
	[-0.0178, 0.0292]	[-0.0126, 0.0294]	[-0.0173, 0.0325]	[-0.0204, 0.0288]	[0.1095, 0.1523]
Population size	-0.0097	0.0970	0.1212	-0.0110	0.0000
	(0.5388)	(0.6812)	(0.5279)	(0.5179)	(0.0190)
	[-0.9010, 0.8817]	[-1.4811, 1.6750]	[-0.8237, 1.0660]	[-0.9393, 0.9172]	[-0.0372, 0.0373]
Unemployment Rate (%)	-0.0009	-0.0004	-0.0013	-0.0015	0.0007
	(0.0028)	(0.0026)	(0.0027)	(0.0027)	(0.0033)
	[-0.0058, 0.0040]	[-0.0054, 0.0047]	[-0.0065, 0.0038]	[-0.0066, 0.0036]	[-0.0058, 0.0071]
Ethnic Minority (%)	-0.0017	-0.0026	-0.0018	-0.0021	0.0040***
	(0.0018)	(0.0022)	(0.0020)	(0.0019)	(0.0009)
	[-0.0052, 0.0019]	[-0.0063, 0.0011]	[-0.0056, 0.0019]	[-0.0058, 0.0016]	[0.0022, 0.0057]
Degree Education (%)	-0.0002	-0.0008	0.0002	0.0005	0.0004
	(0.0013)	(0.0014)	(0.0013)	(0.0012)	(0.0010)
	[-0.0027, 0.0023]	[-0.0037, 0.0020]	[-0.0025, 0.0030]	[-0.0021, 0.0031]	[-0.0016, 0.0023]
Average Disposable H.hold Income	-0.1101	-0.0294	0.2336	0.0918	-0.5838***
	(0.2725)	(0.2379)	(0.3660)	(0.3561)	(0.0486)
	[-0.5657, 0.3456]	[-0.4031, 0.3442]	[-0.2983, 0.7655]	[-0.4330, 0.6167]	[-0.6791, -0.4885]
Managerial/Professional occupation (%)	-0.0007	-0.0022	0.0010	0.0004	-0.0026*
	(0.0020)	(0.0015)	(0.0018)	(0.0018)	(0.0012)
	[-0.0034, 0.0021]	[-0.0051, 0.0007]	[-0.0020, 0.0041]	[-0.0025, 0.0034]	[-0.0049, -0.0002]
SD (Observations)					0.2924
Num.Obs.	609	450	517	553	534
R2	0.014	0.037	0.953	0.951	
R2 Adj.	-0.378	0.015	0.935	0.932	
R2 Marg.					0.766
R2 Cond.					0.853
AIC			-1328.3	-1413.3	-881.7
BIC			-699.6	-735.8	-813.2
ICC					0.4
Log.Lik.			812.151	863.633	
RMSE					0.08
CCG Fixed Effects	Yes	Yes	Yes	Yes	No
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Outsourcing, LA Spend, and CCG Spend have a one year lag.

P. Mortality, Population and GDHI are log transformed, 'Ln' denotes the natural log of outcome variable.

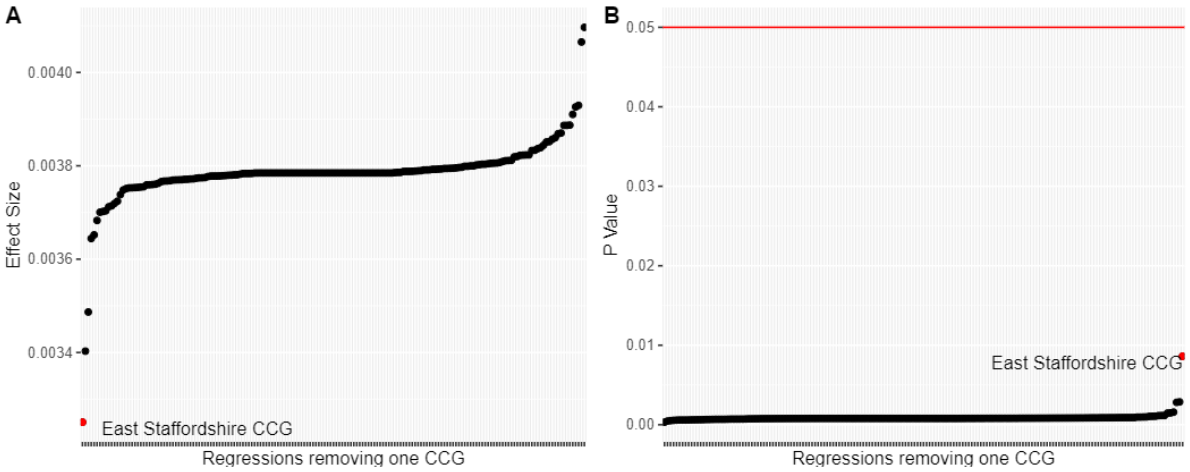
Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

Satterthwaite degrees of freedom used in MLM

S.10. Dropping individual CCGs

S.10.1 Plotting results

To ensure that our overall finding isn't driven by a single CCG we sequentially drop each CCG from our model. We find that removing any single CCG only changes the coefficient minimally and the results are always statistically significant.



S.10.2. Full Model removing East Staffordshire

To ensure that our model is completely robust, we removed East Staffordshire giving us the lowest possible coefficient and highest possible p-value, then ran our models with robust standard errors to make entirely sure that our findings hold given any missing CCG.

	ln(Tr. Mortality)			
	FE	**FD**	**CBPS (1)**	**CBPS (2)**
For-profit Outsourcing (%)	0.0033**	0.0045**	0.0043*	0.0034**
	(0.0008)	(0.0014)	(0.0018)	(0.0009)
	[0.0009, 0.0057]	[0.0016, 0.0074]	[0.0001, 0.0086]	[0.0008, 0.0059]
LA Spend (£000s per person)	0.0028	-0.0023	0.0002	-0.0064
	(0.0203)	(0.0191)	(0.0725)	(0.0617)
	[-0.0526, 0.0582]	[-0.0601, 0.0555]	[-0.1037, 0.1042]	[-0.1010, 0.0883]
Total CCG Spend (£Ms)	0.0004	0.0008	0.0013	0.0000
	(0.0007)	(0.0008)	(0.0008)	(0.0006)
	[-0.0007, 0.0014]	[-0.0005, 0.0020]	[-0.0003, 0.0028]	[-0.0012, 0.0011]
Claimant Rate (%)	0.0133	0.0009	0.0310	0.0098
	(0.0165)	(0.0149)	(0.0204)	(0.0171)
	[-0.0149, 0.0415]	[-0.0237, 0.0254]	[-0.0095, 0.0715]	[-0.0192, 0.0389]
Population size	0.4770	0.8071	0.2513	0.7247
	(0.6720)	(0.8091)	(0.8628)	(0.5539)
	[-0.5927, 1.5467]	[-1.0417, 2.6560]	[-1.1763, 1.6790]	[-0.3728, 1.8222]
Unemployment Rate (%)	0.0023	0.0044	0.0050	0.0023
	(0.0030)	(0.0041)	(0.0043)	(0.0032)
	[-0.0036, 0.0082]	[-0.0015, 0.0104]	[-0.0029, 0.0129]	[-0.0038, 0.0083]
Ethnic Minority (%)	0.0023	0.0039+	0.0036	0.0016
	(0.0024)	(0.0017)	(0.0027)	(0.0021)
	[-0.0020, 0.0066]	[-0.0005, 0.0083]	[-0.0022, 0.0094]	[-0.0028, 0.0060]
Degree Education (%)	-0.0008	-0.0015	-0.0017	-0.0003
	(0.0015)	(0.0012)	(0.0022)	(0.0015)
	[-0.0038, 0.0022]	[-0.0048, 0.0019]	[-0.0063, 0.0029]	[-0.0034, 0.0028]
Average Disposable H.hold Income	-0.1619	0.3290	-0.4489	-0.1097
	(0.2640)	(0.1704)	(0.4015)	(0.2785)
	[-0.7084, 0.3847]	[-0.1104, 0.7684]	[-1.2787, 0.3810]	[-0.7299, 0.5105]
Managerial/Professional occupation (%)	-0.0022	-0.0018	-0.0016	-0.0013
	(0.0018)	(0.0016)	(0.0024)	(0.0015)
	[-0.0055, 0.0011]	[-0.0052, 0.0017]	[-0.0061, 0.0030]	[-0.0047, 0.0022]
Num.Obs.	604	446	370	548
R2	0.032	0.047	0.899	0.894
R2 Adj.	-0.354	0.025	0.843	0.852
AIC			-810.1	-1217.6
BIC			-289.6	-545.8
Log.Lik.			538.033	764.803
CCG Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

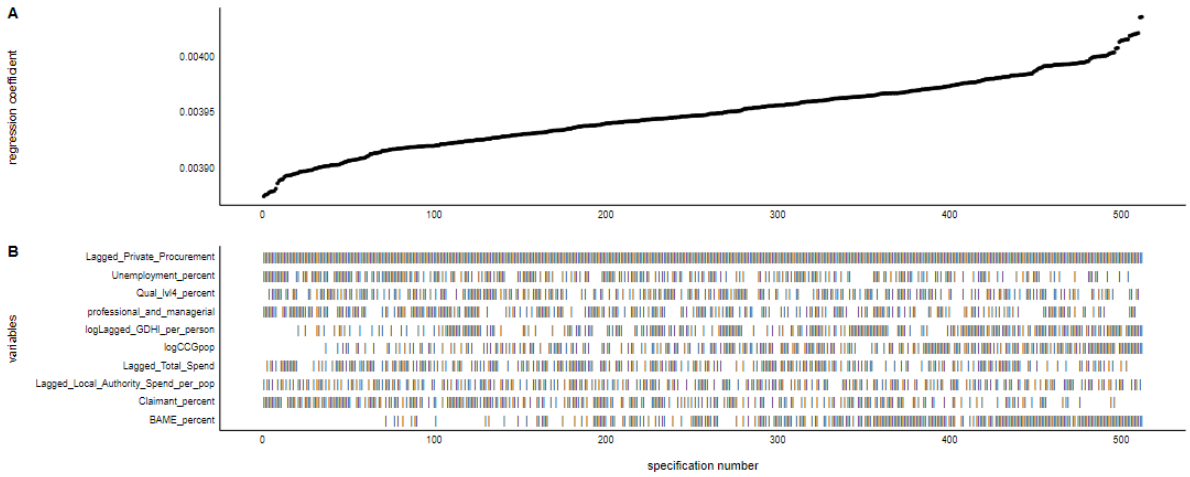
Outsourcing, LA Spend, and CCG Spend have a one year lag.

Tr. Mortality, Population and GDHI are log transformed, 'Ln' denotes the natural log of outcome variable.

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

S.11. Specification curve

To ensure that our finding is not driven by the specific choice of covariates we run a specification curve and find that the effect size varies only minimally with any combination of our covariates. All results have a significant P value, smaller than 0.05. The effect-size varies from 0.00387 to 0.00404 in any given specification which is very stable and suggests our findings are by no means determined by the selection of covariates.

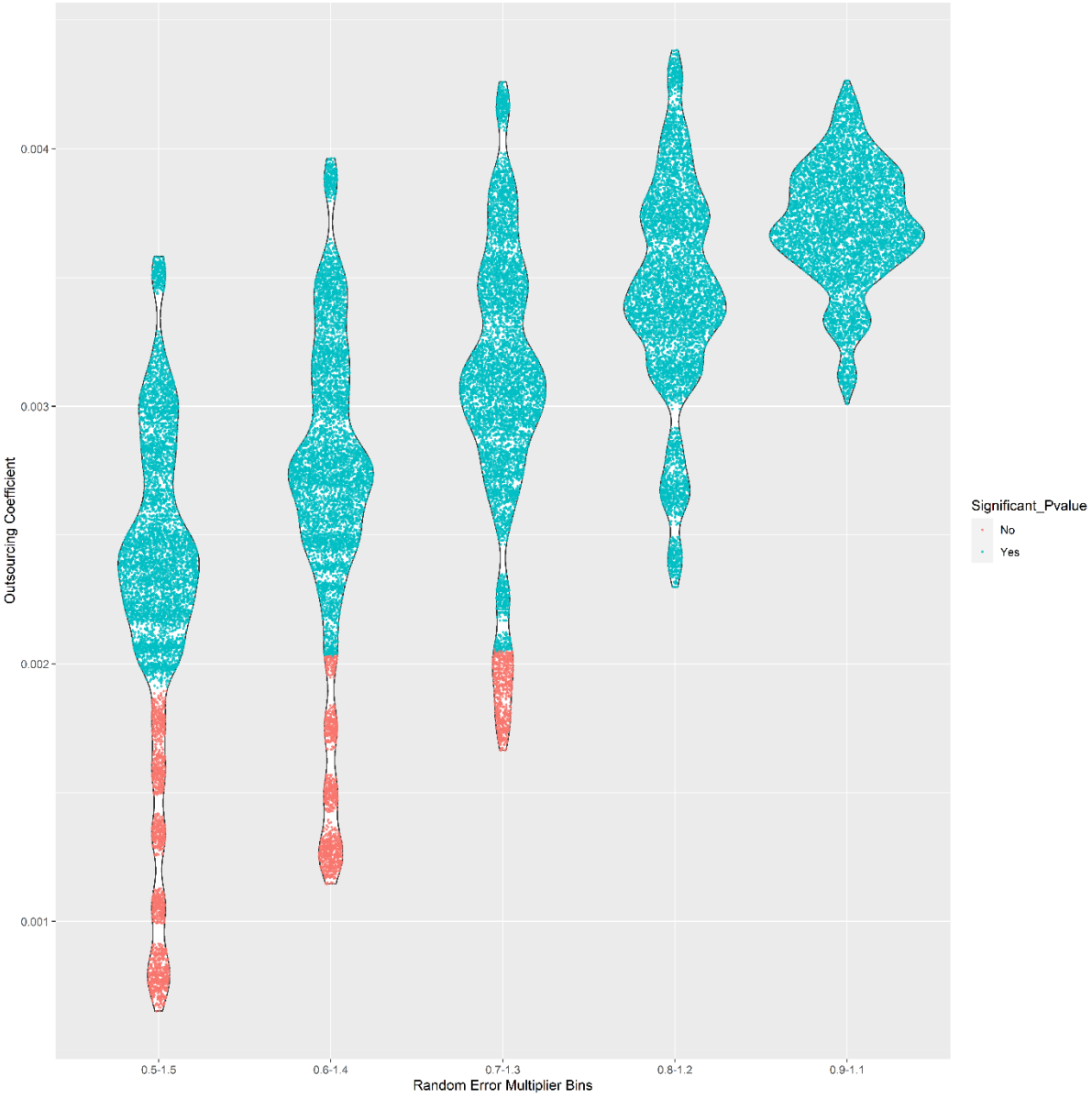


S.12. Combined Specification curve and random error simulation

S.12.1. Plotting all specification coefficients together

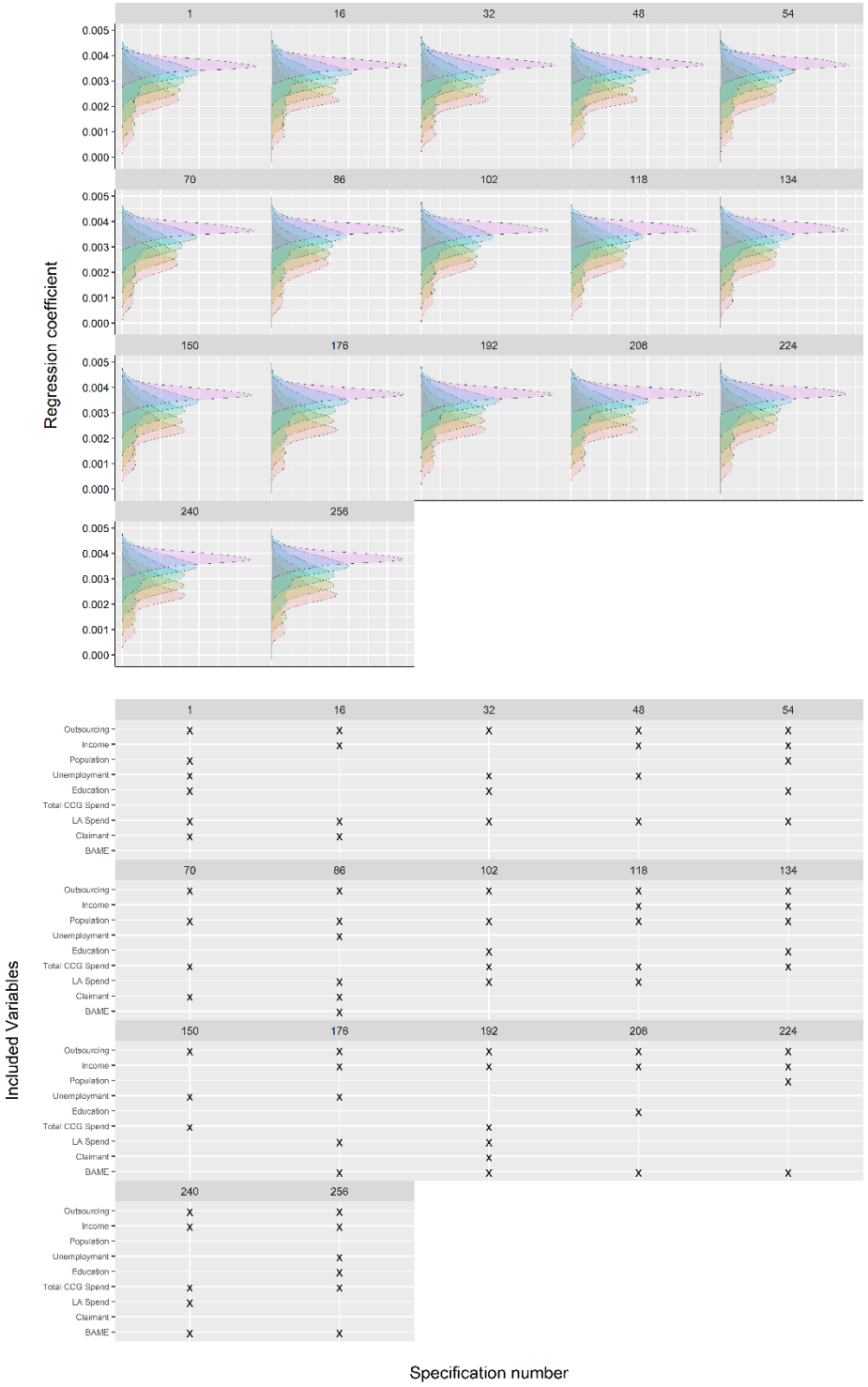
We combine the specification curve with our random error simulation – looping each specification with varying levels of random error. Here we ran each of the 512 specifications 100 times with 5 different error sizes (20 times with each error size). Below we plot the coefficients and significance levels for each of these regressions.

This analysis shows sensitivity in that it represents how much random error would be needed in our data for our results not to hold – or – how much random error could be in our data in which it still holds. The model used is the same two way FE model which does not account for spatial effects.



S.12.2. Selected specifications

If we separate the random error loops for each specification, we can see that given any single specification, the random error creates very similar results. Below we select 17 representatively from the whole sample of specifications, based on average coefficient sizes.



S.13. Matching

In our main results we report outcomes from covariate balancing using nonparametric methods with propensity scores. This is the best method for our data because we have a continuous 'treatment' variable – outsourcing %. We can also wrangle outsourcing to be a binary treatment – CCGs either experience a high level of outsourcing or a low level of outsourcing – ie. they are grouped into a treatment group if they experience some level of outsourcing, or a control group if they do not. In this way we can weight observations based on full matches on the number of GPs and Treatable Mortality Rates in 2013.

Using this identification, we can run more traditional, full matching models. The models have a very similar effect size to our npCBPS. In the table below, models 1-3 are matching on the number of GPs and models 4-6 are matching on levels of Treatable Mortality in 2013. Models 1 and 4 treat 4% of for-profit outsourcing as the treatment benchmark, models 2 and 5 use 7% and models 3 and 6 use 10%.

	ln(T. Mortality)					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
For-profit Outsourcing (%)	0.0037***	0.0035***	0.0038***	0.0033**	0.0040***	0.0035**
	(0.0008)	(0.0008)	(0.0009)	(0.0010)	(0.0010)	(0.0010)
	[0.0017, 0.0057]	[0.0016, 0.0054]	[0.0018, 0.0057]	[0.0010, 0.0056]	[0.0022, 0.0059]	[0.0013, 0.0056]
Num.Obs.	571	571	571	571	571	571
R2	0.912	0.930	0.913	0.893	0.926	0.910
R2 Adj.	0.877	0.903	0.879	0.851	0.897	0.874
AIC	-1213.1	-1097.6	-1196.5	-839.0	-974.9	-839.6
BIC	-500.2	-384.7	-483.5	-126.0	-261.9	-126.6
Log.Lik.	770.575	712.813	762.225	583.496	651.438	583.786
CCG Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Outsourcing, LA Spend, and CCG Spend have a one year lag.

Tr. mortaility, Population and GDHI are log transformed, 'Ln' denotes the natural log of outcome variable.

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

Additional Analyses

S.14. Quadratic term

To test whether our result has a non-linear relationship. We find no significant result with our polynomial variable.

	ln(T. Mortality)
	(1)
For-profit Outsourcing (%)	0.0029
	(0.0021)
	[-0.0012, 0.0071]
Quadratic Outsourcing Term	0.0000
	(0.0000)
	[-0.0001, 0.0001]
Num.Obs.	609
R2	0.890
R2 Adj.	0.846
AIC	-1321.1
BIC	-544.6
Log.Lik.	836.535
CCG Fixed Effects	Yes
Time Fixed Effects	Yes
Clustered Standard Errors	Yes
Control Variables	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Outsourcing, LA Spend, and CCG Spend have a one year lag.

Tr. mortaility, Population and GDHI are log transformed, 'Ln' denotes the natural log of outcome variable.

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

S.14. Growth curve models

S.14.1 Unconditional growth model

We are interested to see if Outsourcing increased statistically significantly over this period. We find that, as per our descriptive analysis, for-profit outsourcing has indeed increased between 2013 and 2020.

	For-profit Outsourcing (%)
	(1)
Time	0.2321*
	(0.1166)
	[0.0034, 0.4607]
Num.Obs.	944
R2 Marg.	0.005
R2 Cond.	
AIC	6750.8
BIC	6779.9
RMSE	6.98
Clustered Standard Errors	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Tr. mortaility is log transformed, 'Ln' denotes the natural log of outcome variable.

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

S.14.2 Conditional growth model

We are also interested if the absolute levels of outsourcing explain changes in mortality rates over this period. We find that levels of outsourcing do not explain changes in mortality.

	ln(T. Mortality)
	(1)
For-profit Outsourcing (%)	0.3984
	(0.4419)
	[-0.4678, 1.2645]
Time	-0.0055**
	(0.0019)
	[-0.0093, -0.0017]
Interaction term	-0.0002
	(0.0002)
	[-0.0006, 0.0002]
Num.Obs.	785
R2 Marg.	0.005
R2 Cond.	0.834
AIC	-1239.0
BIC	-1201.7
ICC	0.8
RMSE	0.07
Clustered Standard Errors	Yes
Control Variables	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Tr. mortality is log transformed, 'Ln' denotes the natural log of outcome variable.

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

S.15 Difference in Difference

Levels of outsourcing are not a binary treatment and almost all CCGs saw an increase in outsourcing between 2013 and 2020. There are only five CCGs which report no increases in outsourcing, but have at least four years of spending reported (three observations of spending change). As such, it is not possible to conduct a rigorous difference in differences analysis.

However below we run a DiD to see whether the coefficient is somewhat comparable to the main findings. We consider that CCGs which did not increase their outsourcing in any given year, but reported at least four years of data, are a control group and all other CCGs which report at least three years of data are a treatment group. We then look at treatable mortality rates before and after 2014 to compare whether the 'treatment' of increased outsourcing is associated with worse changes in mortality rates.

We find a positive statistically insignificant difference in difference between the CCGs which increased outsourcing in at least one year and those which had no increases in outsourcing at all.

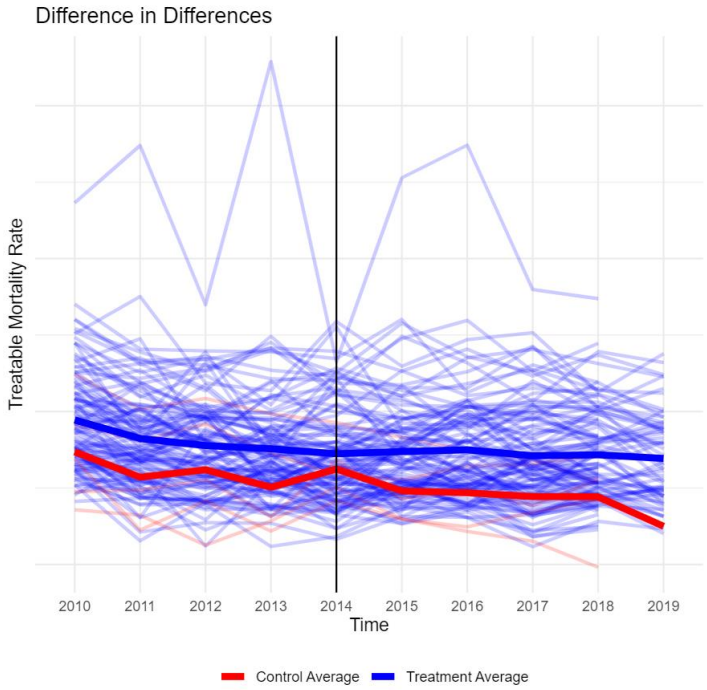
S.15.1 DiD Table

	ln(T. Mortality)
	(1)
Treatment	0.1311**
	(0.0407)
	[0.0513, 0.2110]
Time	-0.0723
	(0.0530)
	[-0.1761, 0.0316]
Treatment*Time	0.0149
	(0.0541)
	[-0.0913, 0.1211]
Num.Obs.	1092
R2	0.048
R2 Adj.	0.045
AIC	-664.2
BIC	-639.2
F	18.311
RMSE	0.18

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

S.15.2 DiD graph

We visualise this relationship below.



S.16. Interactions terms

We are interested in how the relationship between outsourcing and treatable mortality differs according to changes in austerity and population demographics. Perhaps the increase in mortality, given an increase in outsourcing is greater when the population is becoming poorer or total CCG expenditure is declining.

S.16.1 Interaction with austerity

We find no statistically significant interaction effect when testing whether changes to total CCG spend or LA spend alters the relationship between outsourcing and treatable mortality.

	ln(T. Mortality) (1)	(2)
For-profit Outsourcing (%)	0.0033**	0.0035*
	(0.0007)	(0.0010)
	[0.0010, 0.0056]	[0.0007, 0.0063]
Total CCG Spend (£Ms)	0.0000	
	(0.0007)	
	[-0.0013, 0.0013]	
Outsourcing*CCG Spend	0.0000	
	(0.0001)	
	[-0.0001, 0.0002]	
LA spend (£000s per person)		0.0029
		(0.0250)
		[-0.0555, 0.0613]
Outsourcing*LA Spend		0.0000
		(0.0008)
		[-0.0021, 0.0022]
Num.Obs.	648	648
R2	0.886	0.886
R2 Adj.	0.846	0.846
AIC	-1429.3	-1428.8
BIC	-668.7	-668.3
RMSE	0.06	0.06
CCG Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
Clustered Standard Errors	Yes	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Outsourcing, LA Spend, and CCG Spend have a one year lag.

Tr. mortaility, Population and GDHI are log transformed, 'Ln' denotes the natural log of outcome variable.

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

S.16.2 Interaction with demographics

We also find no statistically significant interaction effect for any our demographic variables.

	ln(T. Mortality)						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
For-profit Outsourcing (%)	-0.0647	0.0168	-0.0021	0.0035*	0.0040*	0.0040+	-0.0019
	(0.0474)	(0.0260)	(0.0046)	(0.0011)	(0.0016)	(0.0018)	(0.0042)
	[-0.1533, 0.0239]	[-0.0502, 0.0838]	[-0.0124, 0.0082]	[0.0008, 0.0062]	[0.0003, 0.0078]	[-0.0003, 0.0082]	[-0.0114, 0.0075]
Average Disposable H.hold Income	-0.1505						
	(0.2416)						
	[-0.6624, 0.3614]						
Outsourcing*Income	0.0068						
	(0.0048)						
	[-0.0020, 0.0157]						
Population size		0.4897					
		(0.6013)					
		[-0.5815, 1.5610]					
Outsourcing*Population		-0.0011					
		(0.0021)					
		[-0.0065, 0.0044]					
Managerial/Professional occupation (%)			-0.0034*				
			(0.0020)				
			[-0.0068, 0.0000]				
Outsourcing*Occupation			0.0002				
			(0.0001)				
			[-0.0001, 0.0005]				
Ethnic Minority (%)				0.0019			
				(0.0021)			
				[-0.0025, 0.0062]			
Outsourcing*Ethnicity				0.0000			
				(0.0001)			
				[-0.0002, 0.0002]			
Claimant Rate (%)					0.0145		
					(0.0185)		
					[-0.0170, 0.0460]		
Outsourcing*Claimant Rate					-0.0002		
					(0.0010)		
					[-0.0026, 0.0021]		
Unemployment Rate (%)						0.0017	
						(0.0033)	
						[-0.0056, 0.0089]	
Outsourcing*Unemployment Rate						0.0000	
						(0.0003)	
						[-0.0009, 0.0008]	
Degree Education (%)							-0.0019
							(0.0017)
							[-0.0050, 0.0011]
Outsourcing*Education							0.0001
							(0.0001)
							[-0.0001, 0.0004]
Num.Obs.	609	609	609	609	609	609	609
R2	0.889	0.888	0.889	0.889	0.888	0.888	0.889
R2 Adj.	0.847	0.847	0.848	0.847	0.847	0.846	0.847
AIC	-1331.5	-1329.2	-1333.4	-1329.5	-1329.2	-1328.3	-1331.0
BIC	-590.3	-588.0	-592.2	-588.3	-588.0	-587.1	-589.8
RMSE	0.06	0.06	0.06	0.06	0.06	0.06	0.06
CCG Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Outsourcing, LA Spend, and CCG Spend have a one year lag.

Tr. mortaility, Population and GDHI are log transformed, 'Ln' denotes the natural log of outcome variable.

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

S.16.3 Interaction between deprived and affluent CCGs

We can also conduct interaction effects with time invariant measure of deprivation in a mixed effects model to understand whether the relationship between outsourcing and treatable mortality differs according to overall level of deprivation. Here we use the Index of Multiple Deprivation 2019, extent of deprivation measure. Again we find no significant interaction.

	ln(T. Mortality)
	(1)
For-profit Outsourcing (%)	-0.0005
	(0.0010)
	[-0.0025, 0.0016]
Deprivation (2019)	0.8847***
	(0.0481)
	[0.7905, 0.9790]
Outsourcing*Deprivation	0.0040
	(0.0052)
	[-0.0062, 0.0142]
Num.Obs.	648
R2 Marg.	0.710
R2 Cond.	0.847
AIC	-1239.6
BIC	-1190.4
ICC	0.5
RMSE	0.07
CCG Random Effects	Yes
Time Fixed Effects	Yes
Clustered Standard Errors	Yes

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Outsourcing, LA Spend, and CCG Spend have a one year lag.

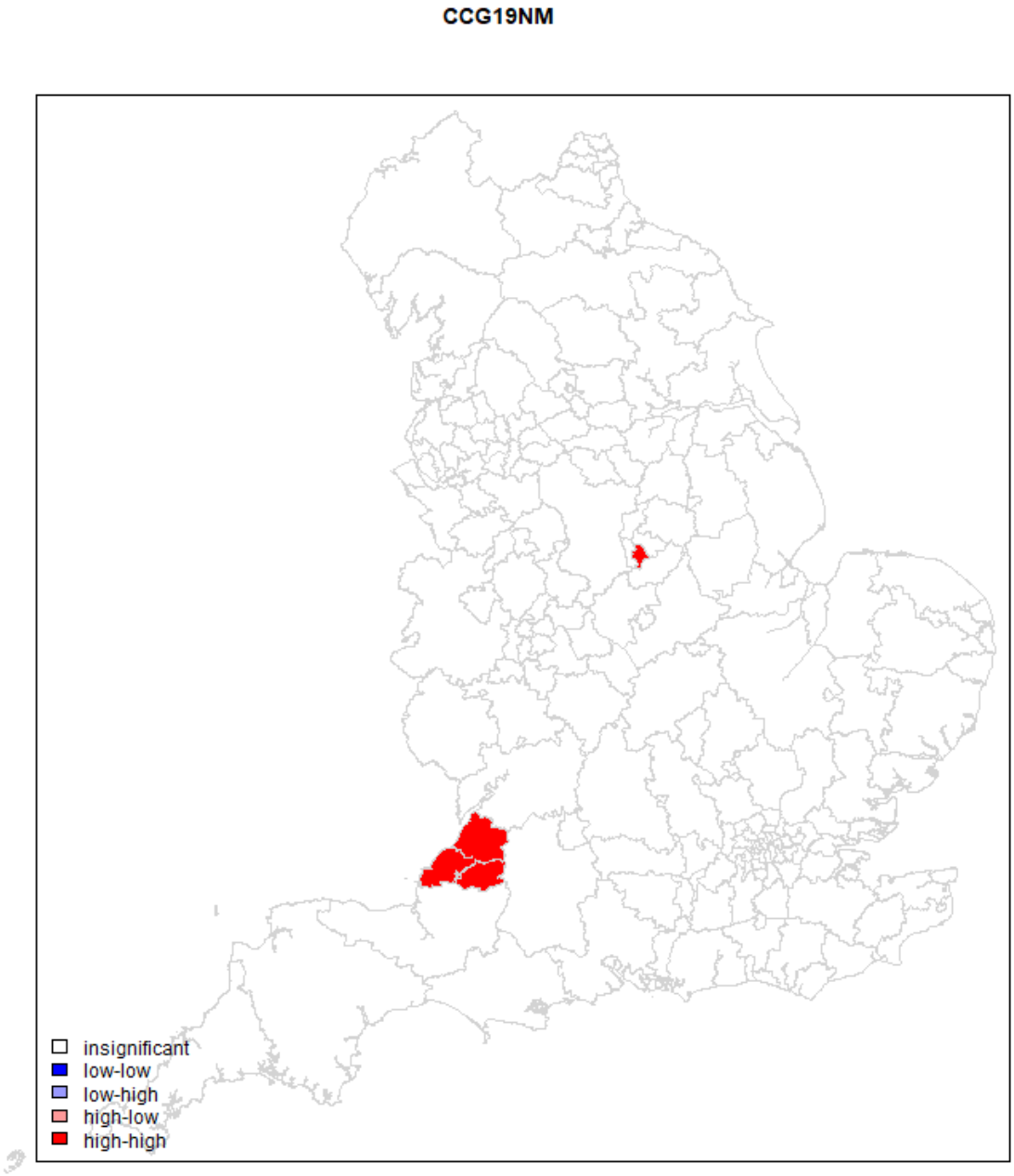
Tr. mortaility, Population and GDHI are log transformed, 'Ln' denotes the natural log of outcome variable.

Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2)

S.17. Spatial autocorrelation

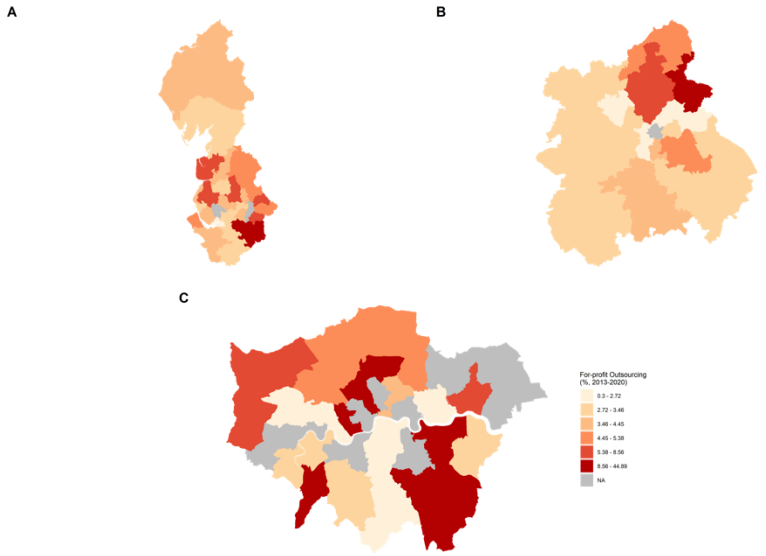
Our results look at within CCG changes in outsourcing, however, it may be the case that there are clusters of high outsourcing. We assess whether, on overall % of outsourcing 2013-2020, there are clusters of high outsourcing. We present LISA clusters below analysing the spatial autocorrelation between bordering neighbours.

We find two clusters of high outsourcing levels, statistically significant at the 5% level. One region in West of England and Nottingham city. However overall, there is very little spatial autocorrelation in the levels of for-profit outsourcing.



S.18. Zoomed in maps

In case the map in figure 1 is difficult to see some of the city regions in England, below we present zoomed in maps for a) the North West of England, b) the West Midlands, c) London.



S.19. Ethnicity breakdown

In the main findings we control for ethnic minority % but there is some available data for further breakdowns in ethnicity. Due to data suppression and small numbers, there is lots of missing data and our observations are reduced by over half. Nonetheless we present these breakdowns below. Our main finding holds in all instances.

	ln(T. Mortality)			
	(1)	**(2)**	**(3)**	**(4)**
For-profit Outsourcing (%)	0.0053*	0.0056**	0.0054*	0.0056**
	(0.0020)	(0.0019)	(0.0019)	(0.0019)
	[0.0012, 0.0095]	[0.0015, 0.0097]	[0.0013, 0.0095]	[0.0015, 0.0097]
Black/Black British (%)	0.0007			
	(0.0038)			
	[-0.0077, 0.0090]			
Mixed ethnicity (%)		0.0150+		
		(0.0075)		
		[-0.0026, 0.0326]		
Indian (%)			0.0034	
			(0.0042)	
			[-0.0062, 0.0130]	
Bangladeshi/ Pakistani (%)				-0.0072+
				(0.0038)
				[-0.0155, 0.0012]
Num.Obs.	290	290	290	290
R2	0.922	0.923	0.922	0.923
R2 Adj.	0.885	0.886	0.885	0.886
AIC	-669.1	-673.2	-669.8	-673.2
BIC	-316.8	-320.9	-317.4	-320.9
RMSE	0.05	0.05	0.05	0.05

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Data

S.20. Data Cleaning

For the statistical analysis in this paper, data is aggregated annually. This means constructing an annual variable of for-profit outsourcing. The data for this variable starts in April 2013 and ends in March 2020. Consequently, we use a % of spend going to for-profit companies rather than an absolute value – which would vary a lot from 2013-2014 and 2019-2020.

When aggregating CCG mortality and population data, we use CCG19CD codes to avoid matching on names. This is important given the many mergers to CCGs taking place in 2020. For non-mortality data used at the CCG scale (income, LA spending, occupation, ethnicity, unemployment rate, claimant rate and education rates) this data is only available at the LA level, consequently we take averages of overlapping LAs for each CCG. An ONS best-fit lookup is used for this purpose.

For the MLM we use LA-level mortality data. LA-level mortality rates are only available as rolling 3-year periods. Consequently, we construct expenditure variables for 3-year periods. For the control variables we calculate a 3-year mean for each LA.

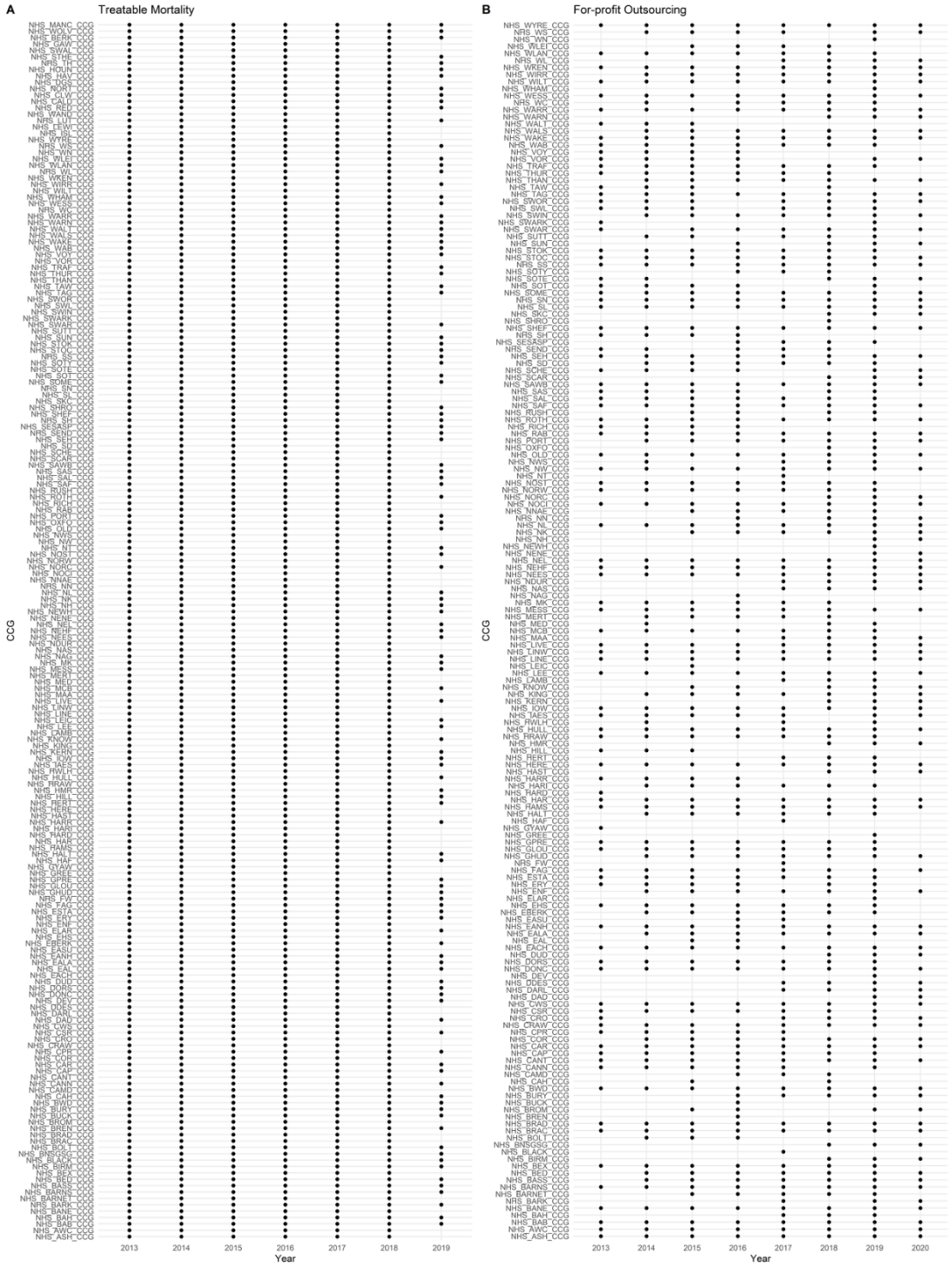
S.21. Missing Data

There are two limitations from missing data in this paper. The first is the missing data in the expenditure data. There are many instances where CCGs did not report their expenditure on their websites, or the format was not machine readable. While there is a chance that not reporting of data is symbolic of poor-quality healthcare management and therefore not random. However, it seems unlikely that outsourcing and likelihood of reporting data is associated and therefore we would not expect our finding to impacted by this. We also conduct many sensitivity checks removing or altering the data slightly and always find robust results.

The second issue with missing data was created by the large number of CCG mergers in 2020. Although our expenditure data is not affected by this as it was collected up until this moment, the mortality data for 2019 and 2020, released after the mergers, is not available for CCGs. There is a chance that the mergers happened non-randomly to treatable mortality rates. However the results all hold when only using data before 2019, so we have taken care to account for this bias.

S.21.1 Missing Data of CCG Expenditure and Mortality

To show the entire extent of the available data, and therefore missing data too, below we plot which years we have data available for in each of the CCGs included in this analysis for the two key variables.



S.22. Model Data Summary

Below we present summaries of all variables included in all the statistical models. Summaries here are for complete observations included in the analysis.

	Mean (SD)	Median (IQR)	Source
Treatable Mortality Rate	85.87 (0.62)	83.7 (22.25)	ONS
For-Profit Outsourcing (%)	5.76 (0.38)	4.04 (3.41)	Rahal & Mohan, (2022).[19]
Total CCG Spend (£Ms)	24.3 (0.75)	19.1 (20.48)	Rahal & Mohan, (2022).[19]
Local Authority Spend (per Capita)	1.27 (0.05)	1.5 (1.61)	MHCLG (RSX)
Claimant Rate	2.07 (0.04)	1.83 (1.39)	ONS (Claimant Count)
Population size	285514.3 (6141.27)	239855 (149055)	ONS
Unemployment Rate	5.36 (0.08)	4.9 (2.6)	ONS (APS)
Ethnic Minority (%)	10.31 (0.4)	5.8 (10.3)	ONS (APS)
Degree Education (%)	35.49 (0.34)	34.3 (11.22)	ONS (APS)
Average Disposable H.hold Income	19952.09 (275.28)	18774 (4641)	ONS (GDHI)
Managerial or Professional Occupation (%)	30.34 (0.23)	29.8 (8.3)	ONS (APS)

S.23. Data Locations

Below we present a table with the full location of data used to create all variables in this analysis. And a brief discussion about the strengths and weaknesses of each.

Variable	Source	Data Location	Strengths	Weaknesses
Treatable Mortality Rate	ONS	https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/causesofdeath/datasets/avoidablemortalitybyclinicalcommissioninggroupsinenglandandhealthboardsinwales	Treatable mortality is a useful measure because it is a measure of health outcome which can a) be measured at a population level and b) only capture outcomes which can be improved by the health system – rather than broader health measures such as life expectancy	CCG reforms in 2020 meant that 2019 data was reported with new merged CCGs so we lose a few observations in that year. Due to the small numbers we cannot break down treatable mortality into specific causes of death very well. For instance a useful analysis could be to see how outsourcing relates with mortality from medical accidents but this is not possible due to data suppression.
For-profit Outsourcing (%)	Rahal, C., & Mohan, J. (2022, January 27). The Role of the Third Sector in Public Health Service Provision: Evidence from 25,338 heterogeneous procurement datasets. https://doi.org/10.31235/osf.io/t4x52	https://doi.org/10.5281/zenodo.5054679	The strengths of this variable are the precision of being able to estimate the exact percent of reported expenditure which goes to for profit companies. Previously, the 'healthcare from non-NHS organisations' category of the CCG accounts would have to be used but the data underlying these numbers was not published.	Lack of reporting by some CCGs means that the data is not complete. Some error may exist in the data from the process of matching supplier names to companies house register. The services for which the payments are made are not reported.
Total CCG Spend (£Ms)	Rahal, C., & Mohan, J. (2022, January 27). The Role of the Third Sector in Public Health Service Provision: Evidence from 25,338 heterogeneous procurement datasets. https://doi.org/10.31235/osf.io/t4x52	https://doi.org/10.5281/zenodo.5054679	A specific measure which legally needs to report all expenditure by CCGs over £25,000. By being able to calculate the total expenditure by a given CCG we can control for any confounding of total healthcare service provided and the percentage of that delivered by the private sector.	Lack of reporting by some CCGs means that the data is not complete.
Local Authority Spend (per Capita)	MHCLG (RSX)	https://www.gov.uk/government/collections/local-authority-revenue-expenditure-and-financing	Total service expenditure includes services such as social care, public health and environmental services. This is complete	This does not give as a detailed insight into the role of joint commissioning or how LAs influence CCG procurement of nursing

			data at the LA level which allows us to control for any confounding from local authority expenditure – which over this period suffered from large funding cuts.	homes, some of which will be owned and run by LAs.
Claimant Rate	ONS (Claimant Count)	https://www.nomisweb.co.uk/query/select/getdatasetbytheme.asp?opt=3&theme=&subgrp=	Claimant rate is a good measure for being able to calculate the labour market activity.	Data is reported at the LA level so we aggregate a mean based on overlapping geographies.
Population size	ONS	https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/clinicalcommissioninggroupmidyearpopulationestimates	Population size is important given changes to the size of a population are often described as being difficult for health systems – particularly given underfunding for these changes. Given the panel data analysis we use, changes in population also represent changes to population density.	We analyse within CCGs but there is more to be assessed in terms of whether rural and urban areas experience this phenomenon differently. The overall population variable cannot help us understand this.
Unemployment Rate	ONS (APS)	https://www.nomisweb.co.uk/query/select/getdatasetbytheme.asp?opt=3&theme=&subgrp=	There will be some overlap between unemployment and claimant count but unemployment will only measure those without any job so covers a more acute definition of labour market activity.	Data is reported at the LA level so we aggregate a mean based on overlapping geographies.
Ethnic Minority (%)	ONS (APS)	https://www.nomisweb.co.uk/query/select/getdatasetbytheme.asp?opt=3&theme=&subgrp=	It is important to control for changes in ethnicity of populations given the disproportionate impact of poor health care on ethnic minorities.	This is a blunt measure of the % of ethnic minority and does not break down different ethnicities. While such an analysis is beyond the remit of this paper, it is an important question worth exploring.
Degree Education (%)	ONS (APS)	https://www.nomisweb.co.uk/query/select/getdatasetbytheme.asp?opt=3&theme=&subgrp=	This measures the percent of people holding degree-level qualifications in a population.	Data is reported at the LA level so we aggregate a mean based on overlapping geographies.
Average Disposable H.hold Income	ONS (GDHI)	https://www.ons.gov.uk/economy/regionalaccounts/grossdisposablehouseholdincome/datasets/regionalgrossdisposablehouseholdincomelocalauthoritiesbyitl1region	This is a good measure of income – which will be important in terms of ability to access alternative healthcare in the case of deteriorating healthcare quality from the NHS	This is a blunt measure of the average income and cannot assess the % of very wealthy people able to afford regular private care nor the % of people experiencing extreme poverty.
Managerial or Professional Occupation (%)	ONS (APS)	https://www.nomisweb.co.uk/query/select/getdatasetbytheme.asp?opt=3&theme=&subgrp=	This measures the percent of people with managerial or professional occupations, which tells us something about the occupational class of an area. It may also control for the % of people with a possibility of receiving some form of private health insurance from their employer.	This cannot break down the impact of healthcare outsourcing/ deterioration on the health of different social classes.

S.24. Causes of Treatable Mortality

Treatable mortality rates are a measure of health system performance based on the number of deaths from causes considered to be avoidable through direct medical intervention. Below we present all the causes that are counted in this measure. Some are marked 50% because they are considered 50% treatable (medical intervention) and 50% preventable (public health intervention).

Condition group and cause	ICD-10 codes	Age	Treatable
Infectious diseases			
Tuberculosis	A15-A19, B90, J65	0-74	• (50%)
Scarlet fever	A38	0-74	•
Sepsis	A40 (excl. A40.3), A41 (excl. A41.3)	0-74	•
Cellulitis	A46, L03	0-74	•
Legionnaires disease	A48.1	0-74	•
Streptococcal and enterococci infection	A49.1	0-74	•
Other meningitis	G00.2, G00.3, G00.8, G00.9	0-74	•
Meningitis due to other and unspecified causes	G03	0-74	•
Neoplasms			
Cervical cancer	C53	0-74	• (50%)
Colorectal cancer	C18-C21	0-74	•
Breast cancer (female only)	C50	0-74	•
Uterus cancer	C54, C55	0-74	•
Testicular cancer	C62	0-74	•
Thyroid cancer	C73	0-74	•
Hodgkin's disease	C81	0-74	•
Lymphoid leukaemia	C91.0, C91.1	0-74	•
Benign neoplasm	D10-D36	0-74	•
Endocrine and metabolic diseases			
Diabetes mellitus	E10-E14	0-74	• (50%)
Thyroid disorders	E00-E07	0-74	•
Adrenal disorders	E24-E25 (excl. E24.4), E27	0-74	•
Diseases of the nervous system			
Epilepsy	G40, G41	0-74	•
Diseases of the circulatory system			
Aortic aneurysm	I71	0-74	• (50%)
Hypertensive diseases	I10-I13, I15	0-74	• (50%)
Ischaemic heart diseases	I20-I25	0-74	• (50%)
Cerebrovascular diseases	I60-I69	0-74	• (50%)
Other atherosclerosis	I70, I73.9	0-74	• (50%)
Rheumatic and other heart diseases	I00-I09	0-74	•
Venous thromboembolism	I26, I80, I82.9	0-74	•
Diseases of the respiratory system			
Upper respiratory infections	J00-J06, J30-J39	0-74	•
Pneumonia, not elsewhere classified or organism unspecified	J12, J15, J16-J18	0-74	•

Acute lower respiratory infections	J20-J22	0-74	•
Asthma and bronchiectasis	J45-J47	0-74	•
Adult respiratory distress syndrome	J80	0-74	•
Pulmonary oedema	J81	0-74	•
Abscess of lung and mediastinum pyothorax	J85, J86	0-74	•
Other pleural disorders	J90, J93, J94	0-74	•
Diseases of the digestive system			
Gastric and duodenal ulcer	K25-K28	0-74	•
Appendicitis	K35-K38	0-74	•
Abdominal hernia	K40-K46	0-74	•
Cholelithiasis and cholecystitis	K80-K81	0-74	•
Other diseases of gallbladder or biliary tract	K82-K83	0-74	•
Acute pancreatitis	K85.0, K85.1, K85.3, K85.8, K85.9	0-74	•
Other diseases of pancreas	K86.1, K86.2, K86.3, K86.8, K86.9	0-74	•
Diseases of the genitourinary system			
Nephritis and nephrosis	N00-N07	0-74	•
Obstructive uropathy	N13, N20-N21, N35	0-74	•
Renal failure	N17-N19	0-74	•
Renal colic	N23	0-74	•
Disorders resulting from renal tubular dysfunction	N25	0-74	•
Unspecified contracted kidney, small kidney of unknown cause	N26-N27	0-74	•
Inflammatory diseases of genitourinary system	N34.1, N70-N73, N75.0, N75.1, N76.4, N76.6	0-74	•
Prostatic hyperplasia	N40	0-74	•
Pregnancy, childbirth and the perinatal period			
Pregnancy, childbirth and the puerperium	O00-O99	0-74	•
Certain conditions originating in the perinatal period	P00-P96	0-74	•
Congenital malformations			
Congenital malformations of the circulatory system (heart defects)	Q20-Q28	0-74	•
Adverse effects of medical and surgical care			
Drugs, medicaments and biological substances causing adverse effects in therapeutic use	Y40-Y59	0-74	•
Misadventures to patients during surgical and medical care	Y60-Y69, Y83-Y84	0-74	•
Medical devices associated with adverse incidents in diagnostic and therapeutic use	Y70–Y82	0-74	•

S.25. CCG Level data

S.25.1 Table of Outsourcing and Treatable Mortality

Below we present a table with the total levels of Outsourcing for each CCG as well as the average treatable mortality rate for each CCG and the total number of treatable deaths between 2013 and 2020.

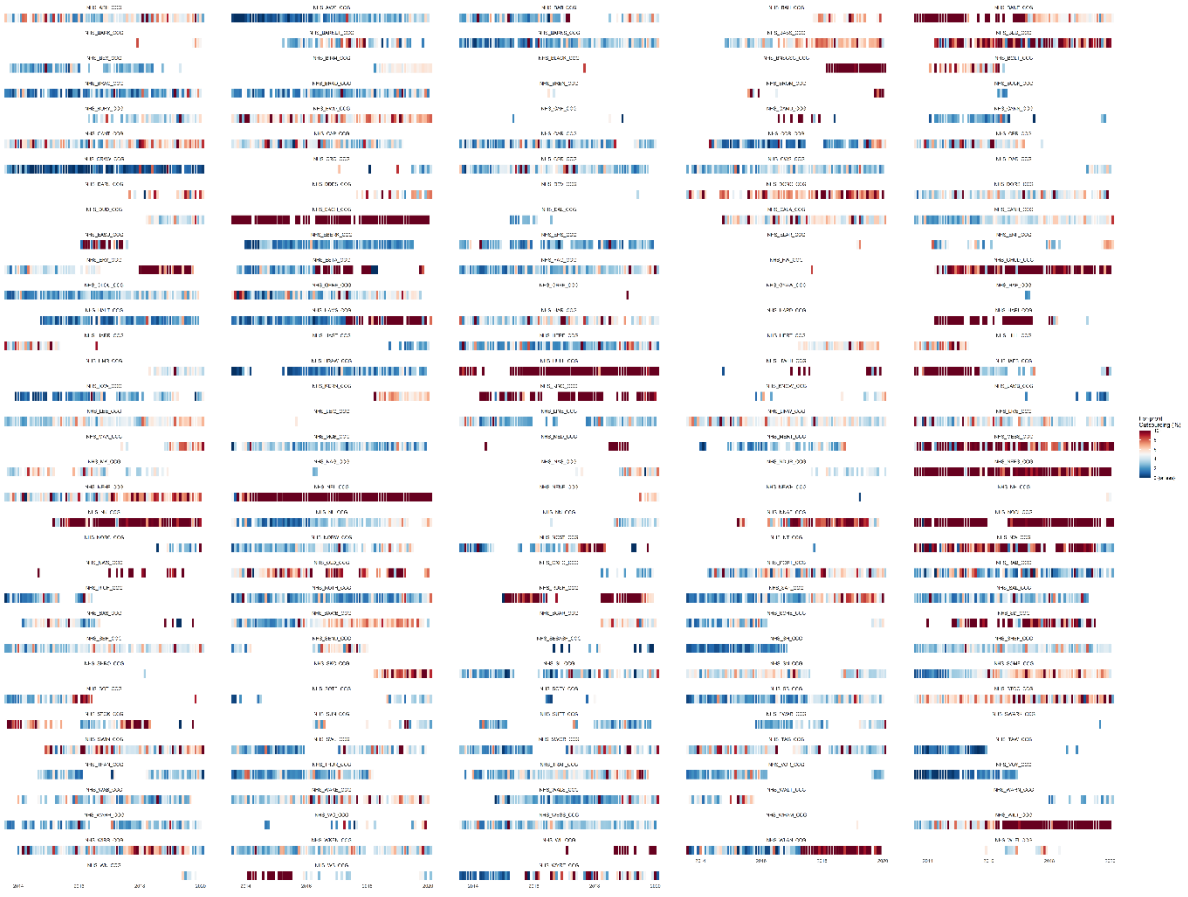
	CCG	Total Spend (£10Ms)	Private sector spend (£10Ms)	For-profit outsourcing (%)	Total Treatable Deaths	Average Treatable Mortality Rate
1	NHS_ASH_CCG	89.1967	4.1937	4.7017	479.5	70.7500
2	NHS_AWC_CCG	121.4167	2.4123	1.9868	688.5	74.9833
3	NHS_BAB_CCG	138.4894	5.8414	4.2180	1380.0	78.3857
4	NHS_BAH_CCG	58.8687	3.7538	6.3765	1298.0	83.9857
5	NHS_BANE_CCG	121.2854	14.1856	11.6961	630.5	67.6667
6	NHS_BARK_CCG	11.6919	0.7148	6.1133	908.5	113.7714
7	NHS_BARNET_CCG	134.5444	6.0226	4.4763	1056.0	65.9833
8	NHS_BARNS_CCG	213.3432	5.2981	2.4834	1682.0	94.8000
9	NHS_BASS_CCG	63.3614	3.6676	5.7884	812.5	88.3143
10	NHS_BED_CCG	274.7652	25.5960	9.3156	2105.5	78.6143
11	NHS_BEX_CCG	106.4552	3.0015	2.8195	882.5	78.4167
12	NHS_BIRM_CCG	286.9020	14.6588	5.1093	6754.5	99.6571
13	NHS_BLACK_CCG	1.9550	0.1673	8.5573	1415.5	133.9571
14	NHS_BNSGSG_CCG	235.9059	42.2482	17.9089	4665.5	78.5286
15	NHS_BOLT_CCG	61.7357	4.2177	6.8318	2034.5	105.6571
16	NHS_BRAC_CCG	75.8158	2.1120	2.7857	359.0	161.8333
17	NHS_BRAD_CCG	250.4083	6.8274	2.7265	1659.0	109.5500
18	NHS_BREN_CCG	3.0066	0.1443	4.7993	1241.0	83.4571
19	NHS_BROM_CCG	31.8450	3.8672	12.1437	1060.0	66.5000
20	NHS_BUCK_CCG	7.7327	0.1529	1.9778	2378.0	63.3857
21	NHS_BURY_CCG	72.9005	3.0352	4.1635	1212.5	92.9143
22	NHS_BWD_CCG	127.7320	8.3127	6.5079	1032.5	115.1000
23	NHS_CAH_CCG	5.0151	0.1782	3.5525	1027.0	104.8000
24	NHS_CAMD_CCG	4.8493	0.5652	11.6563	626.5	67.9667
25	NHS_CANN_CCG	44.5648	0.8544	1.9171	849.5	82.4000
26	NHS_CANT_CCG	157.9543	8.3393	5.2796	852.5	76.1500
27	NHS_CAP_CCG	504.6382	20.2925	4.0212	4385.5	74.9286
28	NHS_CAR_CCG	323.1070	9.4394	2.9215	2123.5	91.3143
29	NHS_COR_CCG	38.9518	1.0503	2.6964	352.0	112.6833
30	NHS_CPR_CCG	72.0828	3.3643	4.6672	1072.0	74.3286
31	NHS_CRAW_CCG	111.1547	2.0091	1.8075	402.5	87.5500
32	NHS_CRO_CCG	33.1473	0.8641	2.6069	1442.5	88.5667
33	NHS_CSR_CCG	132.0259	4.5612	3.4548	1105.0	85.1714
34	NHS_CWS_CCG	404.0761	13.2337	3.2751	2289.5	74.4667
35	NHS_DAD_CCG	118.8040	4.7660	4.0116	6451.5	85.7571
36	NHS_DARL_CCG	17.6710	1.1233	6.3565	532.5	92.7667
37	NHS_DDES_CCG	68.6262	4.1470	6.0429	1526.0	96.6333
38	NHS_DEV_CCG	13.0000	0.4656	3.5814	7181.5	76.4143
39	NHS_DONC_CCG	194.8222	16.0047	8.2151	2134.5	96.9000
40	NHS_DORS_CCG	564.0929	24.4047	4.3264	4424.5	71.3571
41	NHS_DUD_CCG	77.0217	3.3675	4.3722	1789.0	88.9714
42	NHS_EACH_CCG	28.5459	10.4597	36.6417	825.5	69.3667
43	NHS_EAL_CCG	31.0159	0.7564	2.4389	1400.5	86.8000
44	NHS_EALA_CCG	263.6262	13.7482	5.2150	2769.0	101.7857
45	NHS_EANH_CCG	411.3464	16.7221	4.0652	2730.0	75.8429
46	NHS_EASU_CCG	27.5225	2.6953	9.7931	675.0	73.5000
47	NHS_EBERK_CCG	236.6322	4.5800	1.9355	1668.0	76.6714
48	NHS_EHS_CCG	126.5896	3.0757	2.4296	878.5	76.5333
49	NHS_ELAR_CCG	5.6447	0.3613	6.4004	1737.5	67.6000
50	NHS_ENF_CCG	62.6354	2.8353	4.5267	1050.0	77.8667
51	NHS_ERY_CCG	166.8333	12.6663	7.5922	2212.5	79.8714
52	NHS_ESTA_CCG	59.9979	8.1278	13.5468	810.0	87.7429
53	NHS_FAG_CCG	147.5144	4.7309	3.2071	977.0	73.4857
54	NHS_FW_CCG	1.9550	0.1673	8.5573	1486.5	91.0857
55	NHS_GHUD_CCG	148.7779	18.6483	12.5343	1312.5	88.8286
56	NHS_GLOU_CCG	451.8417	13.3179	2.9475	3547.0	75.1857
57	NHS_GPRE_CCG	151.9930	5.9471	3.9127	1262.0	95.9857
58	NHS_GREE_CCG	3.0216	0.3164	10.4725	950.0	94.8500
59	NHS_GYAW_CCG	1.7797	0.2068	11.6217	1159.0	87.1833
60	NHS_HAF_CCG	3.4430	0.0688	1.9983	626.5	81.6143
61	NHS_HALT_CCG	94.9133	1.6843	1.7746	960.0	103.1286
62	NHS_HAMS_CCG	247.3962	16.6362	6.7245	802.5	63.9333
63	NHS_HAR_CCG	144.5336	6.7353	4.6600	1073.5	93.2000
64	NHS_HARD_CCG	1.9596	0.0067	0.3434	642.5	68.8333
65	NHS_HARI_CCG	13.5318	1.9170	14.1665	839.5	89.2167
66	NHS_HARR_CCG	44.8492	2.4334	5.4258	896.0	68.5143

67	NHS_HAST_CCG	38.6745	0.8367	2.1633	1436.0	96.5667
68	NHS_HERE_CCG	142.1713	4.3873	3.0859	907.0	78.1333
69	NHS_HERT_CCG	186.4982	10.0641	5.3964	2745.0	73.3857
70	NHS_HILL_CCG	57.0294	3.2323	5.6678	1163.5	81.9000
71	NHS_HMR_CCG	53.0589	2.4846	4.6827	1577.0	112.2286
72	NHS_HRAW_CCG	90.5708	1.4612	1.6133	663.0	68.9500
73	NHS_HULL_CCG	199.7943	36.7281	18.3830	1874.0	117.9286
74	NHS_HWLH_CCG	22.6649	4.2653	18.8189	668.0	63.9667
75	NHS_IAES_CCG	137.5530	11.7194	8.5199	2257.5	72.3000
76	NHS_IOW_CCG	87.2929	1.9513	2.2353	856.0	77.5286
77	NHS_KERN_CCG	126.6256	7.9390	6.2697	3685.0	78.1429
78	NHS_KING_CCG	74.0873	12.1660	16.4212	489.0	68.7833
79	NHS_KNOW_CCG	26.2597	1.0881	4.1438	1157.0	115.7286
80	NHS_LAMB_CCG	42.5439	0.5722	1.3449	955.0	99.7667
81	NHS_LEE_CCG	609.7731	27.3572	4.4865	4338.5	93.6571
82	NHS_LEIC_CCG	2.8155	0.1556	5.5255	1948.0	110.5286
83	NHS_LINE_CCG	150.5100	4.7180	3.1347	1516.5	97.3167
84	NHS_LINW_CCG	161.2271	7.6162	4.7239	1166.0	90.8667
85	NHS_LIVE_CCG	422.9544	18.4691	4.3667	3273.0	113.6000
86	NHS_MAA_CCG	39.4745	2.4474	6.1998	1078.5	99.2333
87	NHS_MCB_CCG	184.0824	5.8044	3.1532	2124.5	80.9857
88	NHS_MED_CCG	25.6557	4.9932	19.4624	1212.5	91.1333
89	NHS_MERT_CCG	72.9919	2.1740	2.9784	633.5	78.3333
90	NHS_MESS_CCG	238.9167	25.0644	10.4909	2029.0	70.1714
91	NHS_MK_CCG	81.7869	3.9037	4.7730	1184.5	83.1000
92	NHS_NAG_CCG	11.1884	0.2961	2.6461	2967.0	96.9714
93	NHS_NAS_CCG	28.1428	1.4429	5.1269	540.0	76.3000
94	NHS_NDUR_CCG	48.5737	1.9554	4.0255	1122.5	82.3500
95	NHS_NEES_CCG	258.6982	32.5699	12.5899	2133.5	83.8000
96	NHS_NEHF_CCG	153.1753	9.6364	6.2911	815.0	66.9143
97	NHS_NEL_CCG	137.1784	26.5189	19.3317	1079.0	94.0000
98	NHS_NENE_CCG	43.9367	2.7153	6.1800	2904.0	85.5333
99	NHS_NEWH_CCG	2.3938	0.0071	0.2986	1173.5	100.6571
100	NHS_NH_CCG	3.9765	0.2041	5.1329	922.5	67.5000
101	NHS_NK_CCG	101.5054	13.0264	12.8332	1035.5	96.0571
102	NHS_NL_CCG	106.1363	3.4217	3.2238	1184.0	90.6429
103	NHS_NN_CCG	37.0446	1.3956	3.7673	861.0	71.8167
104	NHS_NNAE_CCG	73.3396	6.4838	8.8408	660.0	79.7500
105	NHS_NOCI_CCG	225.8444	45.3639	20.0863	1375.5	118.3333
106	NHS_NORC_CCG	46.6250	1.6254	3.4861	2187.5	84.7286
107	NHS_NORW_CCG	118.1798	4.4186	3.7389	823.0	80.5500
108	NHS_NOST_CCG	94.2442	5.0527	5.3613	1438.0	84.0571
109	NHS_NT_CCG	2.0774	0.0344	1.6555	1345.0	89.0000
110	NHS_NW_CCG	69.4064	6.6690	9.6086	486.5	77.6667
111	NHS_NWS_CCG	45.7581	5.4882	11.9940	1233.0	72.1833
112	NHS_OLD_CCG	117.5544	9.4533	8.0417	1649.5	109.7286
113	NHS_OXFO_CCG	74.1177	1.9666	2.6533	3030.5	68.6429
114	NHS_PORT_CCG	148.6379	7.0648	4.7530	1113.5	95.4714
115	NHS_RAB_CCG	122.6959	3.5011	2.8535	822.5	81.3833
116	NHS_RICH_CCG	41.7409	1.1773	2.8206	563.0	61.8333
117	NHS_ROTH_CCG	199.6942	5.3701	2.6892	1954.0	100.5143
118	NHS_RUSH_CCG	52.5452	6.1027	11.6143	446.5	69.6667
119	NHS_SAF_CCG	106.4715	4.1606	3.9077	743.0	76.9000
120	NHS_SAL_CCG	222.7918	7.0117	3.1472	1669.5	113.7000
121	NHS_SAS_CCG	52.8758	3.2265	6.1021	898.0	74.1286
122	NHS_SAWB_CCG	390.6946	19.8621	5.0838	2705.5	116.5857
123	NHS_SCAR_CCG	31.3256	1.6070	5.1300	640.0	90.1500
124	NHS_SCHE_CCG	57.8572	1.9774	3.4178	905.5	88.1167
125	NHS_SD_CCG	164.7748	20.6561	12.5360	968.5	61.9667
126	NHS_SEH_CCG	158.5507	6.7024	4.2273	1033.5	70.2286
127	NHS_SEND_CCG	53.3497	2.6433	4.9548	1111.5	88.7000
128	NHS_SESASP_CCG	9.7573	0.2299	2.3563	1377.0	77.1714
129	NHS_SH_CCG	32.5019	0.4297	1.3221	344.5	57.9000
130	NHS_SHEF_CCG	442.5339	16.3329	3.6908	3007.0	87.2714
131	NHS_SHRO_CCG	3.1941	0.1066	3.3369	1736.5	76.0143
132	NHS_SKC_CCG	53.4247	4.2064	7.8734	1055.5	84.6000
133	NHS_SL_CCG	87.6896	2.8980	3.3048	698.0	78.5167
134	NHS_SN_CCG	131.6253	5.8571	4.4498	944.5	67.8000
135	NHS_SOME_CCG	406.1872	19.6904	4.8476	3169.5	69.9714
136	NHS_SOT_CCG	69.1321	3.3099	4.7878	1049.0	91.5000
137	NHS_SOTE_CCG	59.3278	1.7189	2.8973	1645.0	113.2000
138	NHS_SOTY_CCG	9.8111	0.1832	1.8677	1045.0	93.0000
139	NHS_SS_CCG	140.6365	3.9594	2.8154	1184.0	99.3143
140	NHS_STOC_CCG	232.4979	13.6225	5.8592	1688.5	80.5000
141	NHS_STOK_CCG	117.8769	8.4045	7.1299	1750.5	98.3000
142	NHS_SUN_CCG	61.9920	2.6068	4.2051	1985.0	97.2571
143	NHS_SUTT_CCG	69.7308	1.9908	2.8550	675.0	73.8000
144	NHS_SWAR_CCG	96.1228	3.0818	3.2061	1274.0	72.6429
145	NHS_SWARK_CCG	12.2270	0.1375	1.1250	908.0	92.7167
146	NHS_SWIN_CCG	116.8057	6.0906	5.2143	915.5	86.5000

147	NHS_SWL_CCG	74.3440	2.7406	3.6863	623.5	83.1833
148	NHS_SWOR_CCG	77.5220	2.9516	3.8075	1340.0	75.8333
149	NHS_TAG_CCG	165.9142	7.6193	4.5923	1868.0	103.6286
150	NHS_TAW_CCG	46.0825	0.5581	1.2112	974.5	94.4714
151	NHS_THAN_CCG	67.7331	2.1346	3.1515	802.0	96.6500
152	NHS_THUR_CCG	77.9838	2.0130	2.5814	858.5	86.9000
153	NHS_TRAF_CCG	149.6637	6.6295	4.4296	1200.5	79.4571
154	NHS_VOR_CCG	33.1918	0.9497	2.8612	478.0	81.9333
155	NHS_VOY_CCG	126.6822	1.2983	1.0249	1988.5	77.7286
156	NHS_WAB_CCG	202.8905	7.1108	3.5048	2443.0	104.2714
157	NHS_WAKE_CCG	273.4190	13.4785	4.9296	2416.5	96.9571
158	NHS_WALS_CCG	177.3103	5.5416	3.1254	1650.0	103.5000
159	NHS_WALT_CCG	53.8998	2.5473	4.7260	1090.5	93.7714
160	NHS_WARN_CCG	24.5900	0.7369	2.9968	1140.0	90.8429
161	NHS_WARR_CCG	122.9043	3.5833	2.9155	1302.0	88.3714
162	NHS_WC_CCG	37.7062	1.3124	3.4807	999.0	76.2667
163	NHS_WESS_CCG	223.3604	7.6282	3.4152	1527.5	73.4714
164	NHS_WHAM_CCG	6.0896	0.3332	5.4709	2370.5	61.8286
165	NHS_WILT_CCG	326.7789	39.7173	12.1542	1944.5	70.4833
166	NHS_WIRR_CCG	260.6889	12.3664	4.7437	2306.5	93.3857
167	NHS_WKEN_CCG	308.6818	11.9971	3.8866	1800.0	71.3667
168	NHS_WL_CCG	10.7974	4.8475	44.8950	705.0	61.5571
169	NHS_WLAN_CCG	77.8140	5.1574	6.6278	725.5	82.8857
170	NHS_WLEI_CCG	35.4466	1.6765	4.7297	2148.5	73.8429
171	NHS_WN_CCG	11.8710	0.5032	4.2389	866.0	77.7667
172	NHS_WS_CCG	49.7483	4.1690	8.3803	1125.0	65.6429
173	NHS_WYRE_CCG	61.3737	2.6873	4.3787	515.0	81.5000

S.25.2 Stripe plot

We can also present the monthly changes to outsourcing for each CCG. Here we limit the scale to 0-10 to be able to show the variation between CCGs and across time.



Reporting Checklists and Statements

S.26. STROBE Checklist

	Item No.	Recommendation	Page No.	Relevant text from manuscript
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1	Observational analysis
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1	"estimate multivariate longitudinal regression models with CCG-level fixed effects analysing the effects of for-profit outsourcing on treatable mortality rates in the following year." "An annual increase of one percentage point of outsourcing to the private sector corresponds with an annual increase in treatable mortality of 0.38% or 0.29 deaths per 100,000 population (95% CI 0·15% to 0·62%; p= 0.0055) in the following year."
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3	"But the evidence on the impact of 'creeping privatisation' in general and in England's NHS specifically remains uncertain. In general, these findings are often inconclusive in that they do not analyse the aggregate effect of outsourcing on service-wide performance [13, 14]. Moreover, such comparisons between for-profit and not-for profit providers are often inappropriate because the case-mixes of private and public services are quite different."
Objectives	3	State specific objectives, including any prespecified hypotheses	4	"In this paper, we examine the impact on treatable mortality of increased outsourcing to private for-profit providers from England's CCGs during the period immediately following the implementation of the 2012 Health and Social Care Act. To do this, we draw on an entirely novel data set which brings together every reported financial transaction between CCGs and private healthcare provides across 173 CCGs. This data allows us to conduct, to our knowledge, the first empirical evaluation of one of the most controversial reforms in England's recent history."
Methods				
Study design	4	Present key elements of study design early in the paper	5	"We ran fixed effects and first differences regression models on the association between outsourcing and treatable mortality, these

				models will control for all time invariant confounders at the regional level."
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5	"Data was collected on all live English CCGs as of 2019. Of the full 191 sample, 173 provided at least some machine-readable data between 2013 and 2020"
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	5	"Data was collected on all live English CCGs as of 2019. Of the full 191 sample, 173 provided at least some machine-readable data between 2013 and 2020"
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	5	"We also ran our fixed effects model using covariate-balancing with propensity scores based on treatable mortality rates at the beginning of the time-series and the total number of General Practitioners in each CCG."
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	4-5	"Table 1 lists our study variables. The response variable is our measure for healthcare quality, 'treatable mortality'. This is defined as: "deaths that can be mainly avoided through timely and effective healthcare interventions, including secondary prevention and treatment" [17]."
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods	*5*	*"*Full locations of the data as well as a discussion of the data limitations is available in table S.22. Data here is for complete observations included in the analysis. For a description and discussion of missing data see S.21. in supplementary material."

		if there is more than one group		
Bias	9	Describe any efforts to address potential sources of bias	6	"To account for potential bias in the main result from the choice of covariates in the model, we present a specification curve in the supplementary materials which is combined with the random error loops (figure S.8.)." "Finally we run the linear fixed effects regression (Table 2, model 1) 173 times, removing a different individual CCG on each loop (see supplementary material S.5.). This was done to check whether any single CCG was primarily driving our overall result. We find that all regressions return a statistically significant, positive result we can therefore be confident that our result is not considerably biased by any single CCG."
Study size	10	Explain how the study size was arrived at	5	"Data was collected on all live English CCGs as of 2019. Of the full 191 sample, 173 provided at least some machine-readable data between 2013 and 2020"

S.27. GATHER Checklist

Item number	Checklist item	Page No.	Relevant text from manuscript
Objectives and funding			
1	Define the indicator(s), populations (including age, sex, and geographic entities), and time period(s) for which estimates were made.	4-5	"Table 1 lists our study variables." "Full locations of the data as well as a discussion of the data limitations is available in table S.22. Data here is for complete observations included in the analysis. For a description and discussion of missing data see S.21. in supplementary material."
2	List the funding sources for the work.	1	"Funding: This work is supported by The Wellcome Trust [221160/Z/20/Z], [220206/Z/20/Z]"
Data inputs			
For all data inputs from multiple sources that are synthesised as part of the study:			
3	Describe how the data were identified and how the data were accessed.	5	"Full locations of the data as well as a discussion of the data limitations is available in table S.22. Data here is for complete observations included in the analysis. For a description and discussion of missing data see S.21. in supplementary material."
4	Specify the inclusion and exclusion criteria. Identify all ad-hoc exclusions.	5	"Data was collected on all live English CCGs as of 2019. Of the full 191 sample, 173 provided at least some machine-readable data between 2013 and 2020, although most of those have years missing due to mergers or missing periods in data publication (see supplementary material S.16. for full description of missing data)."
5	Provide information about all included data sources and their main characteristics. For each data source used, report reference information or contact name/institution, population represented, data collection method, year(s) of data collection, sex and age range, diagnostic criteria or measurement method, and sample size, as relevant.	5	"Full locations of the data as well as a discussion of the data limitations is available in table S.22. Data here is for complete observations included in the analysis. For a description and discussion of missing data see S.21. in supplementary material."
6	Identify and describe any categories of input data that have potentially important biases (eg, based on characteristics listed in item 5).	5	"Full locations of the data as well as a discussion of the data limitations is available in table S.22. Data here is for complete observations included in the analysis. For a description and discussion of missing data see S.21. in supplementary material."
For data inputs that contribute to the analysis but were not synthesised as part of the study:			
7	Describe and give sources for any other data inputs.	5	"Full locations of the data as well as a discussion of the data limitations is available in table S.22. Data here is for complete observations included in the analysis. For a description and discussion of missing data see S.21. in supplementary material."
For all data inputs:			

8	Provide all data inputs in a file format from which data can be efficiently extracted (eg, a spreadsheet rather than a PDF), including all relevant meta-data listed in item 5. For any data inputs that cannot be shared because of ethical or legal reasons, such as third-party ownership, provide a contact name or the name of the institution that retains the right to the data.	13	"The extensive code library which accompanies this work can be found at https://github.com/BenGoodair/CCG-Outsourcing. The data that support the findings of this study are all publicly available, replication materials all available at https://github.com/BenGoodair/CCG-Outsourcing. Locations of raw data is detailed in supplementary material S.22. CCG expenditure data available from Rahal and Mohan (2022). [16]"
Data analysis			
9	Provide a conceptual overview of the data analysis method. A diagram may be helpful.	5	"We ran fixed effects and first differences regression models on the association between outsourcing and treatable mortality, these models will control for all time invariant confounders at the regional level. We also ran our fixed effects model using covariate-balancing with propensity scores based on treatable mortality rates at the beginning of the time-series and the total number of General Practitioners in each CCG. Covariate balancing is an advanced matching method which can weight values to balance the model, accounting for differences in observations according to their value of a continuous treatment variable, in this case for-profit outsourcing[18]."
10	Provide a detailed description of all steps of the analysis, including mathematical formulae. This description should cover, as relevant, data cleaning, data pre-processing, data adjustments and weighting of data sources, and mathematical or statistical model(s).	8	"For full model expressions see supplementary material (S.2.)"
11	Describe how candidate models were evaluated and how the final model(s) were selected.	6	"To account for potential bias in the main result from the choice of covariates in the model, we present a specification curve in the supplementary materials which is combined with the random error loops (figure S.8.)."
12	Provide the results of an evaluation of model performance, if done, as well as the results of any relevant sensitivity analysis.	6	"To check whether potential error in the contract data influences our inferences, we synthetically replicate the effect of error on our findings. By running the regression results 50,000 times, each time multiplying the outsourcing values by random numbers we simulate how random error may impact the study's findings."
13	Describe methods of calculating uncertainty of the estimates. State which sources of uncertainty were, and were not, accounted for in the uncertainty analysis.	8	"Robust SEs are clustered at individual level and use a bias-reduced linearization estimator (CR2) [19] Satterthwaite degrees of freedom used in MLM"

14	State how analytical or statistical source code used to generate estimates can be accessed.	13	"The extensive code library which accompanies this work can be found at https://github.com/BenGoodair/CCG-Outsourcing. The data that support the findings of this study are all publicly available, replication materials all available at https://github.com/BenGoodair/CCG-Outsourcing. Locations of raw data is detailed in supplementary material S.22. CCG expenditure data available from Rahal and Mohan (2022). [16]"
Results and discussion			
15	Provide published estimates in a file format from which data can be efficiently extracted.	13	"The extensive code library which accompanies this work can be found at https://github.com/BenGoodair/CCG-Outsourcing. The data that support the findings of this study are all publicly available, replication materials all available at https://github.com/BenGoodair/CCG-Outsourcing. Locations of raw data is detailed in supplementary material S.22. CCG expenditure data available from Rahal and Mohan (2022). [16]"
16	Report a quantitative measure of the uncertainty of the estimates (eg, uncertainty intervals).	8	95% Cis reported in table
17	Interpret results in light of existing evidence. If updating a previous set of estimates, describe the reasons for changes in estimates.		No previous estimates of this relationship
18	Discuss limitations of the estimates. Include a discussion of any modelling assumptions or data limitations that affect interpretation of the estimates.	13	"The associational nature of our findings cannot rule out the possibility of residual confounding, consequently our findings should not be interpreted as necessarily evidencing a causal relationship between outsourcing and mortality rates. The expenditure data does not contain information on the specific services provided by the supplier, as such there remains further research needed to distinguish if some acute services are primarily causing the relationship we observe."

S.28. Study protocol and data analysis plan statements

There was no study protocol or data analysis plan for this research. No sensitive data is included in the research and, as such, no ethics approval was sought.

Appendix Paper 2

Table A1: participant site locations

Commissioning site Number (CCG/ICB)	Outsourcing levels	Participant numbers
1	High	H; R; B; Q; O; K; D
2	High	F; I; J; T
3	Low	M; P; E; L; G; N; S; C; A

Table A2: participant job roles

Job Role	Participant numbers
Leadership team (COO, CFO, deputies, exec committee members)	C; I; F; K; Q; B; P; M; H
Lay member	S; G
Procurement/ contracting teams	T; A; D; E
Commissioning Support	J
Clinical/ specialty teams	N; O; L
Communications and engagement	R

Table A3: basic codes and organising themes

Qualitative Analysis		
Organising Theme	Basic Theme	Example quotes
Success of NHS providers in meeting demand	Longer waiting times increase use of private sector.	"So to produce capacity quickly, to get to 18 week waiting time targets. That was the inception of the independent sector, but that still holds true"
	Varying population demographics would alter need for, and uptake of, private sector.	"But the population [of redacted affluent area] tended to be much more white middle class so there is much more aspirational, of being able to access the private sector, not needing to rely on the NHS... But there is just that aspiration, which the [redacted deprived place name] population don't have the [redacted deprived place name] population are just so pleased that getting anything, they don't have that level of aspiration, whereas [redacted affluent place name] do with it. It's more that middle class image that you're going private"
	Quality metrics and user feedback may lead to use of competitive procurement process.	""Some of it depends on the quality of services. So if you're concerned, or if there's been CQC issues of serious incidents or complaints, and things like that about a service, then you are much more likely to go procure for a new service."
Private provider locations and the choice agenda	Privatisation driven by locations of private hospitals.	"I think probably the biggest reason is location. And the number of providers around you. You know, it is a hell of a lot easier. Service out for procurement when you've got a massive population and a lot of different providers."
	New Labour reforms created the situ of private hospitals through ISTC contracts.	"Crikey. It must have been 10 or 15 years ago, the NHS undertook a policy of creating what it described as Independent Treatment Centres, I don't know whether you know about that, for some conditions, so orthopaedics was an obvious one and there was a national procurement exercise which drew in international capacity and capability."
	Rural commissioners have limited access to private provision.	"trying to attract an independent providers, because we are in such geographical corner, is quite challenging. It is relatively unique to [redacted commissioning place name] because there's very few major cities that are so far away."
	'The Choice Agenda' and predatory providers empower private providers.	" So with the choice policy, and Any Qualified Provider policy that been in place in the NHS, then if an Independent Sector provider is contracted by anyone in the English NHS, then they are basically able to set themselves up wherever they want to in the country as an Any Qualified Provider and start basically receiving referrals from your population and you're not able to do anything to stop that"
NHS capital	Absence of NHS provision, often for siloed services.	" if you're an independent sector provider, you can go and look to a venture capitalist company for your start-up monies you can buy or build a property and you can be up and running very, very quickly. Whereas in the NHS, it's a bit of a slow burn."
	Workforce availability limited NHS expansion.	"I don't think it's realistic for us to think, well, that's okay. We'll just employ 10 other orthopaedic surgeons, because you know, some of what attracts people to work for you in the NHS is the fact that they know that they'll be able to get a certain level of income from the private independent sector market as well."
Commissioning Leadership and Politics	Leader's appetite for alternatives.	" But the personality of the Chief Exec and chief finance officer, I think can make a massive difference. in a couple of CCGs, a key first question that what we should do is what does the chief exec want to happen? And then, in others it's not, it's, you know, what is what do we think should happen? So, there are some, some very, very

		strong individual, although it's not formal authority, because authority still will go through the government body voting session, if you had to, actually, the key determining factor in what in what happens is what the chief exec wants to happen."
	Outsourcing to challenge NHS provider cultures.	"*[redacted CCG leader] did threaten the hospital with quite a lot of procurement at the very start of [redacted pronoun] tenure, I think that will pushed to shake the hospital up a bit. And to some extent that you can play a bit of tactics, and you can play politics with people, as a leader to try and, well I guess, manipulate essentially."*
Consequences of Financing and Austerity	Stringent budgets induce outsourcing	"*When you're in financial deficit, and you're struggling to balance the books, the NHS bosses above the, commissioning chiefs, they are always on to saying, 'hey, gotta save money, you need to cut this service, to put this out to the private sector', so on."*
	Stringent budgets constrain outsourcing	"*The add-on services that you might have looked at in a basket of private procurement. And that could include some enhanced services that came through into general practice. You might just say, I can't do that anymore. You know, in general practice, we see that we see some enhanced services used to go just get cut year by year… the likelihood is that the most important things [being cut]."*
	Prices of comparable services don't generalise by sector of provision	"*I would say it's not a generalization, it may appear cheaper, but it's because they take less complex patients, which are cheaper anyway, whether you're in their full NHS service or not. So, I think it being cheaper is more of an illusion."*

Appendix Paper 3

Data

A.1 – Data cleaning

This research contains several novel aggregated datasets. They have been aggregated in a mixture of computationally intensive ways. This section will walk through, data source by data source, the processes involved in collecting and cleaning the data – as well as the decisions made and limitations of each measure.

A.1.1 – Privatisation

Privatisation is conceptualised, for the most part, in this research as the % of NHS treatments delivered by private sector providers. We use two measures of this – 1) the % of expenditure from CCGs going to for-profit providers and 2) the % of clinical-led treatments conducting in private providers.

The benefits of the first measure are that it will include all services, not just a subset of treatments. The data also starts in 2013, rather than the end of 2015. And this measure can focus on for-profit providers only – capturing the profit-motivated health providers as opposed to a mixture of for-profit and non-profit companies.

The benefits of the second measure are that it might better capture the pathway from increased health needs to privatisation given that it will solely measure the number of private sector treatments.

A.1.1.1 – CCG expenditure

CCG expenditure is cleaned from the data resource *NHS Spend* (Rahal et al. 2021). Rahal and colleagues scraped monthly expenditure files for all CCGs which published parsable expenditure files (Rahal and Mohan 2022). They then used algorithmic matching to link this data to companies house and charities commission records – identifying whether the expenditure goes to a public body, for-profit company or registered charity.

We utilise this resource, aggregating the data annually for each available CCG. We divide all expenditure on for-profit companies by the total expenditure to produce our key variable for % privatisation.

A.1.1.2 – CCG treatments

NHS England publishes the waiting times for all acute treatments conducted by the NHS (NHS England 2023c). Since October 2015, this data resource has linked the accountable commissioner to the provider. This data includes the total number of treatments conducted monthly by each provider and indicates which provider is an NHS Trust or non-NHS provider.

We take this data, aggregate in annually and calculate the % of treatments each CCG is responsible for conducted in non-NHS providers. We include all treatments, both admitted and non-admitted patients.

A.1.2 – CCG funding

We want to measure the effects of austerity in the NHS. To capture this we measure the levels of funding each CCG receives annually. We also include a slightly different measure which will measure experiences of financial difficulty of CCGs – not necessarily corresponding with austerity policies.

The benefits of using the measure of funding is that it accurately represents the allocation from central funding sources – the first manifestation of austerity policies. It is also complete data and was collected manually to ensure accuracy. Regional allocations are, however, determined by algorithms based on local data and anticipated need. Therefore, changes in allocation levels are sometimes a product of demographic changes and the potential confounding should be considered when regressing against health outcomes.

The balance reported by CCGs end of year accounts might provide us with a better measure of the experience of financial difficulty of CCGs. This allows us to answer a slightly different question, not whether austerity drives privatisation, but whether financial difficulty drives privatisation. The downside of this measure is that the causes of a low account balance may be features of accounting rather than actually representative of the CCG needing to find spending cuts. Another downside is that NHS England stopped presenting aggregated commissioner accounts since 2017, so the final years were scraped from annual reports of all CCGs.

A.1.2.1 – CCG allocation

The total allocation provided to CCGs is reported by NHS England annually (NHS England 2023a). We take this and aggregate the data to give us a longitudinal value for CCG allocation between 2013 and 2019. We also use best-fit look ups to assess the levels before NHS reforms in 2013 for the visualisation in figure 1 (NAO 2012).

Annual values for the CCG allocation are then divided by the CCG-s mid-year population estimates – provided by the ONS. And constant prices are calculated using a GDP deflator (ONS 2023).

A.1.2.2 – CCG accounts balance

CCG annual accounts were published annually in a central location between 2013 and 2017 (NHS England 2018). We take the end of year balance to represent the annual financial health of the CCG. For the years after 2017, we downloaded every CCG end of year report, processed the pdfs in R and parsed rows reporting end of year balance.

A.1.3 – LA allocation

Local authority allocation is calculated as the central government grants given to LAs. This excludes tax revenue and follows the methods of Alexiou and colleagues (Alexiou et al. 2023). We take the revenue support grant, and the redistributed non-domestic rates/ retained income from Rate Retention Scheme. These are summed, divided by estimated mid-year population to represent the generosity of central government towards Local Authorities.

A.1.4 – Benefits expenditure

For benefits data, we take the Universal Credit reported by the Department for Work and Pensions (DWP 2023). We also combine this with all the principal components which the UC replaced (housing benefit, personal independence payments, incapacity support payments, jobseekers allowance, disability living allowance, tax credits, employment and support allowance, we also included carers support allowance). This process was inspired by the work of Beatty and Fothergill who calculated the anticipated regional variation in welfare cuts – to our knowledge this is the first time it has been actually calculated (Beatty and Fothergill 2016).

A.1.5 – Mortality rates

We take the avoidable mortality rates presented at the approximate CCG boundary geographies (ONS 2021a). CCGs do not function on strict geographies but rather based on GP registrations within a certain boundary. Therefore, these represent approximate populations. Avoidable mortality is constructed as an aggregate of two different types of amenable mortality: treatable and preventable. Treatable mortality represents deaths from causes which are medically curable, preventable mortality represents deaths which have a more social/ public health link. The exact causes of death are reported below in A1.6.

A.1.6 – Causes of avoidable mortality

Condition group and cause	ICD-10 codes	Age	Treatable	Preventable
Infectious diseases				
Intestinal diseases	A00-A09	0-74		•
Diphtheria, Tetanus, Poliomyelitis	A35, A36, A80	0-74		•
Whooping cough	A37	0-74		•
Meningococcal infection	A39	0-74		•
Sepsis due to streptococcus pneumonia and sepsis due to haemophilus influenzae	A40.3, A41.3	0-74		•
Haemophilus influenza infections	A49.2	0-74		•
Sexually transmitted infections (except HIV/AIDS)	A50-A60, A63, A64	0-74		•
Varicella	B01	0-74		•
Measles	B05	0-74		•
Rubella	B06	0-74		•
Viral Hepatitis	B15-B19	0-74		•
HIV/AIDS	B20-B24	0-74		•
Malaria	B50-B54	0-74		•
Haemophilus and pneumococcal meningitis	G00.0, G00.1	0-74		•
Tuberculosis	A15-A19, B90, J65	0-74	• (50%)	• (50%)
Scarlet fever	A38	0-74	•	
Sepsis	A40 (excl. A40.3), A41 (excl. A41.3)	0-74	•	
Cellulitis	A46, L03	0-74	•	
Legionnaires disease	A48.1	0-74	•	

Streptococcal and enterococci infection	A49.1	0-74	•	
Other meningitis	G00.2, G00.3, G00.8, G00.9	0-74	•	
Meningitis due to other and unspecified causes	G03	0-74	•	
Neoplasms				
Lip, oral cavity and pharynx cancer	C00-C14	0-74		•
Oesophageal cancer	C15	0-74		•
Stomach cancer	C16	0-74		•
Liver cancer	C22	0-74		•
Lung cancer	C33-C34	0-74		•
Mesothelioma	C45	0-74		•
Skin (melanoma) cancer	C43	0-74		•
Bladder cancer	C67	0-74		•
Cervical cancer	C53	0-74	• (50%)	• (50%)
Colorectal cancer	C18-C21	0-74	•	
Breast cancer (female only)	C50	0-74	•	
Uterus cancer	C54, C55	0-74	•	
Testicular cancer	C62	0-74	•	
Thyroid cancer	C73	0-74	•	
Hodgkin's disease	C81	0-74	•	
Lymphoid leukaemia	C91.0, C91.1	0-74	•	
Benign neoplasm	D10-D36	0-74	•	
Endocrine and metabolic diseases				
Nutritional deficiency anaemia	D50-D53	0-74		•
Diabetes mellitus	E10-E14	0-74	• (50%)	• (50%)
Thyroid disorders	E00-E07	0-74	•	
Adrenal disorders	E24-E25 (excl. E24.4), E27	0-74	•	
Diseases of the nervous system				

Epilepsy	G40, G41	0-74	•	
Diseases of the circulatory system				
Aortic aneurysm	I71	0-74	• (50%)	• (50%)
Hypertensive diseases	I10-I13, I15	0-74	• (50%)	• (50%)
Ischaemic heart diseases	I20-I25	0-74	• (50%)	• (50%)
Cerebrovascular diseases	I60-I69	0-74	• (50%)	• (50%)
Other atherosclerosis	I70, I73.9	0-74	• (50%)	• (50%)
Rheumatic and other heart diseases	I00-I09	0-74	•	
Venous thromboembolism	I26, I80, I82.9	0-74	•	
Diseases of the respiratory system				
Influenza	J09-J11	0-74		•
Pneumonia due to streptococcus pneumonia or haemophilus influenza	J13-J14	0-74		•
Chronic lower respiratory diseases	J40-J44	0-74		•
Lung diseases due to external agents	J60-J64, J66-J70, J82, J92	0-74		•
Upper respiratory infections	J00-J06, J30-J39	0-74	•	
Pneumonia, not elsewhere classified or organism unspecified	J12, J15, J16-J18	0-74	•	
Acute lower respiratory infections	J20-J22	0-74	•	
Asthma and bronchiectasis	J45-J47	0-74	•	
Adult respiratory distress syndrome	J80	0-74	•	
Pulmonary oedema	J81	0-74	•	
Abscess of lung and mediastinum pyothorax	J85, J86	0-74	•	
Other pleural disorders	J90, J93, J94	0-74	•	
Diseases of the digestive system				
Gastric and duodenal ulcer	K25-K28	0-74	•	
Appendicitis	K35-K38	0-74	•	
Abdominal hernia	K40-K46	0-74	•	

Cholelithiasis and cholecystitis	K80-K81	0-74	•	
Other diseases of gallbladder or biliary tract	K82-K83	0-74	•	
Acute pancreatitis	K85.0, K85.1, K85.3, K85.8, K85.9	0-74	•	
Other diseases of pancreas	K86.1, K86.2, K86.3, K86.8, K86.9	0-74	•	
Diseases of the genitourinary system				
Nephritis and nephrosis	N00-N07	0-74	•	
Obstructive uropathy	N13, N20-N21, N35	0-74	•	
Renal failure	N17-N19	0-74	•	
Renal colic	N23	0-74	•	
Disorders resulting from renal tubular dysfunction	N25	0-74	•	
Unspecified contracted kidney, small kidney of unknown cause	N26-N27	0-74	•	
Inflammatory diseases of genitourinary system	N34.1, N70-N73, N75.0, N75.1, N76.4, N76.6	0-74	•	
Prostatic hyperplasia	N40	0-74	•	
Pregnancy, childbirth and the perinatal period				
Tetanus neonatorum	A33	0-74		•
Obstetrical tetanus	A34	0-74		•
Pregnancy, childbirth and the puerperium	O00-O99	0-74	•	
Certain conditions originating in the perinatal period	P00-P96	0-74	•	
Congenital malformations				
Certain congenital malformations (neural tube defects)	Q00, Q01, Q05	0-74		•
Congenital malformations of the circulatory system (heart defects)	Q20-Q28	0-74	•	
Adverse effects of medical and surgical care				
Drugs, medicaments and biological substances causing adverse effects in therapeutic use	Y40-Y59	0-74	•	
Misadventures to patients during surgical and medical care	Y60-Y69, Y83-Y84	0-74	•	

Medical devices associated with adverse incidents in diagnostic and therapeutic use	Y70–Y82	0-74	•	
Injuries				
Transport Accidents	V01-V99	0-74		•
Accidental Injuries	W00-X39, X46-X59	0-74		•
Intentional self-harm	X66-X84	0-74		•
Event of undetermined intent	Y16-Y34	0-74		•
Assault	X86-Y09, U50.9	0-74		•
Alcohol-related and drug-related deaths				
Alcohol-specific disorders and poisonings	E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, Q86.0, R78.0, X45, X65, Y15	0-74		•
Other alcohol-related disorders	K73, K74.0-K74.2, K74.6	0-74		•
Drug disorders and poisonings	F11-F16, F18-F19, X40-X44, X85, Y10-Y14	0-74		•
Intentional self-poisoning by drugs	X60-X64	0-74		•
Provisional assignment of new diseases				
COVID-19	U07.1-U07.2	0-74		•

A.2 – Data descriptives

A.2.1 – summary table

Below we present a summary table of the key variables of this paper.

Study Variables

	Min/ Max	Mean (SD)	Median (IQR)	Source
For-Profit Outsourcing (%)	-207.1/ 50.97	5.89 (0.48)	4.47 (22.3)	ONS
CCG Allocation (£000s per capita)	1.03/ 1.91	1.35 (0.01)	1.33 (3.54)	Rahal & Mohan, (2022).
LA Allocation (£000s per capita)	0.14/ 4.52	0.35 (0.01)	0.32 (0.2)	NHS England
Benefit Expenditure (£000s per capita)	0.06/ 2.42	1.12 (0.02)	1.03 (0.17)	MHCLG
Treatable Mortality Rate	49.1/ 187.1	85.52 (0.73)	82.75 (0.53)	DWP

Study Variables

	Min/ Max	Mean (SD)	Median (IQR)	Source
CCG account balance (£000s)	-101774/ 5562	-20782.96 (605.75)	-17652 (16002.75)	NHS England
Treatment outsourcing (%)	0.16/ 51.49	8.86 (0.37)	6.43 (7.59)	NHS England

A.2.2 – summary by CCG

Study Variables (means)

CCG_Name	For-Profit Outsourcing (%)	CCG Allocation (£000s per capita)	LA Allocation (£000s per capita)	Benefit Expenditure (£000s per capita)	Treatable Mortality Rate	CCG account balance (£000s)	Treatment outsourcing (%)
AIREDALE WHARFEDALE AND CRAVEN	2.0040399	1.3200551	0.3927374	1.2339395	76.31111	-7758.667	10.8964534
ASHFORD	4.5548064	1.1813933	0.2822377	1.1045187	76.78889	-11187.571	8.6949541
AYLESBURY VALE	NaN	NaN	NaN	NaN	NaN	-12610.000	2.8900532
BARKING AND DAGENHAM	6.4209120	1.6057659	0.5496945	2.0363305	112.78000	-26619.167	16.9252487
BARNET	4.0750923	1.4935608	0.2772486	1.3814923	69.72222	-44292.714	0.8409992
BARNSLEY	2.5535948	1.7873400	0.4693370	1.6331018	98.92000	-23768.750	2.6038469
BASILDON AND BRENTWOOD	5.7858484	1.3381784	0.2756618	1.0012255	79.30000	-17200.000	16.3970335
BASSETLAW	5.0507408	1.5170380	0.3113625	1.2810198	88.23000	-8316.857	6.5152778
BATH AND NORTH EAST SOMERSET	12.7149831	1.4567778	0.2484815	0.8076593	69.32222	-13288.714	22.4126460
BATH AND NORTH EAST SOMERSET SWINDON AND WILTSHIRE	NaN	NaN	NaN	NaN	NaN	NaN	16.2643306
BEDFORDSHIRE	9.3148882	1.2068194	0.2588432	0.9805416	80.31000	-31862.875	2.8385431
BEDFORDSHIRE LUTON AND MILTON KEYNES	NaN	NaN	NaN	NaN	NaN	NaN	4.8645702
BERKSHIRE WEST	NaN	1.2185410	0.2441986	0.8433799	78.20000	-34902.000	10.9715834
BEXLEY	2.9369950	1.2241388	0.2969126	1.1812782	77.58889	-26166.286	0.8399753
BIRMINGHAM AND SOLIHULL	5.1861274	1.4248881	0.4684026	1.4781800	101.45000	NaN	4.8924398
BIRMINGHAM CROSSCITY	NaN	0.7296326	NaN	NaN	NaN	-46050.250	3.2951096

Study Variables (means)

CCG_Name	For-Profit Outsourcing (%)	CCG Allocation (£000s per capita)	LA Allocation (£000s per capita)	Benefit Expenditure (£000s per capita)	Treatable Mortality Rate	CCG account balance (£000s)	Treatment outsourcing (%)
BIRMINGHAM SOUTH AND CENTRAL	NaN	1.7519687	NaN	NaN	NaN	-24496.500	3.1481545
BLACK COUNTRY AND WEST BIRMINGHAM	NaN	NaN	NaN	NaN	NaN	NaN	5.0919595
BLACKBURN WITH DARWEN	6.9805565	1.5404663	0.5801595	1.9096274	116.54000	-7924.571	9.9511888
BLACKPOOL	8.5572793	1.9656360	0.6316682	2.2225272	139.71000	-11818.125	9.0735318
BOLTON	6.8668168	1.6150880	0.4892536	1.6559895	106.74000	-24418.125	10.3138171
BRACKNELL AND ASCOT	NaN	NaN	NaN	NaN	NaN	-13649.250	4.5776335
BRADFORD CITY	2.6976899	1.6149020	0.5209969	1.7027269	162.34444	-7362.167	22.8419312
BRADFORD DISTRICT AND CRAVEN	NaN	NaN	NaN	NaN	NaN	NaN	19.2497906
BRADFORD DISTRICTS	2.4629029	1.3184678	0.5209969	1.7027269	108.77778	-21629.000	23.5760208
BRENT	4.7993359	1.6285920	0.5503280	2.0354431	87.90000	-39706.000	4.9449167
BRIGHTON AND HOVE	6.3062925	1.5930929	0.4075509	1.4407780	84.32000	-20866.167	18.5665017
BRISTOL	NaN	NaN	NaN	NaN	NaN	-28132.000	9.9488374
BRISTOL NORTH SOMERSET AND SOUTH GLOUCESTERSHIRE	18.3517775	1.2618035	0.3221669	1.0945881	80.18000	-72822.000	13.8183661
BROMLEY	10.4205782	1.5155126	0.2200550	1.0274752	68.13333	-18846.429	9.3338067
BUCKINGHAMSHIRE	1.9777907	NaN	0.2161908	0.6470110	67.36000	-47314.000	3.4117330
BUCKINGHAMSHIRE OXFORDSHIRE AND BERKSHIRE WEST	NaN	NaN	NaN	NaN	NaN	NaN	NaN
BURY	4.3771741	1.5390974	0.3822926	1.4191020	97.90000	-15346.000	4.3104617
CALDERDALE	NaN	1.5679519	0.4023504	1.3729626	94.59000	-20635.875	12.0799573
CAMBRIDGESHIRE AND PETERBOROUGH	4.0284231	1.1627447	0.2828916	0.9653371	76.09000	-71829.500	5.2322138
CAMDEN	24.7089249	1.9860996	0.7549636	1.6458007	72.56667	-47476.714	0.3234840
CANNOCK CHASE	1.3862433	1.2677137	0.2748545	1.0186111	82.41000	-8362.500	5.4509160

Study Variables (means)

CCG_Name	For-Profit Outsourcing (%)	CCG Allocation (£000s per capita)	LA Allocation (£000s per capita)	Benefit Expenditure (£000s per capita)	Treatable Mortality Rate	CCG account balance (£000s)	Treatment outsourcing (%)
CANTERBURY AND COASTAL	5.1871529	1.2813067	0.2822377	1.2538242	75.32222	-19440.429	5.2730265
CASTLE POINT AND ROCHFORD	4.7488183	1.3357592	0.2756618	0.8982547	75.12000	-18324.125	5.5702944
CENTRAL LONDON WESTMINSTER	NaN	1.9429985	0.7999350	1.7438892	67.91000	-27977.500	0.4105991
CENTRAL MANCHESTER	NaN	NaN	NaN	NaN	NaN	-19986.500	5.5998732
CHESHIRE	NaN	NaN	NaN	NaN	NaN	NaN	7.3408989
CHILTERN	NaN	NaN	NaN	NaN	NaN	-24263.750	2.6744505
CHORLEY AND SOUTH RIBBLE	3.4192662	1.3977463	0.3706104	1.0552713	87.26000	-11029.500	14.8195281
CITY AND HACKNEY	3.4955461	1.8176686	5.5530912	1.6818652	108.31000	-54918.000	1.1184750
COASTAL WEST SUSSEX	3.1345752	1.3839791	0.2125597	0.9920836	76.95556	-38576.429	9.3157155
CORBY	2.6846243	1.3605871	0.3113381	1.3385046	111.00000	-5338.250	13.1585977
COUNTY DURHAM	NaN	NaN	NaN	NaN	NaN	NaN	5.0545231
COVENTRY AND RUGBY	3.0177230	1.3616422	0.3698993	1.2002836	93.57000	-42094.143	2.8250378
COVENTRY AND WARWICKSHIRE	NaN	NaN	NaN	NaN	NaN	NaN	5.3988440
CRAWLEY	1.3128621	1.4586997	0.2125597	1.2844166	91.84444	-3550.857	23.0340814
CROYDON	-38.8832847	1.4686577	0.3551956	1.5086876	90.81111	-37776.143	7.5130076
CUMBRIA	NaN	NaN	NaN	NaN	NaN	-23285.750	1.5396414
DARLINGTON	6.3804543	1.6277385	0.3988106	1.4534928	94.48889	-8128.286	14.3286522
DARTFORD GRAVESHAM AND SWANLEY	NaN	1.2203778	0.2822377	1.0363521	87.92222	-18981.333	4.4104954
DERBY AND DERBYSHIRE	3.7196120	1.4098329	0.3440149	1.2067130	86.71000	-63037.667	5.6533801
DEVON	3.5814419	NaN	0.3339668	1.1766369	77.66000	NaN	5.3498438
DONCASTER	8.8547291	1.4979440	0.4939511	1.5371216	99.46000	-31438.625	2.8690864
DORSET	4.2184648	1.3746890	0.2327566	0.2355753	72.35000	-48247.750	3.8955158

Study Variables (means)

CCG_Name	For-Profit Outsourcing (%)	CCG Allocation (£000s per capita)	LA Allocation (£000s per capita)	Benefit Expenditure (£000s per capita)	Treatable Mortality Rate	CCG account balance (£000s)	Treatment outsourcing (%)
DUDLEY	4.2967370	1.3336466	0.4193858	1.3247973	89.90000	-25253.000	8.7298773
DURHAM DALES EASINGTON AND SEDGEFIELD	6.3312577	1.6721165	0.4677314	1.5626017	100.42222	-26931.857	3.5981941
EALING	2.6683142	1.6662295	0.4453522	1.6642268	89.35000	-46220.800	2.0196174
EAST AND NORTH HERTFORDSHIRE	4.2560243	1.2722710	0.2412951	0.9185673	77.54000	-39161.143	7.8852932
EAST BERKSHIRE	1.8600623	1.2319564	0.2657702	0.9248234	79.76000	-63707.000	2.8827053
EAST LANCASHIRE	5.5337574	1.4704674	0.3706104	1.4677333	104.24000	-36357.429	7.0187645
EAST LEICESTERSHIRE AND RUTLAND	6.4004338	1.1199526	0.2245890	0.7611640	70.19000	-15598.500	5.9977567
EAST RIDING OF YORKSHIRE	6.8491964	1.2561370	0.3251442	0.9670587	81.45000	-26973.875	5.8722704
EAST STAFFORDSHIRE	16.1733558	1.2716390	0.2748545	1.0014964	89.54000	-9286.500	2.8390079
EAST SURREY	9.6730021	1.1690071	0.2005426	0.7657867	75.00000	-10668.167	15.6232433
EAST SUSSEX	NaN	NaN	NaN	NaN	NaN	NaN	16.6822197
EASTBOURNE HAILSHAM AND SEAFORD	2.4595383	1.4177578	0.2960271	1.0997955	77.70000	-17765.429	19.7192434
EASTERN CHESHIRE	39.8058678	1.2846323	0.1789344	0.8648080	69.91111	-14528.714	13.9535108
ENFIELD	4.3006309	1.4236114	0.4261441	1.9747890	79.47778	-37096.000	3.6144218
EREWASH	NaN	1.3379959	NaN	NaN	NaN	-9972.750	19.2005427
FAREHAM AND GOSPORT	3.2522821	1.2037573	0.1987067	0.9513756	75.72000	-13010.125	12.2726802
FRIMLEY	NaN	NaN	NaN	NaN	NaN	NaN	4.6990650
FYLDE AND WYRE	8.5572793	1.2115016	0.3706104	1.2643442	92.74000	-9320.625	10.0853375
GATESHEAD	NaN	1.8781130	NaN	NaN	NaN	NaN	NaN
GLOUCESTERSHIRE	2.7865148	1.2205178	0.2828771	0.9498518	76.57000	-42122.750	19.8720321
GREAT YARMOUTH AND WAVENEY	11.6217126	1.5417882	0.3577687	1.2250597	89.17778	-15106.833	0.4808054

Study Variables (means)

CCG_Name	For-Profit Outsourcing (%)	CCG Allocation (£000s per capita)	LA Allocation (£000s per capita)	Benefit Expenditure (£000s per capita)	Treatable Mortality Rate	CCG account balance (£000s)	Treatment outsourcing (%)
GREATER HUDDERSFIELD	12.2885403	1.2540580	0.3665833	1.3797187	90.50000	-17473.000	21.4586644
GREATER MANCHESTER	NaN	NaN	NaN	NaN	NaN	NaN	NaN
GREATER PRESTON	3.8865152	1.3669466	0.3706104	1.0791275	98.31000	-13153.000	13.5077197
GREENWICH	10.4725214	1.6697212	0.6440112	1.6547790	98.43333	-26074.857	1.6115775
GUILDFORD AND WAVERLEY	NaN	1.2222740	0.2005426	0.6700853	65.11111	-17704.333	6.4154152
HALTON	1.6365939	1.5807160	0.5647861	1.7359998	107.44000	-6997.000	3.5624263
HAMBLETON RICHMONDSHIRE AND WHITBY	1.4958993	1.2601966	0.2644779	0.9656807	71.80000	-11059.571	4.2722867
HAMMERSMITH AND FULHAM	1.9982777	1.7903590	0.6668926	1.5550319	89.57000	-25040.000	10.1026640
HAMPSHIRE SOUTHAMPTON AND ISLE OF WIGHT	NaN	NaN	NaN	NaN	NaN	NaN	8.6206895
HARDWICK	NaN	1.3400918	NaN	NaN	NaN	-7497.500	4.7750927
HARINGEY	20.2214363	1.6726038	0.5930048	2.0840628	94.72222	-34360.000	2.0197867
HARROGATE AND RURAL DISTRICT	0.3434487	1.2399156	0.2644779	0.7201543	71.27778	-10654.667	2.3214955
HARROW	6.3047602	1.3370466	0.2970035	1.3010840	73.53000	-29955.250	3.0302778
HARTLEPOOL AND STOCKTON ON TEES	2.4534226	1.6201875	0.4822827	1.6646762	99.31111	-21392.286	6.0295829
HASTINGS AND ROTHER	4.6265004	1.5096628	0.2960271	1.4498597	94.57778	-21214.000	5.1825609
HAVERING	NaN	1.6023419	0.2508444	1.1186116	81.24000	-31660.500	21.8074513
HEREFORDSHIRE	2.9363600	1.4183106	0.3208864	1.0132969	79.21111	-10755.571	6.2561405
HEREFORDSHIRE AND WORCESTERSHIRE	NaN	NaN	NaN	NaN	NaN	NaN	6.3983375
HERTS VALLEYS	5.3596605	1.2835255	0.2412951	0.8881219	75.04000	-54222.625	13.6978412
HEYWOOD MIDDLETON AND ROCHDALE	4.4850589	1.4646705	0.5736835	1.8047134	113.29000	-17838.500	14.4022761

Study Variables (means)

CCG_Name	For-Profit Outsourcing (%)	CCG Allocation (£000s per capita)	LA Allocation (£000s per capita)	Benefit Expenditure (£000s per capita)	Treatable Mortality Rate	CCG account balance (£000s)	Treatment outsourcing (%)
HIGH WEALD LEWES HAVENS	13.6855562	1.2118629	0.2960271	0.9269461	65.24444	-8452.429	16.4802146
HILLINGDON	5.7233446	1.3943653	0.3200765	1.3148703	82.36000	-25786.250	1.8107334
HORSHAM AND MID SUSSEX	6.1212688	1.1426544	0.2125597	0.6961755	65.41111	-5631.600	27.0670803
HOUNSLOW	NaN	1.4946975	0.3795719	1.3505238	85.57000	-31304.750	0.1523533
HULL	17.9923413	1.5596903	0.6173006	1.9278734	119.78000	-23354.500	7.5200144
IPSWICH AND EAST SUFFOLK	7.5214499	1.1668289	0.3248573	0.8357226	73.59000	-30247.125	5.6843120
ISLE OF WIGHT	2.1391667	1.5531017	0.4556403	1.3951807	80.80000	-10902.875	2.6724900
ISLINGTON	NaN	1.9918083	0.7671900	1.9641141	98.84444	-31033.833	1.2596978
KENT AND MEDWAY	NaN	NaN	NaN	NaN	NaN	NaN	14.0631624
KERNOW	6.5310656	1.3797361	0.8338947	0.7952097	78.48000	-40748.875	8.0190262
KINGSTON	15.6041414	1.5597308	0.2367384	0.9419485	70.61111	-19093.857	0.8452703
KIRKLEES	NaN	NaN	NaN	NaN	NaN	NaN	19.8859411
KNOWSLEY	4.1714680	2.0682619	0.8539420	2.2685157	114.54000	-8815.750	4.4187366
LAMBETH	1.2768142	1.8755141	0.7150545	1.7522522	101.13333	-28162.571	0.7140476
LANCASHIRE NORTH	NaN	NaN	NaN	NaN	NaN	-11104.750	5.0308581
LEEDS	4.5152885	1.4174116	0.4123428	1.3593460	95.63000	-56663.000	8.4842289
LEEDS NORTH	NaN	NaN	NaN	NaN	NaN	-12505.000	6.0390071
LEEDS SOUTH AND EAST	NaN	NaN	NaN	NaN	NaN	-14498.250	6.7949591
LEEDS WEST	NaN	NaN	NaN	NaN	NaN	-15158.500	8.6843647
LEICESTER CITY	5.5254972	1.2751643	0.5777424	1.7139688	111.80000	-24620.000	4.3809269
LEWISHAM	NaN	1.7589381	0.6520676	1.8556667	101.31111	-23899.167	0.8105600
LINCOLNSHIRE	NaN	NaN	NaN	NaN	NaN	NaN	8.9504107
LINCOLNSHIRE EAST	2.9514039	1.4861545	0.3720180	1.2494611	98.77778	-20226.571	8.2895793

Study Variables (means)

CCG_Name	For-Profit Outsourcing (%)	CCG Allocation (£000s per capita)	LA Allocation (£000s per capita)	Benefit Expenditure (£000s per capita)	Treatable Mortality Rate	CCG account balance (£000s)	Treatment outsourcing (%)
LINCOLNSHIRE WEST	4.7107105	1.2262465	0.3720180	1.1668057	90.04444	-17306.857	9.0464460
LIVERPOOL	4.2740782	1.6580275	0.7280092	2.1203049	115.86000	-40904.250	7.7182482
LUTON	NaN	1.4332496	0.4447692	1.5827417	109.46000	-16893.571	2.0319534
MANCHESTER	NaN	NaN	0.7154594	1.9340289	137.96000	-56173.400	6.4644092
MANSFIELD AND ASHFIELD	5.5921191	1.3254886	0.3113625	1.5470516	101.12222	-12587.714	5.0825211
MEDWAY	17.6645506	1.4908065	0.3281881	1.3553763	94.35556	-30959.571	16.6874959
MERTON	2.7012556	1.4375216	0.3411342	1.1177074	79.52222	-14229.000	5.4227269
MID ESSEX	11.5616988	1.1706158	0.2756618	0.9199119	71.54000	-28726.500	18.8073220
MILTON KEYNES	4.6755496	1.2757416	0.3480829	1.0333659	86.77000	-21402.571	7.5633682
MORECAMBE BAY	3.2708439	NaN	0.3708268	1.1244631	85.32000	-22416.200	4.5750902
NENE	6.0572732	1.1940329	0.3113381	0.9174096	88.58889	-51277.143	9.8483388
NEWARK AND SHERWOOD	4.7264142	1.4084722	0.3113625	1.1440049	81.56667	-7715.286	6.9337615
NEWBURY AND DISTRICT	NaN	NaN	NaN	NaN	NaN	-10152.750	7.8270468
NEWCASTLE GATESHEAD	2.6461214	1.4939762	0.5789642	1.4503413	100.10000	-42237.714	2.6355701
NEWCASTLE NORTH AND EAST	NaN	1.8191773	NaN	NaN	NaN	-10987.500	NaN
NEWCASTLE WEST	NaN	1.7819163	NaN	NaN	NaN	-11632.500	NaN
NEWHAM	0.2986233	1.6619755	0.6925016	2.0944409	106.68000	-52135.750	9.7684282
NORFOLK AND WAVENEY	NaN	NaN	NaN	NaN	NaN	NaN	3.1415044
NORTH AND WEST READING	NaN	NaN	NaN	NaN	NaN	-8442.750	12.8306595
NORTH CENTRAL LONDON	NaN	NaN	NaN	NaN	NaN	NaN	2.4341224
NORTH CUMBRIA	7.1318466	NaN	0.4063486	1.1252035	86.50000	-11693.500	1.9619496
NORTH DERBYSHIRE	NaN	1.4973029	NaN	NaN	NaN	-19552.000	7.9230178
NORTH DURHAM	4.0079823	1.4248383	0.4677314	1.5626017	86.24444	-20860.571	3.9299796
NORTH EAST ESSEX	12.3729726	1.3990203	0.2756618	1.3078142	86.28000	-26736.875	7.5609213

Study Variables (means)

CCG_Name	For-Profit Outsourcing (%)	CCG Allocation (£000s per capita)	LA Allocation (£000s per capita)	Benefit Expenditure (£000s per capita)	Treatable Mortality Rate	CCG account balance (£000s)	Treatment outsourcing (%)
NORTH EAST HAMPSHIRE AND FARNHAM	6.2806245	1.2640041	0.1993187	0.7390661	67.22000	-16322.143	3.7801064
NORTH EAST LINCOLNSHIRE	19.2158001	1.4670463	0.4717101	1.4564448	97.81000	-9833.250	15.9103920
NORTH EAST LONDON	NaN	NaN	NaN	NaN	NaN	NaN	9.7542292
NORTH EAST WEST DEVON	NaN	0.4838870	NaN	NaN	NaN	NaN	NaN
NORTH EASTERN AND WESTERN DEVON	NaN	NaN	NaN	NaN	NaN	-45051.750	NaN
NORTH HAMPSHIRE	5.1801882	1.1346185	0.1987067	0.7007398	70.17000	-13447.500	3.1703851
NORTH KIRKLEES	12.2047592	1.3030189	0.3665833	1.3797187	97.16000	-14433.143	16.2036137
NORTH LINCOLNSHIRE	3.5370613	1.4767895	0.3906370	1.2322580	92.49000	-13366.500	12.1689126
NORTH MANCHESTER	NaN	NaN	NaN	NaN	NaN	-16899.750	8.9720212
NORTH NORFOLK	3.8102703	1.3774606	0.3906802	0.9339450	72.42222	-13959.714	1.3861487
NORTH SOMERSET	NaN	1.4512190	NaN	NaN	NaN	-13862.500	18.7453017
NORTH STAFFORDSHIRE	5.7029063	1.3282064	0.2748545	1.0264838	85.09000	-11969.167	7.2849798
NORTH TYNESIDE	1.6554586	1.7525009	0.4571006	1.3960881	91.98000	-18273.250	2.8975173
NORTH WEST LONDON	NaN	NaN	NaN	NaN	NaN	NaN	2.9925104
NORTH WEST SURREY	14.1994079	1.2665789	0.2005426	0.7598587	73.95556	-32316.429	2.4727107
NORTH YORKSHIRE	NaN	NaN	NaN	NaN	NaN	NaN	4.6988397
NORTHAMPTONSHIRE	NaN	NaN	NaN	NaN	NaN	NaN	9.2403544
NORTHERN EASTERN AND WESTERN DEVON	NaN	1.0789355	NaN	NaN	NaN	NaN	4.7324063
NORTHUMBERLAND	NaN	1.6157039	0.4229489	1.0567500	82.66000	-15559.250	1.2856719
NORWICH	3.6755734	1.1547750	0.3906802	1.0717667	81.55556	-18597.667	2.0772496
NOTTINGHAM AND NOTTINGHAMSHIRE	NaN	NaN	NaN	NaN	NaN	NaN	13.5298690
NOTTINGHAM CITY	19.4359531	1.6259567	0.5815084	1.8324114	118.62222	-24587.714	30.0549802

Study Variables (means)

CCG_Name	For-Profit Outsourcing (%)	CCG Allocation (£000s per capita)	LA Allocation (£000s per capita)	Benefit Expenditure (£000s per capita)	Treatable Mortality Rate	CCG account balance (£000s)	Treatment outsourcing (%)
NOTTINGHAM NORTH AND EAST	8.3949923	1.2463496	0.3113625	1.2545154	83.24444	-6600.000	26.8606889
NOTTINGHAM WEST	8.8560264	1.0716082	0.3113625	1.0041340	80.22222	-4147.429	30.5987469
OLDHAM	8.2884770	1.6825331	0.5658750	1.7146042	110.15000	-31949.500	40.9783128
OXFORDSHIRE	2.6791276	1.1186089	0.2442488	0.7942622	71.67000	-42296.625	7.3807304
PORTSMOUTH	4.6880558	1.5018638	0.4491347	1.4356795	96.12000	-12172.667	14.4069519
REDBRIDGE	NaN	1.1551090	0.3514613	1.3923040	85.31000	-29483.167	21.9583428
REDDITCH AND BROMSGROVE	2.8556868	1.1299817	0.2460617	1.0067499	82.53333	-5686.714	6.1175082
RICHMOND	2.9762075	1.4468640	0.1882854	0.7611258	65.77778	-22536.000	0.2221765
ROTHERHAM	3.1659587	1.6008452	0.4767774	1.6144837	101.71000	-20993.000	2.5458323
RUSHCLIFFE	11.9324556	1.2302479	0.3113625	0.6897779	69.98889	-11394.714	28.3246475
SALFORD	3.0672487	1.8256864	0.6128450	1.8555344	117.12000	-14143.500	8.8040284
SANDWELL AND WEST BIRMINGHAM	4.6345327	0.9681984	0.6381453	1.8595168	118.00000	-50603.429	1.7070940
SCARBOROUGH AND RYEDALE	5.3799749	1.4852452	0.2644779	1.1239637	95.12222	-11695.714	1.6205471
SHEFFIELD	3.6492285	1.3488746	0.5072482	1.4302704	88.16000	-34421.250	3.3126780
SHROPSHIRE	3.3368759	1.3882564	0.3117914	0.9517960	77.40000	-20763.500	3.0842533
SHROPSHIRE TELFORD AND WREKIN	NaN	NaN	NaN	NaN	NaN	NaN	7.2279130
SLOUGH	NaN	NaN	NaN	NaN	NaN	-13606.000	2.2798163
SOLIHULL	NaN	NaN	NaN	NaN	NaN	-18068.000	5.6648116
SOMERSET	4.4678616	1.3234996	0.2933782	0.9349749	70.66000	-35085.875	9.3460096
SOUTH CHESHIRE	3.7285734	1.2529310	0.1789344	0.8648080	89.01111	-12852.143	4.5714638
SOUTH DEVON AND TORBAY	NaN	1.4776570	NaN	NaN	NaN	-15019.500	4.5054190
SOUTH EAST LONDON	NaN	NaN	NaN	NaN	NaN	NaN	2.4624521

Study Variables (means)

CCG_Name	For-Profit Outsourcing (%)	CCG Allocation (£000s per capita)	LA Allocation (£000s per capita)	Benefit Expenditure (£000s per capita)	Treatable Mortality Rate	CCG account balance (£000s)	Treatment outsourcing (%)
SOUTH EAST STAFFORDSHIRE AND SEISDON AND PENINSULAR	NaN	NaN	NaN	NaN	NaN	-11877.250	NaN
SOUTH EAST STAFFORDSHIRE AND SEISDON PENINSULA	1.6878548	1.1405894	0.2748545	1.0037435	79.11000	-14916.500	2.5005263
SOUTH EAST STAFFS AND SEISDON AND PENINSULAR	NaN	NaN	NaN	NaN	NaN	NaN	NaN
SOUTH EASTERN HAMPSHIRE	4.2043080	1.2196531	0.1987067	0.8634490	71.10000	-16592.625	9.6103697
SOUTH GLOUCESTERSHIRE	NaN	1.2563881	NaN	NaN	NaN	-16425.000	13.0641684
SOUTH KENT COAST	7.5826348	1.3783420	0.2822377	1.2404517	87.67778	-21575.143	4.0123674
SOUTH LINCOLNSHIRE	3.3389988	1.3929495	0.3720180	1.0004585	80.81111	-12537.714	7.9530941
SOUTH MANCHESTER	NaN	NaN	NaN	NaN	NaN	-10718.500	6.2274482
SOUTH NORFOLK	4.3562387	1.1786005	0.3906802	0.9400623	69.47778	-15449.286	2.4047420
SOUTH READING	NaN	NaN	NaN	NaN	NaN	-7163.000	13.7820397
SOUTH SEFTON	2.9589145	1.5739342	0.4692111	1.5329889	99.75000	-13384.500	6.7862268
SOUTH TEES	2.7691997	1.2944538	0.5472237	1.9045852	111.68889	-21793.857	7.7415281
SOUTH TYNESIDE	2.3728609	1.8987494	0.6375589	1.7667364	96.71000	-16238.875	7.2529382
SOUTH WARWICKSHIRE	3.0821571	1.2570660	0.2632533	0.7809500	72.80000	-10254.286	3.1750378
SOUTH WEST LINCOLNSHIRE	3.5795178	1.3128957	0.3720180	0.9251260	83.93333	-10436.286	8.5359894
SOUTH WEST LONDON	NaN	NaN	NaN	NaN	NaN	NaN	2.4333793
SOUTH WORCESTERSHIRE	4.0169131	1.1569157	0.2460617	1.0094666	77.18889	-15045.571	8.0648921
SOUTHAMPTON	5.7321260	1.5517885	0.4439781	1.3692611	93.81000	-18536.250	31.1325310
SOUTHEND	4.8076836	1.3610279	0.3767200	1.4295623	89.65000	-16979.000	4.6069102
SOUTHERN DERBYSHIRE	NaN	1.2935321	NaN	NaN	NaN	-40380.500	2.9563906
SOUTHPORT AND FORMBY	4.3613847	1.6064625	0.4692111	1.5329889	81.40000	-10709.000	11.1957846

Study Variables (means)

CCG_Name	For-Profit Outsourcing (%)	CCG Allocation (£000s per capita)	LA Allocation (£000s per capita)	Benefit Expenditure (£000s per capita)	Treatable Mortality Rate	CCG account balance (£000s)	Treatment outsourcing (%)
SOUTHWARK	1.2096786	1.6885021	0.8092886	1.6654548	96.77778	-24484.167	0.7253536
ST HELENS	NaN	1.6873106	0.5197867	1.7172501	102.33000	-10398.500	6.4073830
STAFFORD AND SURROUNDS	9.5635580	1.1450291	0.2748545	0.8665473	73.63000	-17125.833	7.2278226
STOCKPORT	5.7010103	1.5552155	0.3262755	1.1817273	82.45000	-21238.375	5.6806639
STOKE ON TRENT	7.9147498	1.5172780	0.4157966	1.3381703	102.77000	-13210.750	6.8880441
SUNDERLAND	4.2972936	1.8659543	0.6079469	1.7802746	100.39000	-28485.750	2.6839759
SURREY DOWNS	14.7802062	1.2591072	0.2005426	0.7114741	62.45556	-41762.857	27.5841329
SURREY HEARTLANDS	NaN	NaN	NaN	NaN	NaN	NaN	11.4950703
SURREY HEATH	1.3044954	1.2550714	0.2005426	0.6561314	59.86000	-5427.571	13.8170941
SUTTON	2.9583098	1.4471390	0.3253991	1.0444585	74.27778	-16047.714	1.8005202
SWALE	NaN	1.2366729	0.2822377	1.4106882	91.77778	-15216.500	14.7358165
SWINDON	6.0622261	1.3416628	0.2591154	0.8871701	87.56667	-15076.000	9.4536982
TAMESIDE AND GLOSSOP	4.7441940	1.5475705	0.4171132	1.3624870	106.34000	-16646.500	9.0314062
TEES VALLEY	NaN	NaN	NaN	NaN	NaN	NaN	10.2348723
TELFORD AND WREKIN	1.3331075	1.4087909	0.4360138	1.5590270	97.68000	-13420.500	3.5832731
THANET	2.8019933	1.5346661	0.2822377	1.7180116	100.25556	-12693.286	3.8027651
THURROCK	2.6411420	1.2392838	0.3863557	1.2480661	88.88000	-12791.500	9.7594639
TOWER HAMLETS	NaN	1.6839869	0.8698695	2.0388443	101.05000	-54559.571	9.9339224
TRAFFORD	3.9934938	1.3096014	0.3308060	1.1056695	83.16000	-19693.500	5.1937053
VALE OF YORK	0.8981463	1.1549735	0.2728808	0.8409022	79.93000	-20127.125	4.4711398
VALE ROYAL	2.7766693	1.2730936	0.2631530	1.0884294	87.25556	-7573.857	4.7790273
WAKEFIELD	4.9741473	1.5143236	0.4327119	1.5465631	98.23000	-28791.250	19.5013083
WALSALL	3.1947509	1.5980008	0.5158921	1.6745361	102.85000	-26150.000	3.7575718
WALTHAM FOREST	4.6716208	1.2820689	0.5027260	1.7008526	95.26000	-23534.714	15.0473718

Study Variables (means)

CCG_Name	For-Profit Outsourcing (%)	CCG Allocation (£000s per capita)	LA Allocation (£000s per capita)	Benefit Expenditure (£000s per capita)	Treatable Mortality Rate	CCG account balance (£000s)	Treatment outsourcing (%)
WANDSWORTH	NaN	1.6168296	0.4848656	1.2898362	83.94444	-29058.667	1.7493382
WARRINGTON	3.0191161	1.4825199	0.2806174	1.1282495	91.53000	-13529.286	6.3145675
WARWICKSHIRE NORTH	3.1881692	1.2307206	0.2632533	1.1846573	93.07000	-17169.714	2.8479504
WEST CHESHIRE	3.0431326	1.4761978	0.2631530	1.0884294	79.06667	-11689.000	3.6066711
WEST ESSEX	3.1990560	1.2608954	0.2756618	0.9844610	76.95000	-21520.000	10.2332536
WEST HAMPSHIRE	5.4708901	1.1922937	0.1987067	0.7837889	62.88000	-46347.375	4.6083264
WEST KENT	3.7627633	1.1481021	0.2822377	0.8829893	73.90000	-28035.000	12.7781763
WEST LANCASHIRE	6.1785737	1.3591499	0.3706104	1.2401941	86.26000	-7297.750	12.9755151
WEST LEICESTERSHIRE	4.9134165	1.0874790	0.2273051	0.8123710	76.26000	-21038.571	4.2087393
WEST LONDON	39.0699237	1.8745667	0.7279895	1.6037220	65.51000	-61787.000	0.5263075
WEST LONDON KANDC AND QPP	NaN	NaN	NaN	NaN	NaN	-50062.750	NaN
WEST NORFOLK	4.2388663	1.3892893	0.3906802	1.0826297	81.18889	-13137.286	5.1114118
WEST SUFFOLK	6.4881571	1.3419430	0.3248573	0.6866124	67.59000	-18624.625	2.0192400
WEST SUSSEX	NaN	NaN	NaN	NaN	NaN	NaN	19.3060582
WIGAN BOROUGH	3.4951655	1.6352259	0.4517052	1.4433375	106.55000	-23696.750	5.3440831
WILTSHIRE	11.7715276	1.1954885	0.2222053	0.8545283	73.48889	-34137.000	17.7326253
WINDSOR ASCOT AND MAIDENHEAD	NaN	NaN	NaN	NaN	NaN	-10085.000	1.6584402
WIRRAL	4.4405010	1.5992971	0.5086710	1.7014497	94.26000	-26561.125	5.2572582
WOKINGHAM	NaN	NaN	NaN	NaN	NaN	-9948.000	11.5309470
WOLVERHAMPTON	NaN	1.6233011	0.6051321	1.7231589	114.96000	-27804.167	7.1281057
WYRE FOREST	4.1867039	1.4198590	0.2460617	1.2493154	85.87778	-7748.571	5.0785388

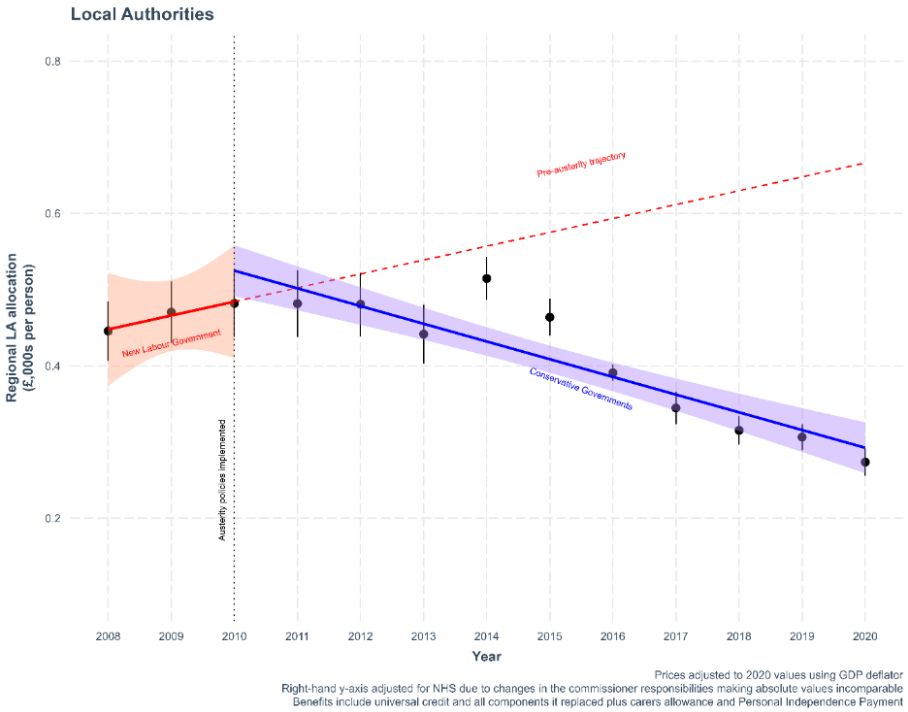
A.2.3 – summary table by year

Variable	N	Year						
		2014, N = 185	2015, N = 185	2016, N = 185	2017, N = 186	2018, N = 180	2019, N = 185	2020, N = 112
For-Profit Outsourcing (%)	782							
N		110	115	117	120	128	139	53
Mean (Median)		5.7 (3.2)	5.6 (3.8)	6.1 (4.0)	6.9 (4.8)	5.1 (4.6)	6.9 (5.1)	7.3 (5.2)
Range (SD)		0.4, 58.0 (7.6)	0.5, 51.0 (6.6)	-1.3, 49.9 (6.8)	0.0, 33.9 (6.3)	-207.1, 39.3 (19.9)	0.3, 51.2 (6.1)	1.9, 33.5 (5.8)
CCG Allocation (£000s per capita)	1,218							
N		185	185	185	186	180	185	112
Mean (Median)		1.30 (1.29)	1.31 (1.29)	1.33 (1.31)	1.37 (1.34)	1.36 (1.34)	1.36 (1.34)	1.41 (1.40)
Range (SD)		1.01, 1.82 (0.16)	1.03, 1.83 (0.16)	1.08, 1.84 (0.15)	1.11, 1.91 (0.15)	1.10, 1.92 (0.15)	1.09, 1.94 (0.15)	1.11, 2.14 (0.16)
LA Allocation (£000s per capita)	1,194							
N		179	179	179	180	180	185	112
Mean (Median)		0.52 (0.45)	0.47 (0.41)	0.39 (0.36)	0.35 (0.30)	0.32 (0.27)	0.31 (0.26)	0.31 (0.26)
Range (SD)		0.26, 5.31 (0.40)	0.24, 4.52 (0.34)	0.22, 1.32 (0.15)	0.16, 4.08 (0.30)	0.13, 3.36 (0.26)	0.13, 2.99 (0.24)	0.12, 3.28 (0.31)
Benefit Expenditure (£000s per capita)	1,192							
N		179	179	179	180	180	183	112
Mean (Median)		1.40 (1.38)	1.37 (1.35)	1.31 (1.29)	1.20 (1.18)	0.83 (0.80)	0.90 (0.86)	0.61 (0.60)
Range (SD)		0.09, 2.51 (0.43)	0.07, 2.43 (0.42)	0.06, 2.29 (0.40)	0.07, 2.09 (0.38)	0.36, 1.50 (0.26)	0.42, 1.65 (0.28)	0.32, 1.11 (0.18)
Treatable Mortality Rate	1,008							
N		179	179	179	180	180	111	0
Mean (Median)		87 (85)	87 (84)	87 (86)	85 (82)	85 (83)	85 (83)	NA (NA)
Range (SD)		58, 129 (16)	59, 176 (17)	57, 187 (17)	45, 140 (17)	48, 147 (16)	47, 145 (16)	Inf, -Inf (NA)
CCG account balance (£000s)	1,137							
N		181	181	182	184	152	168	89
Mean (Median)		-17,248 (-15,386)	-18,373 (-15,592)	-19,864 (-17,657)	-19,844 (-17,162)	-23,449 (-20,905)	-26,419 (-22,801)	-31,689 (-27,210)
Range (SD)		-47,652, -403 (9,192)	-52,246, -3,611 (10,793)	-58,371, -876 (11,980)	-56,590, 5,562 (11,964)	-101,774, -2,751 (15,029)	-96,792, 3,357 (16,596)	-94,147, 6,964 (20,160)
Treatment outsourcing (%)	1,033							
N		0	185	185	186	180	185	112
Mean (Median)		NA (NA)	8 (5)	7 (5)	8 (6)	9 (6)	9 (6)	7 (5)
Range (SD)		Inf, -Inf (NA)	0, 49 (9)	0, 38 (8)	0, 44 (8)	0, 51 (9)	0, 43 (9)	0, 45 (6)

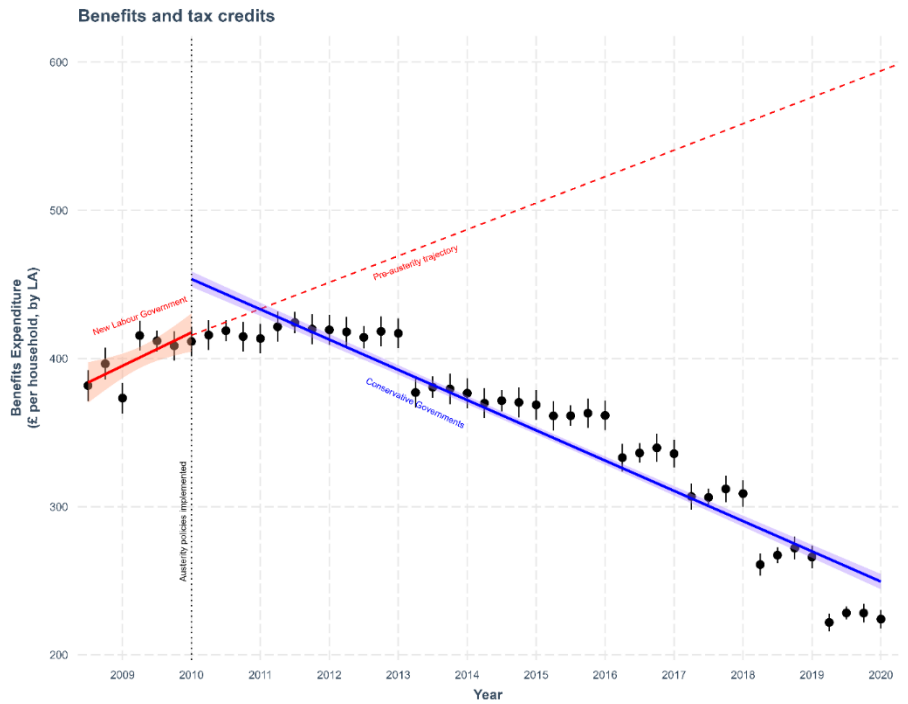
A.3 – Data visualisation

Figure 1 in the main paper presents the impacts of austerity on reduced NHS funding, here we show the same plots for LA and benefit funding/expenditure.

A.3.1 – LA Allocation



A.3.2 Benefits expenditure



Supplementary Analyses

A.4 Confounding privatisation

	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value
For-profit outsourcing (%)	0.0039 [0.0020, 0.0059]	0.0043	0.0039 [0.0020, 0.0057]	0.0040	0.0040 [0.0020, 0.0060]	0.0039	0.0039 [0.0019, 0.0059]	0.0044	0.0039 [0.0020, 0.0058]	0.0038
CCG Allocation (£ per capita)			-0.1343 [-0.5457, 0.2772]	0.5264					-0.1290 [-0.5428, 0.2848]	0.5449
LA Allocation (£ per capita)					0.0507 [-0.0888, 0.1902]	0.4850			0.0252 [-0.1179, 0.1684]	0.7326
Benefit Allocation (£ per capita)							-0.0390 [-0.0848, 0.0068]	0.2960	-0.0405 [-0.0973, 0.0162]	0.3058
Total CCG Spend (£10ms)	-0.0008 [-0.0016, 0.0000]	0.0804	-0.0007 [-0.0016, 0.0002]	0.1668	-0.0008 [-0.0016, 0.0001]	0.0955	-0.0009 [-0.0017, -0.0001]	0.0544	-0.0008 [-0.0016, 0.0001]	0.1167
Average Income (£)	0.0000 [0.0000, 0.0000]	0.6210	0.0000 [0.0000, 0.0000]	0.6617	0.0000 [0.0000, 0.0000]	0.6867	0.0000 [0.0000, 0.0000]	0.6279	0.0000 [0.0000, 0.0000]	0.6938
CCG Population	0.0000 [0.0000, 0.0000]	0.4871	0.0000 [0.0000, 0.0000]	0.5644	0.0000 [0.0000, 0.0000]	0.4378	0.0000 [0.0000, 0.0000]	0.4572	0.0000 [0.0000, 0.0000]	0.5090
Num.Obs.	500	500	482	482	500	500	500	500	482	482
R2	0.050	0.050	0.048	0.048	0.052	0.052	0.054	0.054	0.053	0.053
R2 Adj.	-0.354	-0.354	-0.359	-0.359	-0.356	-0.356	-0.353	-0.353	-0.360	-0.360
AIC	4619.9	4619.9	4473.7	4473.7	4621.2	4621.2	4620.0	4620.0	4475.3	4475.3
BIC	4641.0	4641.0	4498.7	4498.7	4646.5	4646.5	4645.3	4645.3	4508.7	4508.7
RMSE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
CCG Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table reports results from multivariate longitudinal regression models.

Robust SEs are clustered at CCG level and use a bias-reduced linearization estimator (CR2)

Lag of one year applied to allocation variables

Tr. mortality and allocations are log transformed, "Ln" denotes the natural log of outcome variable.

Control variables are household income, total commissioner spend and population size

A.5 Moderating privatisation

	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value
For-profit outsourcing (%)	0.0039 [0.0020, 0.0059]	0.0043	0.0057 [0.0021, 0.0093]	0.0122	0.0075 [0.0040, 0.0110]	0.0041	0.0041 [0.0024, 0.0057]	0.0011
CCG Allocation (£ per capita)			-0.0851 [-0.5257, 0.3556]	0.7074				
LA Allocation (£ per capita)					0.0276 [-0.1155, 0.1707]	0.7098		
Benefit Allocation (£ per capita)							-0.0567 [-0.0977, -0.0158]	0.1378
Interaction: Outsourcing*CCG_Allocation			-0.0078 [-0.0237, 0.0081]	0.3615				
Interaction: Outsourcing*LA_Allocation					0.0030 [-0.0001, 0.0061]	0.0902		
Interaction: Outsourcing*Bens_Allocation							0.0040 [0.0005, 0.0075]	0.0483
Num.Obs.	500	500	482	482	500	500	500	500
R2	0.050	0.050	0.049	0.049	0.057	0.057	0.062	0.062
R2 Adj.	-0.354	-0.354	-0.361	-0.361	-0.352	-0.352	-0.345	-0.345
AIC	4619.9	4619.9	4475.0	4475.0	4620.5	4620.5	4617.9	4617.9
BIC	4641.0	4641.0	4504.2	4504.2	4650.0	4650.0	4647.4	4647.4

	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value
RMSE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
CCG Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table reports results from multivariate longitudinal regression models.

Robust SEs are clustered at CCG level and use a bias-reduced linearization estimator (CR2)

Lag of one year applied to allocation variables

Tr. mortality and allocations are log transformed, "Ln" denotes the natural log of outcome variable.

Control variables are household income, total commissioner spend and population size

A.6 Confounding privatisation on avoidable mortality

	ln. Avoidable Mortality [.95 ci]	p-value	ln. Avoidable Mortality [.95 ci]	p-value	ln. Avoidable Mortality [.95 ci]	p-value	ln. Avoidable Mortality [.95 ci]	p-value	ln. Avoidable Mortality [.95 ci]	p-value
For-profit outsourcing (%)	0.0020 [0.0005, 0.0035]	0.0314	0.0020 [0.0005, 0.0035]	0.0309	0.0020 [0.0004, 0.0035]	0.0338	0.0020 [0.0005, 0.0035]	0.0314	0.0020 [0.0005, 0.0035]	0.0349
CCG Allocation (£ per capita)			-0.1878 [-0.5575, 0.1819]	0.3260					-0.1828 [-0.5538, 0.1881]	0.3404
LA Allocation (£ per capita)					-0.0048 [-0.1091, 0.0994]	0.9287			-0.0183 [-0.1237, 0.0872]	0.7376
Benefit Allocation (£ per capita)							-0.0331 [-0.0588, -0.0073]	0.1890	-0.0341 [-0.0576, -0.0106]	0.1143
Num.Obs.	500	500	482	482	500	500	500	500	482	482
R2	0.030	0.030	0.036	0.036	0.030	0.030	0.035	0.035	0.042	0.042
R2 Adj.	-0.383	-0.383	-0.375	-0.375	-0.387	-0.387	-0.380	-0.380	-0.376	-0.376
AIC	5695.9	5695.9	5505.6	5505.6	5697.9	5697.9	5695.3	5695.3	5507.0	5507.0
BIC	5717.0	5717.0	5530.7	5530.7	5723.2	5723.2	5720.6	5720.6	5540.4	5540.4
RMSE	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
CCG Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table reports results from multivariate longitudinal regression models.

Robust SEs are clustered at CCG level and use a bias-reduced linearization estimator (CR2)

Lag of one year applied to allocation variables

Tr. mortality and allocations are log transformed, "Ln" denotes the natural log of outcome variable.

Control variables are household income, total commissioner spend and population size

A.7 CCG Balance

	Relationship		Confounding		Moderating	
	For-profit Outsourcing (%) [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value
For-profit outsourcing (%)			0.0044 [0.0023, 0.0064]	0.0016	0.0047 [0.0018, 0.0075]	0.0122
CCG Balance (£000s)	0.0000 [-0.0001, 0.0001]	0.5237	0.0000 [0.0000, 0.0000]	0.7144	0.0000 [0.0000, 0.0000]	0.6692
Interaction: Outsourcing*Balance					0.0000 [0.0000, 0.0000]	0.7380
Num.Obs.	457	457	457	457	457	457
R2	0.002	0.002	0.045	0.045	0.045	0.045
R2 Adj.	-0.440	-0.440	-0.396	-0.396	-0.401	-0.401
AIC	2138.1	2138.1	4386.9	4386.9	4388.9	4388.9
BIC	2146.4	2146.4	4411.7	4411.7	4417.7	4417.7
RMSE	2.50	2.50	0.05	0.05	0.05	0.05
CCG Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	No	No	Yes	Yes	Yes	Yes

Table reports results from multivariate longitudinal regression models.

Robust SEs are clustered at CCG level and use a bias-reduced linearization estimator (CR2)

Lag of one year applied to independent variables

Tr. mortality are log transformed, "Ln" denotes the natural log of outcome variable.

Control variables are household income, total commissioner spend and population size

A.8 Private sector treatments

	Treatments Outsourced (%) [.95 ci]	p-value	Treatments Outsourced (%) [.95 ci]	p-value	Treatments Outsourced (%) [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value
Treatments outsourced (%)							0.0018 [-0.0002, 0.0039]	0.0977	0.0019 [-0.0002, 0.0040]	0.1061	0.0018 [-0.0003, 0.0040]	0.1121
CCG Allocation (£ per capita)	9.9927 [-35.9020, 55.8874]	0.6720					-0.0643 [-0.5519, 0.4233]	0.7969				
LA Allocation (£ per capita)			0.6469 [-2.6461, 3.9398]	0.7375					-0.0073 [-0.0797, 0.0651]	0.8551		
Benefit Allocation (£ per capita)					0.0314 [-4.9454, 5.0081]	0.9917					-0.0339 [-0.0972, 0.0295]	0.4181
Num.Obs.	438	438	448	448	448	448	644	644	660	660	660	660
R2	0.002	0.002	0.001	0.001	0.000	0.000	0.012	0.012	0.012	0.012	0.014	0.014
R2 Adj.	-0.569	-0.569	-0.590	-0.590	-0.590	-0.590	-0.393	-0.393	-0.406	-0.406	-0.403	-0.403
AIC	2320.1	2320.1	2363.3	2363.3	2363.4	2363.4	5606.2	5606.2	5748.8	5748.8	5747.7	5747.7
BIC	2336.4	2336.4	2379.8	2379.8	2379.9	2379.9	5633.0	5633.0	5775.8	5775.8	5774.6	5774.6
RMSE	3.39	3.39	3.35	3.35	3.35	3.35	0.06	0.06	0.06	0.06	0.06	0.06
CCG Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Treatments Outsourced (%) [.95 ci]	p-value	Treatments Outsourced (%) [.95 ci]	p-value	Treatments Outsourced (%) [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value	ln. Treatable Mortality [.95 ci]	p-value
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table reports results from multivariate longitudinal regression models.

Robust SEs are clustered at CCG level and use a bias-reduced linearization estimator (CR2)

Lag of one year applied to allocation variables

Tr. mortality and allocations are log transformed, "Ln" denotes the natural log of outcome variable.

Control variables are household income, total commissioner spend and population size

A.9 LA Allocation and mortality

	Treatable Mortality		Preventable Mortality		Avoidable Mortality		Treatable Mortality		Preventable Moratlity		Avoidable Mortality	
	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value
Lag LA Allocation [1]	-0.0676 [-0.2921-0.1569]	0.5551	-0.0396 [-0.2397-0.1605]	0.6979	-0.0737 [-0.2768-0.1294]	0.4769	-0.0483 [-0.2646-0.1679]	0.6614	-0.0261 [-0.2223-0.1701]	0.7942	-0.0549 [-0.2489-0.1392]	0.5795
Lag LA Allocation [0]	-0.0528 [-0.214-0.1084]	0.5207	0.0387 [-0.1388-0.2163]	0.6691	0.0156 [-0.1507-0.1819]	0.8543	-0.0377 [-0.1936-0.1182]	0.6358	0.0389 [-0.137-0.2148]	0.6647	0.028 [-0.1345-0.1906]	0.7355
Lag For-Profit Outsourcing % [1]							0.0049 [0.0028-0.0071]	0	0.0012 [-0.0019-0.0042]	0.4606	0.002 [0.0002-0.0038]	0.0277
Lag For-Profit Outsourcing % [0]							-0.0001 [-0.0029-0.0026]	0.9275	0.0009 [-0.0007-0.0026]	0.2815	0.0004 [-0.0007-0.0016]	0.4449
Lag Mortality [2]	-0.1953 [-0.3797--0.0108]	0.038	-0.2999 [-0.5809--0.019]	0.0364	-0.2967 [-0.598-0.0046]	0.0536	-0.1726 [-0.3523-0.0071]	0.0598	-0.312 [-0.5867--0.0373]	0.026	-0.312 [-0.5771--0.0468]	0.0211
Lag Mortality [1]	-0.4106 [-0.7552--0.0661]	0.0195	-0.883 [-1.4225--0.3435]	0.0013	-0.8264 [-1.48--0.1728]	0.0132	-0.3482 [-0.676--0.0204]	0.0373	-0.9114 [-1.4292--0.3935]	0.0006	-0.8435 [-1.4177--0.2693]	0.004
N	319	319	319	319	319	319	319	319	319	319	319	319

[a] Table represents results from a 'Generalised Methods of Moment' dynamic panel model

[b] CIs are calculated using robust SEs

[c] Benefit allocation and mortality rates are log transformed

A.10 CCG allocation and mortality

	Treatable Mortality		Preventable Mortality		Avoidable Mortality		Treatable Mortality		Preventable Mortality		Avoidable Mortality	
	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value
Lag CCG Allocation [1]	-0.3655 [-1.3926-0.6617]	0.4856	-0.3932 [-1.2949-0.5085]	0.3927	-0.5634 [-1.4301-0.3033]	0.2026	-0.3463 [-1.3459-0.6534]	0.4972	-0.3496 [-1.2484-0.5492]	0.4458	-0.5303 [-1.3756-0.315]	0.2188
Lag CCG Allocation [0]	0.0822 [-0.9207-1.085]	0.8724	-0.599 [-1.5246-0.3265]	0.2046	-0.3587 [-1.0611-0.3436]	0.3168	0.0764 [-0.9318-1.0846]	0.882	-0.6219 [-1.5515-0.3076]	0.1897	-0.3742 [-1.0858-0.3374]	0.3027
Lag For-Profit Outsourcing % [1]							0.0049 [0.0028-0.007]	0	0.0012 [-0.0017-0.0042]	0.4113	0.0021 [0.0002-0.0041]	0.033
Lag For-Profit Outsourcing % [0]							-0.0002 [-0.003-0.0027]	0.9062	0.0009 [-0.0005-0.0022]	0.2083	0.0004 [-0.0012-0.0019]	0.6641
Lag Mortality [2]	-0.1689 [-0.3655-0.0278]	0.0924	-0.2965 [-0.5755--0.0176]	0.0372	-0.344 [-0.6261--0.0619]	0.0169	-0.15 [-0.3408-0.0408]	0.1233	-0.306 [-0.5792--0.0327]	0.0282	-0.3471 [-0.6036--0.0906]	0.008
Lag Mortality [1]	-0.3666 [-0.7224--0.0108]	0.0434	-0.852 [-1.4209--0.2831]	0.0033	-0.8947 [-1.5417--0.2478]	0.0067	-0.3119 [-0.6486-0.0247]	0.0694	-0.8707 [-1.4213--0.3201]	0.0019	-0.8751 [-1.4637--0.2865]	0.0036
N	308	308	308	308	308	308	308	308	308	308	308	308

	Treatable Mortality		Preventable Mortality		Avoidable Mortality		Treatable Mortality		Preventable Mortality		Avoidable Mortality	
	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value	Estimate [95% ci]	P-value

[a] Table represents results from a 'Generalised Methods of Moment' dynamic panel model

[b] CIs are calculated using robust SEs

[c] Benefit allocation and mortality rates are log transformed

Appendix Paper 4

A1 - PubMed search string

(((privati*[Title]) OR (outsourc*[Title]) OR ("contracting-out"[Title])) AND ((healthcare[Title/Abstract]) OR (health-care[Title/Abstract]) OR (health s*[Title/Abstract]) OR (care[Title/Abstract]) OR (hosp*[Title/Abstract])) AND ((quality[Title/Abstract]) OR (effect*[Title/Abstract]) OR (impact*[Title/Abstract]) OR (associat*[Title/Abstract]) OR (perform*[Title/Abstract]) OR (outcome*[Title/Abstract])))

A2 – Bibliography of included studies.

1 Heimeshoff M, Schreyögg J, Tiemann O. Employment effects of hospital privatization in Germany. Eur J Health Econ 2014; 15: 747–57.

2 Ramamonjiarivelo Z, Hearld L, Weech-Maldonado R. The impact of public hospitals' privatization on nurse staffing. Health Care Manage Rev 2021; 46: 266–77.

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6 Siganporia P, Astrakianakis G, Alamgir H, Ostry A, Nicol A-M, Koehoorn M. Hospital support services and the impacts of outsourcing on occupational health and safety. Int J Occup Environ Health 2016; 22: 274–82.

7 Oh J, Lee J-S, Choi Y-J, Park H-K, Do YK, Eun S-J. Struggle against privatization: a case history in the use of comparative performance evaluation of public hospitals. Int J Health Serv 2011; 41: 371–88.

8 Villa S, Kane N. Assessing the impact of privatizing public hospitals in three American states: implications for universal health coverage. Value Health 2013; 16: S24-33.

9 Mosquera PA, San Sebastian M, Burström B, Hurtig A-K, Gustafsson PE. Performing Through Privatization: An Ecological Natural Experiment of the Impact of the Swedish Free Choice Reform on Ambulatory Care Sensitive Conditions. Front Public Health 2021; 9: 504998.

10 Goodair B, Reeves A. Outsourcing health-care services to the private sector and treatable mortality rates in England, 2013-20: an observational study of NHS privatisation. Lancet Public Health 2022; 7: e638–46.

11 Quercioli C, Messina G, Basu S, McKee M, Nante N, Stuckler D. The effect of healthcare delivery privatisation on avoidable mortality: longitudinal cross-regional results from Italy, 1993-2003. J Epidemiol Community Health 2013; 67: 132–8.

12 Toffolutti V, Reeves A, McKee M, Stuckler D. Outsourcing cleaning services increases MRSA incidence: Evidence from 126 english acute trusts. Soc Sci Med 2017; 174: 64–9.

13 Bedard K, Frech HE 3rd. Prison health care: is contracting out healthy? 2009

A3 – Critical appraisal of included studies Cochrane-I

Confounding

Study	Is there potential for confounding of the effect of intervention in this study?	Was the analysis based on splitting participants' follow up time according to intervention received?	Were intervention discontinuations or switches likely to be related to factors that are prognostic for the outcome?	Did the authors use an appropriate analysis method that controlled for all the important confounding domains?	Were confounding domains that were controlled for measured validly and reliably by the variables available in this study?	Did the authors control for any post-intervention variables that could have been affected by the intervention?	Did the authors use an appropriate analysis method that controlled for all the important confounding domains and for time-varying confounding?	Were confounding domains that were controlled for measured validly and reliably by the variables available in this study?	**Judgement**
Ramamonjiarivelo et al., 2021	PY	N	NA	Y	Y	Y	PY	Y	Moderate
Heimeshoff, Schreyögg & Tiemann, 2014	PY	N	NA	Y	Y	Y	PY	Y	Moderate
Ramamonjiarivelo, Hearld & Weech-Maldonado, 2021	PY	N	NA	Y	Y	Y	PY	Y	Moderate
Tiemann & Schreyögg, 2012	PY	N	NA	Y	Y	Y	PY	Y	Moderate

Hebrang et al., 2002	Y	N	NA	PN		PN	PN		Serious
Siganporia et al., 2016	PY	N	NA	PY	Y	Y	PY	Y	Moderate
Oh et al., 2011	Y	N	NA	N		N	N		Critical
Villa & Kane, 2013	Y	N	NA	PY	PY	N	PY	N	Moderate
Mosquera et al., 2021	Y	N	NA	PY	Y	Y	N	Y	Serious
Goodair & Reeves, 2022	Y	N	NA	PY	Y	Y	PY	Y	Moderate
Quercioli et al., 2013	Y	N	NA	PY	Y	Y	PY	Y	Moderate
Toffolutti et al., 2017	Y	N	NA	PY	Y	Y	PY	Y	Moderate
Bedard & Frech, 2009	Y	N	NA	PY	Y	Y	PY	Y	Moderate

Selection effects

Study	Was selection of participants into the study (or into the analysis) based on participant characteristics observed after the start of intervention?	Were the post-intervention variables that influenced selection likely to be associated with intervention?	Were the post-intervention variables that influenced selection likely to be influenced by the outcome or a cause of the outcome?	Do start of follow-up and start of intervention coincide for most participants?	Were adjustment techniques used that are likely to correct for the presence of selection biases?	**Judgement**
Ramamonjiarivelo et al., 2021	N	NA	NA	PN	PY	Moderate
Heimeshoff, Schreyögg & Tiemann, 2014	N	NA	NA	PN	PY	Moderate
Ramamonjiarivelo, Hearld & Weech-Maldonado, 2021	N	NA	NA	PN	PY	Moderate
Tiemann & Schreyögg, 2012	N	NA	NA	PN	PY	Moderate
Hebrang et al., 2002	N	NA	NA	PN	N	Critical
Siganporia et al., 2016	N	NA	NA	PN	PY	Moderate
Oh et al., 2011	N	NA	NA	PN	N	Critical
Villa & Kane, 2013	N	NA	NA	PN	PY	Moderate
Mosquera et al., 2021	N	NA	NA	PN	PY	Moderate
Goodair & Reeves, 2022	Y	Y	PY	PN	PY	Critical
Quercioli et al., 2013	Y	Y	PY	PN	PY	Critical
Toffolutti et al., 2017	Y	Y	PY	PN	PY	Critical
Bedard & Frech, 2009	Y	Y	PY	PN	PY	Critical

Defined intervention groups

Study	Were intervention groups clearly defined?	Was the information used to define intervention groups recorded at the start of the intervention?	Could classification of intervention status have been affected by knowledge of the outcome or risk of the outcome?	**Judgement**
Ramamonjiarivelo et al., 2021	Y	Y	PN	Low
Heimeshoff, Schreyögg & Tiemann, 2014	Y	Y	PN	Low
Ramamonjiarivelo, Hearld & Weech-Maldonado, 2021	Y	Y	PN	Low
Tiemann & Schreyögg, 2012	Y	Y	PN	Low
Hebrang et al., 2002	Y	Y	PN	Low
Siganporia et al., 2016	Y	Y	PN	Low
Oh et al., 2011	Y	Y	PN	Low
Villa & Kane, 2013	Y	Y	PN	Low

Mosquera et al., 2021	Y	Y	PN	Low
Goodair & Reeves, 2022	Y	Y	PN	Low
Quercioli et al., 2013	Y	Y	PN	Low
Toffolutti et al., 2017	Y	Y	PN	Low
Bedard & Frech, 2009	Y	Y	PN	Low

Spillover effects

Study	Were there deviations from the intended intervention beyond what would be expected in usual practice?	Were these deviations from intended intervention unbalanced between groups *and* likely to have affected the outcome?	Were important co-interventions balanced across intervention groups?	Was the intervention implemented successfully for most participants?	Did study participants adhere to the assigned intervention regimen?	Was an appropriate analysis used to estimate the effect of starting and adhering to the intervention?	**Judgement**
Ramamonjiarivelo et al., 2021	NA	NA	NA	NA	NA	NA	NA
Heimeshoff, Schreyögg & Tiemann, 2014	NA	NA	NA	NA	NA	NA	NA
Ramamonjiarivelo, Hearld & Weech-Maldonado, 2021	NA	NA	NA	NA	NA	NA	NA
Tiemann & Schreyögg, 2012	NA	NA	NA	NA	NA	NA	NA
Hebrang et al., 2002	NA	NA	NA	NA	NA	NA	NA
Siganporia et al., 2016	NA	NA	NA	NA	NA	NA	NA
Oh et al., 2011	NA	NA	NA	NA	NA	NA	NA
Villa & Kane, 2013	NA	NA	NA	NA	NA	NA	NA
Mosquera et al., 2021	NA	NA	NA	NA	NA	NA	NA
Goodair & Reeves, 2022	NA	NA	NA	NA	NA	NA	NA
Quercioli et al., 2013	NA	NA	NA	NA	NA	NA	NA
Toffolutti et al., 2017	NA	NA	NA	NA	NA	NA	NA
Bedard & Frech, 2009	NA	NA	NA	NA	NA	NA	NA

Missing data

Study	Were outcome data available for all, or nearly all, participants?	Were participants excluded due to missing data on intervention status?	Were participants excluded due to missing data on other variables needed for the analysis?	Are the proportion of participants and reasons for missing data similar across interventions?	Is there evidence that results were robust to the presence of missing data?	**Judgement**
Ramamonjiarivelo et al., 2021	PY	N	N	NA	Y	Low
Heimeshoff, Schreyögg & Tiemann, 2014	PY	N	N	NA	Y	Low
Ramamonjiarivelo, Hearld & Weech-Maldonado, 2021	PY	N	N	NA	Y	Low
Tiemann & Schreyögg, 2012	PY	N	N	NA	Y	Low
Hebrang et al., 2002	PY	N	N	NA	Y	Low
Siganporia et al., 2016	PY	N	N	NA	Y	Low
Oh et al., 2011	PY	N	N	NA	Y	Low

Villa & Kane, 2013	PY	N	N	NA	Y	Low
Mosquera et al., 2021	PY	N	N	NA	Y	Low
Goodair & Reeves, 2022	PN	PY	PY	NA	Y	Moderate
Quercioli et al., 2013	PY	N	N	NA	Y	Low
Toffolutti et al., 2017	PN	N	PY	NA	PN	Moderate
Bedard & Frech, 2009	PY	N	PY	NA	Y	Low

Knowledge of intervention group

Study	Could the outcome measure have been influenced by knowledge of the intervention received?	Were outcome assessors aware of the intervention received by study participants?	Were the methods of outcome assessment comparable across intervention groups?	Were any systematic errors in measurement of the outcome related to intervention received?	**Judgement**
Ramamonjiarivelo et al., 2021	N	N	Y	N	Low
Heimeshoff, Schreyögg & Tiemann, 2014	N	N	Y	N	Low
Ramamonjiarivelo, Hearld & Weech-Maldonado, 2021	N	N	Y	N	Low
Tiemann & Schreyögg, 2012	N	N	Y	N	Low
Hebrang et al., 2002	N	N	Y	N	Low
Siganporia et al., 2016	N	N	Y	N	Low
Oh et al., 2011	N	N	Y	N	Low
Villa & Kane, 2013	N	N	Y	N	Low
Mosquera et al., 2021	N	N	Y	N	Low
Goodair & Reeves, 2022	N	N	Y	N	Low
Quercioli et al., 2013	N	N	Y	N	Low
Toffolutti et al., 2017	N	N	Y	N	Low
Bedard & Frech, 2009	N	N	Y	N	Low

Researcher bias

Study	Is the reported effect estimate likely to be selected, on the basis of the results, from multiple outcome measurements within the outcome domain?	Is the reported effect estimate likely to be selected, on the basis of the results, from multiple analyses of the intervention-outcome relationship?	Is the reported effect estimate likely to be selected, on the basis of the results, from different subgroups?	**Judgement**
Ramamonjiarivelo et al., 2021	PY	PY	N	Serious
Heimeshoff, Schreyögg & Tiemann, 2014	PY	PY	N	Serious
Ramamonjiarivelo, Hearld & Weech-Maldonado, 2021	PY	PY	N	Serious
Tiemann & Schreyögg, 2012	PY	PY	N	Serious
Hebrang et al., 2002	PY	PY	N	Serious
Siganporia et al., 2016	PY	PY	N	Serious
Oh et al., 2011	PY	PY	N	Serious
Villa & Kane, 2013	PY	PY	N	Serious
Mosquera et al., 2021	PY	PY	N	Serious
Goodair & Reeves, 2022	PY	PY	N	Serious
Quercioli et al., 2013	PY	PY	N	Serious
Toffolutti et al., 2017	PY	PY	N	Serious
Bedard & Frech, 2009	PY	PY	N	Serious

Overall Judgement

Study	**Overall Judgement**
Ramamonjiarivelo et al., 2021	Moderate
Heimeshoff, Schreyögg & Tiemann, 2014	Moderate
Ramamonjiarivelo, Hearld & Weech-Maldonado, 2021	Moderate
Tiemann & Schreyögg, 2012	Moderate
Hebrang et al., 2002	Critical
Siganporia et al., 2016	Moderate
Oh et al., 2011	Critical
Villa & Kane, 2013	Moderate
Mosquera et al., 2021	Critical
Goodair & Reeves, 2022	Moderate
Quercioli et al., 2013	Moderate
Toffolutti et al., 2017	Moderate
Bedard & Frech, 2009	Moderate