# The High Cost of Free

## The Economics of Bulk-Billing Incentives

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**Abstract**

This paper investigates the effects of increasing conditional subsidies when existing compliance rates are high, using the 2022 & 2023 increases to bulk-billing incentives in Australia. In this research, I develop a theoretical model to formalise the general practitioners' decision of whether to bulk-bill a group of patients and how to set prices in the presence of conditional subsidies, with limited eligibility. I use a Difference-in-Differences approach to estimate the causal effect of the policies on bulk-billing rates and patient out-of-pocket costs, exploiting eligible and ineligible cohorts. I find that the 2023 policy increased bulk-billing rates by 3 percentage points, from a base rate of 85%, and reduced out-of-pocket costs by 12% in the treated group relative to the control group. Further analysis on labour supply responses shows that general practitioners did not increase hours after incentives were increased or relocate to areas with higher treatment intensity. I estimate that each new '*free*' appointment saved the patient an average of \$22 and cost the government an average of \$480 in higher direct expenditure, meaning that approximately 95% of the policy cost was a transfer to general practitioners for existing behaviour. Distributional analysis confirms that the increases in bulk-billing were larger in affluent areas. This research shows that increasing conditional subsidies is an expensive route to greater access, particularly when compliance is already high.

# 1 Introduction

Australia's public healthcare system is built on the principle of universal access to affordable healthcare. This healthcare system consists of public providers and public-private partnerships, where the government covers a portion of the patients' service costs. To maintain affordability, the government pays additional subsidies to private medical practitioners, which are conditional on the service being provided to the patient without any direct charge. This incentive structure creates an inherent trade-off when compliance falls, as increasing subsidies may expand access to patients through higher participation from medical practitioners, but also inefficiently increases scheme costs by increasing payments to practitioners who are already participants. In 2022 & 2023, the Australian government increased the conditional subsidies in an attempt to increase affordability and counteract falling compliance rates.

This paper investigates the effects of increasing conditional subsidies when compliance rates are already high, using the 2022 & 2023 changes to bulk-billing incentives in Australia. I develop a theoretical model to formalise the general practitioner's (GPs) optimisation problem when faced with subsidies that are conditional on providing services to patients free of charge and have limited eligibility. I estimate the causal effect of these policies on bulk-billing rates and patient out-of-pocket costs using a Difference-in-Difference regression design. The results show the 2023 policy increased bulk-billing rates by 3 percentage points, from a base rate of 85% and reduced out-of-pocket costs by 12% in the treated group, relative to the control group. I estimate that each new '*free*' appointment saved the patient, on average, \$22 and costs the government, on average, \$480 in higher direct expenditure. Distributional analysis also reveals that patients in affluent areas benefited from larger increases in bulk-billing rates, relative to disadvantaged areas.

The theoretical model formalises the GPs equilibrium pricing and bulk-billing decision as a function of their implied value of time and shows how incentives with limited eligibility complicate the optimal response. The model predicts that an increase to bulk-billing incentives will weakly increase the probability that any particular eligible appointment is bulk-billed, as the increased revenue from maximising demand offsets the opportunity cost of the lost time. This means that GPs may switch to bulk-billing even when their current appointment prices are higher than the increased bulk-billing incentive. This prediction is confirmed by the empirical results which shows that the 2023 policy caused an increase in the bulk-billing rate for the treated group, relative to the control group.

Using monthly data on GP appointments, I estimate the causal effects of the policies on bulk-billing rates and out-of-pocket costs using a Difference-in-Difference (DiD) regression design, exploiting the eligibility criteria for bulk-billing incentives. The key identification assumption is that there are parallel trends in the treatment and control groups preceding treatment. The log-odds of being bulk-billed are stable in the months prior to the 2023 policy and the log out-of-pocket costs are somewhat stable over the same period. This means that in the absence of treatment, outcomes would have evolved similarly in the treatment group as observed in the control group.

In the year following the 2023 policy, bulk-billing rates rose by 3 percentage points, from a base of 85% and out-of-pocket costs fell by 12%, in the treated groups relative to the control group. Thus, the 2023 policy successfully achieved its aim of lowering patient costs and increasing bulk-billing rates. However, the changes are modest given the policy magnitude of the policy, which is estimated to cost $3.5 billion. The empirical estimates suggest that the 2022 policy had no significant effect on bulk-billing rates or patient out-of-pocket costs.

To test for labour supply and appointment demand responses to increased incentives, I estimate how total appointments, the number of GPs, and weekly hours GPs work responded to geographic variation in incentives. These estimates show there is no policy effect on total appointments and no observable change in GP labour supply in response to larger incentive payments for bulk-billing. This indicates that the policy changes did not increase the availability of GP services.

To assess the efficiency and equity of the policies, I estimate government expenditure, patient savings and distributional effects. The estimated government expenditure for each additional policy-driven bulk-billed appointment is $480 and the patient saving from that appointment being bulk-billed is $22. This gap between public expenditure and patient savings exists because the overwhelming majority of appointments were already bulk-billed. These estimates indicate that $3.3 billion of the estimated $3.5 billion fiscal outlay, for the 2023 policy, was transferred directly to GPs in the form of higher income for existing behaviour. Further, distributional analysis reveals that the policy caused larger increases in bulk-billing in affluent areas, suggesting that it had a minimal impact on the affordability of primary healthcare in disadvantaged areas.

## 1.1 Related Literature

This paper contributes to the literature on conditional subsidies using changes to bulk-billing incentives in Australia as a case study. I extend the literature on bulk-billing in Australia by developing a theoretical framework for the GPs' response to conditional subsidies, by providing new causal estimates for the effects of bulk-billing incentives and by conducting a comprehensive welfare analysis including cost-benefit calculations. I further contribute to the literature by estimating heterogeneous effects across socioeconomic areas and examining GP labour-supply responses to incentive changes.

The literature on conditional subsidies in healthcare shows mixed effects across settings. Basinga et al. (2011) find that a district-level Pay-for-Performance scheme in Rwanda substantially increased the number of deliveries at recognised health facilities and the number of preventive-care visits for children. Morris et al. (2004) shows that monetary incentives for preventive care raised utilisation by 15–20 percentage points in rural Honduras. In the US, Rosenthal et al. (2005) estimated a modest increase in cervical cancer screening under a provider bonus scheme, and Campbell et al. (2009) found that a national GP Pay-for-Performance program produced short-term quality gains in the UK, but these gains faded when compliance became high.

Research on Australia's bulk-billing incentives has primarily been descriptive, focusing on policy changes and distributional outcomes. De Abreu Lourenço et al. (2015) find that bulk-billing is more common for individual low-income patients, though Graham et al. (2023) do not find any consistent association between the spatial distribution of bulk-billing practices and area socioeconomic status. Mudiyanselage et al. (2023) document that the 2015 Medicare rebate freeze was associated with lower bulk-billing rates, and O'Sullivan et al. (2022) show that the mandatory bulk-billing policies, introduced during the COVID-19 pandemic, posed viability risks to mixed-billing practices in rural areas. Saxby and Zhang (2024) show the 2022 rural incentive increases preceded modest gains in rural bulk-billing.

Some recent studies adopt causal frameworks. Saxby and Zhang (2025) use a DiD approach to estimate the 2022 policy effect and find the policy lifted bulk-billing rates by 9% and lowered out-of-pocket costs by 13% in rural areas, relative to metropolitan areas. However, their specification treats all rural regions as exposed and does not account for the limited eligibility of bulk-billing incentives. I extend on this analysis by estimating the treatment effect on the eligible patients and I find no statistically significant impact on outcomes in the treated group from the 2022 policy. The difference in our estimates further suggests that their estimate may capture differential trends between metropolitan and rural areas in the period following the COVID-19 pandemic.

Yong et al. (2018) estimate the GP labour supply response to expanded rural incentive eligibility and find small heterogeneous increases in the number of GPs, using a DiD approach. I build on this analysis by estimating the relationship between GP labour supply and incentive magnitude, using the 2023 policy change, and find no significant effects. This result is consistent with Broadway et al. (2017), who report that incentives do not have large effects on GP labour supply and McIsaac et al. (2019), who do not find clear evidence that incentives attract healthcare workers to areas that are underserved.

Elkins and Schurer (2017) model the distributional effects of proposed co-pay policies for bulk-billed service and find they are likely to disproportionately affect lower-income groups. I extend the distributional analysis on bulk-billing by showing that the recent incentive increases had larger effects in affluent areas, consistent with the Saxby and Zhang (2025) finding for the 2022 policy. Unlike previous authors, I add to this by providing formal cost-benefit analysis of the bulk-billing incentive changes in way that is directly relevant for future policy changes.

I extend the literature by developing a theoretical model that formalises the GPs' decision of whether to bulk-bill when faced with conditional subsidies that have limited eligibility. This model predicts that bulk-billing incentives will lift the bulk-billing rate for eligible groups if they increase revenue above the GPs' implied value of time. The model directs me to consider the possibility of negative spillovers to untreated groups, something not acknowledged or explored in the literature. But this model also has wider relevance to changes in conditional subsidies more generally.

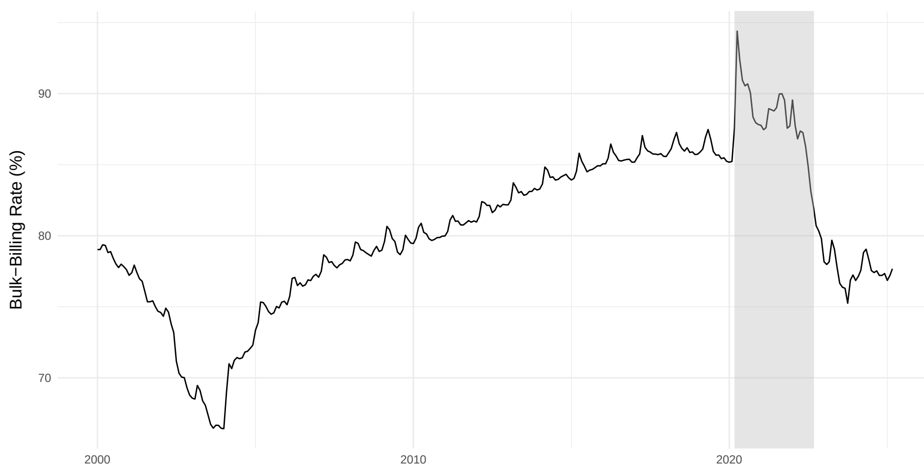
The remainder of the paper is structured as follows. Section 2 provides background information and relevant policy details. Section 3 constructs the theoretical framework. Section 4 introduces the data and Section 5 describes the empirical strategy. Section 6 presents the main results and Section 7 discusses and concludes.

# 2 Background Information on Bulk-Billing in Australia

The Australian public healthcare system, *Medicare*, operates through a mix of public providers and public-private partnerships. The government pays private practitioners a fee for every medical service listed on the *Medicare Benefits Schedule* to cover a portion of the patient's appointment costs; This payment is referred to as the *Medicare rebate*. An appointment is '*bulk-billed*' if the medical practitioner does not charge the patient any fee, and accepts the Medicare rebate as full payment. General practitioner (GP) services are a substantial part of primary care and GP consultations are commonly bulk-billed. To ensure that bulk-billing is a sustainable approach for GPs, the government also provides an additional payment, the *bulk-billing incentive*, for select services when a patient who is under the age of 16 or holds a Commonwealth Healthcare Concession Card (CHCC) is bulk-billed.[1]

Bulk-billing has historically covered the majority of GP appointments, but since 2022 the bulk-billing rate has fallen dramatically, as shown in *Figure 1.* From 2004, the bulk-billing rates rose steadily from 66% to 85% in 2017, before stabilizing at this level until the COVID-19 pandemic in 2020. At the onset of the pandemic, mandatory bulk-billing requirements were introduced for some essential services and bulk-billing rates surged to all-time highs. After the pandemic period, the bulk-billing rate declined rapidly until 2023, where it has stabilized at around 78% of GP appointments.

**Figure 1:** National Bulk-billing Rate for GP Appointments




*Note:* The shaded period denotes the COVID-19 pandemic.

In January 2022, the policy increased the existing bulk-billing incentive loading in rural areas to reduce patient out-of-pocket costs and enhance the financial viability of bulk-billing in remote areas.[2] The updated rural incentive payments were scaled according to the Modified Monash Model (MMM) classifications. *Table 1* reports the incentive amounts for a standard consult in all MMM classifications before and after the policy change and *Figure 2* shows a map of the MMM classifications.[3] Prior to the 2022

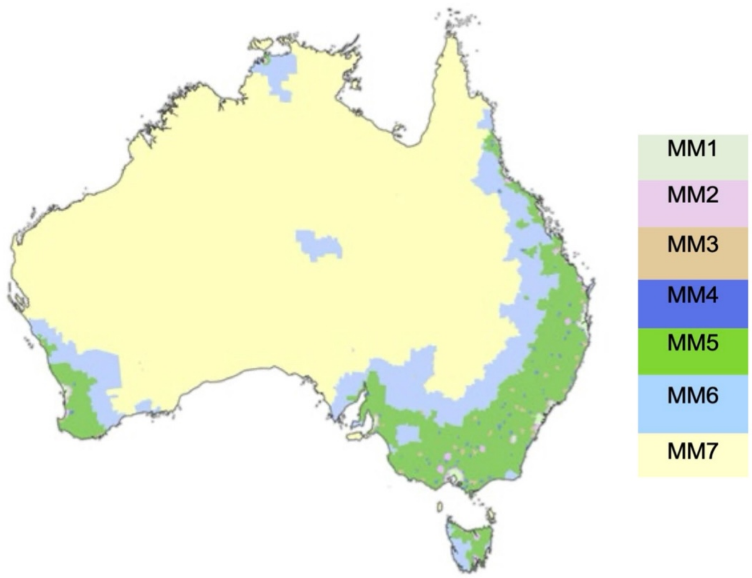
[1]The incentive is payable for appointments 10 minutes or longer, but does not scale with appointment duration. A short consult appointment is up to 6 minutes long and is not eligible.

[2]The Hon Greg Hunt MP (2021)

[3]Incentive amounts from Australian Government Department of Health, Disability and Aging

policy, practices in rural and remote communities received an additional 50% loading on top of the base incentive amount paid in metropolitan areas. The 2022 policy change increased the loading by a further 10% for large and medium rural towns, 20% for small rural towns, 30% for remote communities and 40% for very remote communities (so the total loading ranged from 60% to 90%). These changes were increases of $0.60 in MMM3-4 areas up to $2.60 in MMM7 areas.

**Figure 2:** Modified Monash Model Classifications, 2023




In November 2023, the existing bulk-billing incentive was tripled in all areas to reduce patient out-of-pocket costs and lift the bulk-billing rate, which had fallen significantly since the COVID-19 pandemic.[4] *Table 2* reports the incentive amount in each MMM classification before and after the policy change.[5] The bulk-billing incentive was increased by $13.80 in metropolitan areas, $21.00 in regional centers, $22.30 in medium and large rural towns, $23.70 in small rural towns, $25.00 in remote communities, and $26.55 in very remote communities.

(2025b). Figure from Australian Government Department of Health, Disability and Aging (2023)

[4] The Hon Mark Butler MP (2023)

[5] Incentive amounts from Australian Government Department of Health, Disability and Aging (2025b)

**Table 1:** Bulk-Billing Incentive for Consult (B+), 2022 Dollars

| Region Classification | Pre-Policy | Post-Policy | Increase |
|---|---|---|---|
| MMM 1 – *Metropolitan Area* | $6.55 | $6.55 | $0.00 |
| MMM 2 – *Regional Centres* | $9.90 | $9.90 | $0.00 |
| MMM 3 – *Large Rural Town* | $9.90 | $10.50 | $0.60 |
| MMM 4 – *Medium Rural Town* | $9.90 | $10.50 | $0.60 |
| MMM 5 – *Small Rural Town* | $9.90 | $11.15 | $1.25 |
| MMM 6 – *Remote Communities* | $9.90 | $11.80 | $1.90 |
| MMM 7 – *Very Remote Communities* | $9.90 | $12.50 | $2.60 |

**Table 2:** Bulk-Billing Incentive for Consult (B+), 2023 Dollars

| Region Classification | Pre-Policy | Post-Policy | Increase |
|---|---|---|---|
| MMM 1 – *Metropolitan Area* | $6.85 | $20.65 | $13.80 |
| MMM 2 – *Regional Centres* | $10.40 | $31.40 | $21.00 |
| MMM 3 – *Large Rural Town* | $11.05 | $33.35 | $22.30 |
| MMM 4 – *Medium Rural Town* | $11.05 | $33.35 | $22.30 |
| MMM 5 – *Small Rural Town* | $11.75 | $35.45 | $23.70 |
| MMM 6 – *Remote Communities* | $12.40 | $37.40 | $25.00 |
| MMM 7 – *Very Remote Communities* | $13.15 | $39.70 | $26.55 |

From November 2025, eligibility for the GP bulk-billing incentives will be expanded to all patients who hold a Medicare Card; this includes the vast majority of Australian Citizens and Permanent Residents.[6] This policy is expected to cost the Government $7.9 billion over the following 4 years, and the Government has predicted this change will lift the bulk-billing rate to 90% nationally for GP appointments.

[6]The Hon Mark Butler MP (2025)

# 3 Theoretical Framework

General practitioners seek to maximise income, subject to the limited time they have to see patients. I assume that GPs provide care to multiple patient groups, each of whom has downward sloping demand for appointments. The optimal pricing decision is complicated by the fact that GPs receive an additional government payment when an eligible patient is bulk-billed. I assume that the number of patients in any group is limited and that bulk-billing any subset of patients maximises that group's demand. This model formalises the GP's decision whether to bulk-bill when faced with conditional subsidies that only apply to a limited subset of patients.

The GP provides services $s \in S$ to each patient group $g \in G$ and chooses prices $\{p_{sg}\}$ to allocate their time to maximise income, subject to a time constraint $h$. Time required for each appointment $t_s > 0$ and rebates $r_{sg} \geq 0$ are exogenous. A bulk-billing incentive $b_{sg} \geq 0$ is available if and only if the $(sg)$ is eligible and $p_{sg} = 0$. For each $(sg)$, demand $n_{sg}(p)$ is twice differentiable, strictly decreasing ($n'_{sg}(p) < 0$) and weakly concave ($n''_{sg}(p) \leq 0$). $\lambda \geq 0$, captures the value of a marginal unit of the GP's time. I assume if demand from all $(sg)$ is maximised, the GPs' time constraint is exceeded, $\int_S \int_G n_{sg}(0)\, t_s \, ds\, dg > h$.

The GPs maximisation problem is given by *Equation 1*.

$$
\begin{aligned}
Y \;&= \max_{\{p_{sg}\}} \left\{ \int_S \int_G \left[ (r_{sg} + b_{sg} + p_{sg})\, n_{sg}(p_{sg}) \right] \; ds\, dg \right\} \\
&\text{s.t.} \quad h \geq \int_S \int_G \left[ n_{sg}(p_{sg}) t_s \right] \; ds\, dg
\end{aligned}
\tag{1}
$$

To solve *Equation 1*, the GP must decide the optimal price, including whether to bulk-bill, to charge each $(sg)$ pair. The existence of bulk-billing incentives with limited eligibility, $b_{sg}$, complicates the pricing choice, as bulk-billing an eligible group yields a discontinuous jump in revenue from $(sg)$ and a discontinuous increase in time commitment. Since the GP is time-constrained, the optimal price to charge one pair $(sg)$

is interdependent on the prices charged to all other pairs. Since any number of $(sg)$ pairs may have corner solutions, the problem can become multi-dimensional and very complex.

Define $\pi_{sg}$ so total income decomposes as $Y = \int_S \int_G \pi_{sg}\, ds\, dg$, with

$$\pi_{sg}(p_{sg}, \lambda) = [r_{sg} + p_{sg} + b_{sg}]\, n_{sg}(p_{sg}) - \lambda\, n_{sg}(p_{sg})\, t_s \tag{2}$$

Here $\lambda$ is the shadow value of the GP's time. When $\lambda$ is fixed, the pricing problem, $\pi_{sg}(p_{sg}, \lambda)$, is independent across all $(sg)$ pairs, given $\lambda$. For each $(sg)$ the GP either sets an interior price $p^*_{sg}(\lambda)$, or bulk-bills ($p_{sg} = 0$). The optimal interior price, $p^*_{sg}(\lambda)$, is given implicitly by $\lambda$ and increases in $\lambda$.

$$\lambda \;=\; \frac{n_{sg}(p^*_{sg}) \;+\; [\, r_{sg} + p^*_{sg}\,]\, n'_{sg}(p^*_{sg})}{n'_{sg}(p^*_{sg})\, t_s} \tag{3}$$

Bulk-billing $(sg)$ is optimal if and only if its $\pi^{bb}_{sg} \geq \pi^{p^*}_{sg}$ exceeds the interior value at $p^*_{sg}(\lambda)$. This is equivalent to the cutoff condition

$$\lambda \;\leq\; \frac{[r_{sg} + b_{sg}]\, n_{sg}(0) \;-\; [r_{sg} + p^*_{sg}(\lambda)]\, n_{sg}(p^*_{sg}(\lambda))}{t_s\, [\, n_{sg}(0) - n_{sg}(p^*_{sg}(\lambda))\,]} \tag{4}$$

Meaning, the GP will choose to bulk-bill if $\lambda$ is less than ratio of the revenue gain from bulk-billing to the additional time it takes. Thus there is an optimal price for every $(sg)$ for any fixed $\lambda$; either to charge the optimal interior $p^*_{sg}(\lambda)$, or to bulk-bill and ($p^*_{sg} = 0$).

Each $\lambda$ corresponds to some maximised earning at a particular induced level of hours worked. Since the GP is constrained to work at most $h$ hours, the GPs' solution is the optimal prices at $\lambda^*$ such that the time constraint binds.

**Lemma 1** (Uniqueness of $\lambda^*$)**.** *For any $(s, g)$, time spent servicing the $(sg)$ pair $n_{sg}\big(p^*_{sg}(\lambda)\big)t_s$ is weakly decreasing in $\lambda$.*

*(i)* ***Claim 1: Interior case.*** *When $p^*_{sg}(\lambda) > 0$, the first-order condition implies*

*$p^*_{sg}(\lambda)$ increases with $\lambda$; since $n'_{sg}(p) < 0$, $n_{sg}\big(p^*_{sg}(\lambda)\big)t_s$ strictly decreases in $\lambda$. (Proof in Appendix A.2.1.)*

*(ii)* ***Claim 2: Bulk-billing case.*** *When $p^*_{sg}(\lambda) = 0$, if bulk-billing is optimal at some $\lambda_1$, it remains optimal for all $\lambda_2 < \lambda_1$; raising $\lambda$ cannot make bulk-billing newly optimal, so time used weakly decreases in $\lambda$. (Proof in Appendix A.2.2.)*

*Because time for each $(sg)$ is weakly decreasing in $\lambda$ (strictly for interior types), total time across all $(sg)$ is decreasing in $\lambda$. Since $\int_S \int_G n_{sg}(0)t_s > h$ there exists a unique $\lambda^*$ such that the GP's time constraint binds:*

$$\int_S \int_G n_{sg}\big(p^*_{sg}(\lambda^*)\big)t_s \, ds \, dg = h.$$

The intuition is that raising $\lambda$ makes time more expensive, thus for any $(sg)$ at an interior price, the optimal price rises with $\lambda$, so quantity demanded and time spent strictly falls. By claim 2, increasing $\lambda$ cannot make bulk-billing newly optimal (you may stop bulk-billing as $\lambda$ rises, but never start), so time servicing an $(sg)$ pair weakly decreases in $\lambda$ (strictly when $p^*_{sg} > 0$) and total hours supplied is decreasing in $\lambda$ (strictly when the GP is charging any $(sg)$ pair $p^*_{sg} > 0$). This implies there is a unique $\lambda^*$ at which the time constraint binds.

**Proposition 1** (Effects of Incentive Increases)**.** *Consider an increase in the bulk-billing incentive, $b_{sg}$, for some eligible set of patients $\mathcal{E} \subseteq S \times G$.*

*(i)* ***Direct effect on eligible groups.*** *For any particular $(sg) \in \mathcal{E}$, holding all else constant, the probability of that $(sg)$ pair being bulk-billed weakly increases.*
*This follows directly from the bulk-billing condition in Equation 4, as the RHS increases in $b_{sg}$.*

*(ii)* ***Indirect effect on ineligible groups.*** *For all $(sg) \notin \mathcal{E}$, (a) the probability of being bulk-billed weakly decreases, and (b) if the ineligible group is not being bulk-billed the optimal price rises. When incentive increases cause a switch to*

*bulk-billing for any eligible* $(sg)$ *pair, the increase in bulk-billing weakly raises total time spent servicing that* $(sg)$*. Since the GP is time-constrained and* $n_{sg}(p^*_{sg}(\lambda))t_s$ *falls in* $\lambda$ *(Lemma 1), the equilibrium value* $\lambda^*$ *must weakly increase to restore the time constraint, given in Equation 1.*
*This increases the LHS of Equation 4, making* $(sg) \notin \mathcal{E}$ *weakly less likely to be bulk-billed. It directly increases the LHS of Equation 3, and thus raises the optimal price if the ineligible* $(sg)$ *pair is not being bulk-billed.*

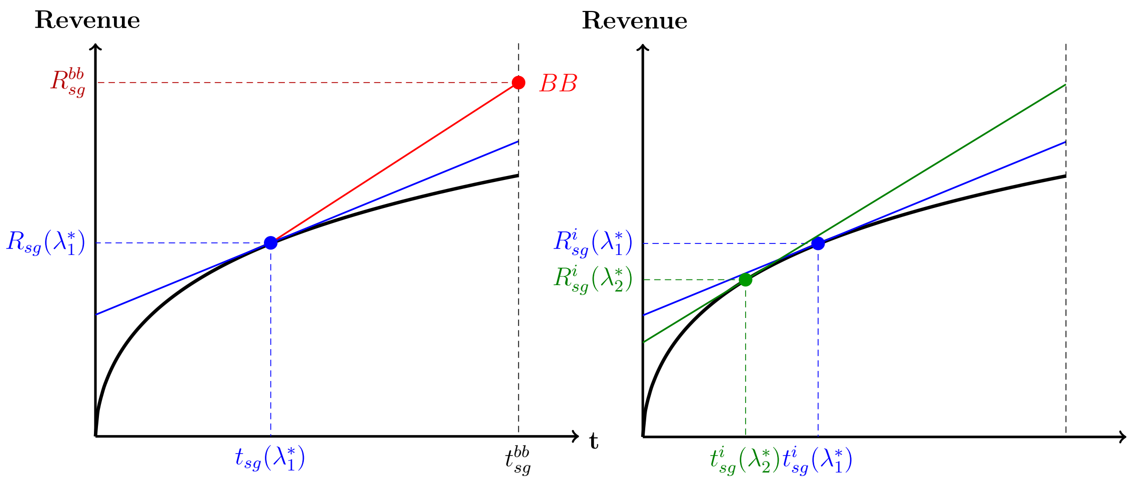
*Figure 3* shows this prediction visually. *Panel (a)* shows the effect of increased incentives on an eligible pair. Here the GP is strictly better off bulk-billing the eligible pair, thus moving from the interior solution $(R_{sg}(\lambda^*_1), t_{sg}(\lambda^*_1))$ to the bulk-billing point $(R^{bb}_{sg}, t^{bb}_{sg})$, and allocating more time to eligible patients. *Panel (b)* shows the effect on an ineligible pair where GPs' time commitment to the eligible group causes $\lambda^*_1$ to increase to $\lambda^*_2$. The GP thus moves from $(R^i_{sg}(\lambda^*_1), t^i_{sg}(\lambda^*_1))$ to $(R^i_{sg}(\lambda^*_2), t^i_{sg}(\lambda^*_2))$ by increasing the optimal price $p^*_{sg}$, showing the negative spillover from incentive increase onto ineligible patients.

The models predictions provide testable implications explored in Section 6, where I estimate the causal effects of incentive changes on bulk-billing rates and patient out-of-pocket costs.

# 4 Data

I use monthly data on appointments at the local government area (LGA) level to estimate the causal effects of the policy changes. Data from Australian Institute of Health and Welfare (2025a,b) reports monthly bulk-billing rates, number of appointments, patient age category, appointment costs, government rebates and patient gap-fees from 1984 to December 2024. The Australian Government Department of Health, Disability and Aging (2025a) data reports the number of GPs and average weekly GP hours from each year 2013 to 2024, by LGA. Australian Bureau of Statistics (2023) census data

**Figure 3:** GP Optimal Price Setting with Bulk-Billing Incentives




**(a)** Eligible $(sg)$ **(b)** Ineligible $(sg)$

*Note:* The figure illustrates the GP's optimal price-setting behaviour when bulk-billing incentives are increased for some eligible $(sg)$ pairs. The black curve shows the GP's revenue function $R(q) = p(q) \times q$. In panel (a), an eligible $(sg)$ pair is moved from $(R_{sg}(\lambda_1^*), t_{sg}(\lambda_1^*))$ to the bulk-billing point $(R_{sg}^{bb}, t_{sg}^{bb})$, increasing the time servicing that pair. In panel (b), the GP now has less available time for each ineligible $(sg)$ pair and thus as $\lambda$ increases from $\lambda_1^*$ to $\lambda_2^*$, the optimal allocation moves from $(R_{sg}^i(\lambda_1^*), t_{sg}^i(\lambda_1^*))$ to $(R_{sg}^i(\lambda_2^*), t_{sg}^i(\lambda_2^*))$. $X^i$ denotes ineligible, $X^{bb}$ denotes the pair is being bulk-billed.

from 2021 reports socioeconomic percentile at the LGA level. I merge the Australian Bureau of Statistics (2021) data with the Australian Government Digital Atlas (2025) data to assign a bulk-billing incentive value to each location.[7]

The key limitations of this data are that treatment eligibility is not directly observed and aggregation harms the precision of the analysis. Commonwealth Healthcare Concession Card (CHCC) status and service type are both required to determine incentive eligibility and are not observed in the available data. Aggregation by age group at the LGA level limits the accuracy of all estimates. I discuss the extent to which these limitations are relevant in the following sections.

Summary statistics for the key variables are reported in *Table 3* for each age category. From January 2000 to December 2024, 76% of GP appointments were bulk-billed and the bulk-billing rate was higher for those under 16 and over 64 years of age, at 83% and 86% respectively, and lower for those aged 16 to 64, at 70%. The Government payment for each appointment was approximately \$44, on average, and the patients' out-of-pocket costs were \$6, on average. The average out-of-pocket cost includes bulk-billed appointments and thus causes the value to be small. The average conditional out-of-pocket cost is \$28, and is the average amount paid conditional on the appointment not being bulk-billed.

*Figure 5* shows the bulk-billing rate for each age group. Bulk-billing rates have fallen sharply from the all-time highs seen during the COVID-19 pandemic but still remain high, being over 65% in all age groups. The bulk-billing rate for those under 65 years of age rose steadily for 15 years until 2020. In March 2020, the bulk-billing rate spiked sharply for all age groups, on account of mandatory bulk-billing for some appointments and changes in appointment composition, due to COVID-19. In early 2022, bulk-billing rates began to substantially decline for all groups but have since stabilized at around 85% for those under 16 and over 64 and close to 70% for those aged 16 to 64.

*Figure 6* shows the average out-of-pocket cost per appointment for each age group. Out-

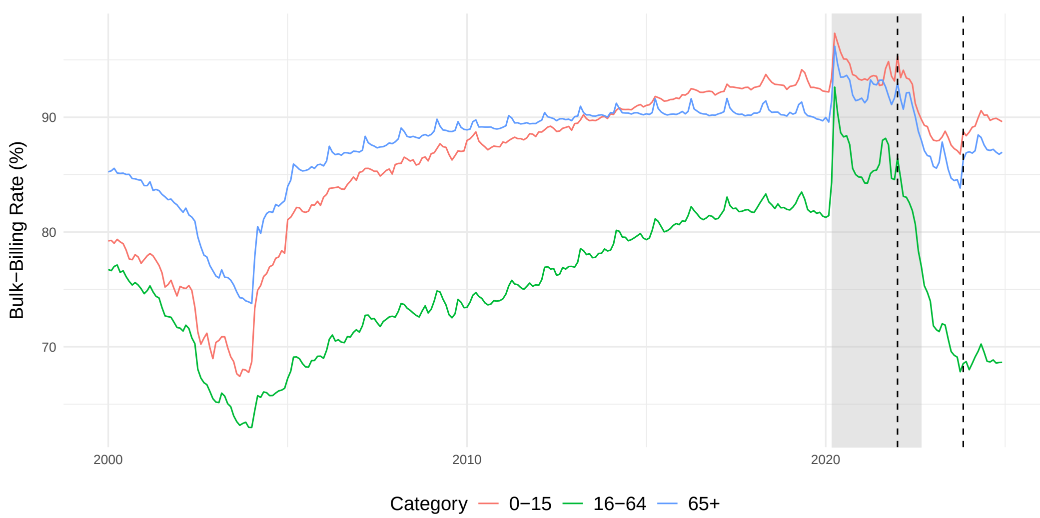
[7] Where an LGA spans multiple MMM locations, I assign the lowest present numerical value that represents at least 5% of the LGA land area.

**Table 3:** Summary Statistics by Age Group

| **Variable** | **Total** | **0–15** | **16–64** | **65+** |
|---|---|---|---|---|
| Mean Monthly Appointments | 21,394 | 3,446 | 12,476 | 6,974 |
| | (42,066) | (6,675) | (25,059) | (12,074) |
| Bulk-billing Rate (%) | 76.17 | 82.85 | 70.37 | 85.80 |
| | (14.94) | (17.35) | (16.50) | (12.70) |
| Mean Government Payment ($) | 44.41 | 40.52 | 43.69 | 46.59 |
| | (10.86) | (9.69) | (10.53) | (10.65) |
| Mean Out-of-Pocket Cost ($) | 5.99 | 3.66 | 7.85 | 3.06 |
| | (4.13) | (3.46) | (5.31) | (2.55) |
| Mean Conditional Out-of-Pocket ($) | 27.81 | 27.62 | 28.43 | 25.44 |
| | (12.33) | (15.08) | (12.44) | (12.78) |
| Mean Number of GPs* | 58.88 | | | |
| | (115.50) | | | |
| Mean Weekly (GP) Hours* | 40.44 | | | |
| | (7.14) | | | |
| Observations | 414,660 / 63,336* | 129,729 | 152,923 | 132,008 |

*Note:* January 2000 – December 2024.
Standard deviations reported in parentheses.
* Variables taken from annual observations, all other variables from monthly observations.

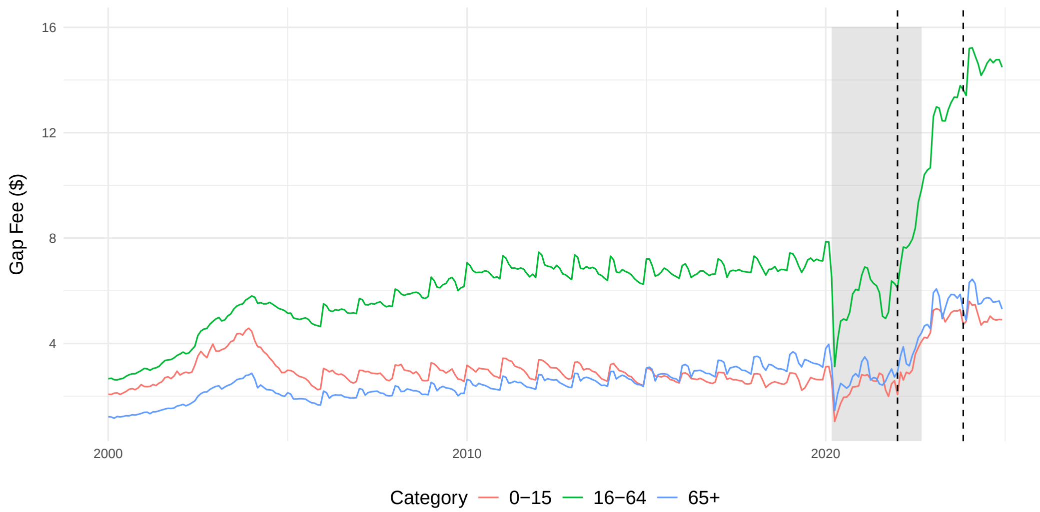
**Figure 5:** National Bulk-billing Rate, by Age Group




*Note:* The shaded period denotes the COVID-19 pandemic. The first dashed line denotes the 2022 policy, the second dashed line denotes the 2023 policy.

of-pocket costs have risen sharply, for all age groups, since the COVID-19 pandemic, but have begun to stabilize at all-time highs. From 2005 to 2020, out-of-pocket costs were low and stable, being half the amount for those under 16 and over 64 compared to those aged 16 to 64.[8] Since early 2022, out-of-pocket costs have risen substantially for all groups and have since settled around $15 for those 16-64, and around $5 for those under 16 and over 65+.

**Figure 6:** Average Out-of-Pocket Costs, by Age Group

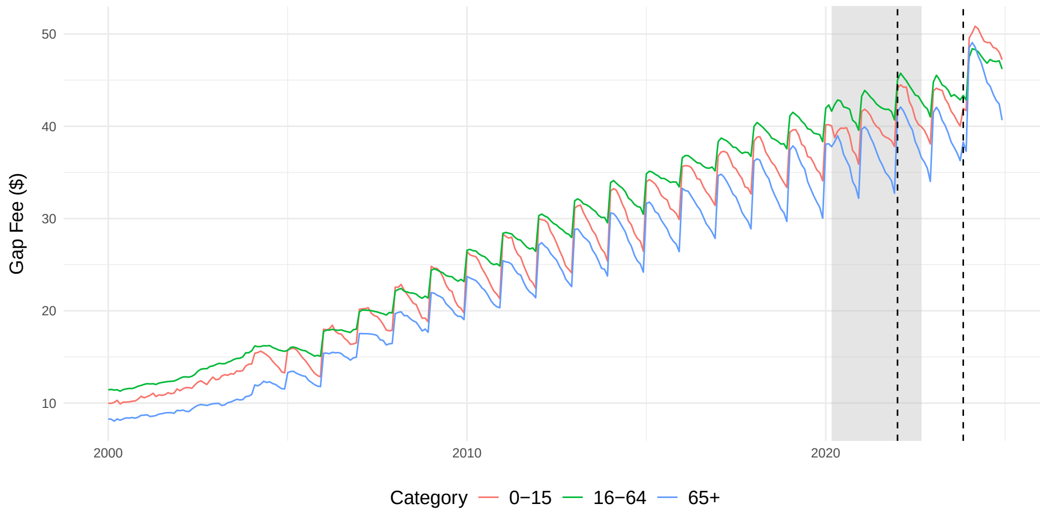



*Note:* The shaded period denotes the COVID-19 pandemic. The first dashed line denotes the 2022 policy, the second dashed line denotes the 2023 policy.

*Figure 7* shows the average conditional out-of-pocket cost for each age group. There has not been any significant shift in mean conditional out-of-pocket costs since the pandemic, suggesting that the sharp increase in out-of-pocket costs is due to falling bulk-billing rates. Conditional out-of-pocket costs have risen steadily from approximately $10 in 2000, to over $45 in 2024. There is little-to-no change from trend since the beginning of the COVID-19 pandemic, which strongly contrasts the trends seen in *Figure 5 & 6*.

[8]Out-of-Pocket costs are higher for those aged 16 to 64 because bulk-billing rates for this group are lower.

**Figure 7:** Average Conditional Out-of-Pocket Costs, by Age Group




*Note:* The shaded period denotes the COVID-19 pandemic. The first dashed line denotes the 2022 policy, the second dashed line denotes the 2023 policy.

# 5 Empirical Methodology

I estimate the causal effects of the policies using the Difference-in-Difference (DiD) regression design. Patients under the age of 16 and those who hold a CHCC are eligible for bulk-billing incentives when the appointment is at least 10 minutes long. However, as CHCC status is unobserved, I assign treatment status to those '0-15' and those '65+', as a high proportion of the latter group holds a CHCC.[9] I consider the '16-64' category as the control group as only a small proportion of people in this group are eligible for the CHCC. The reliance on broad age groups is dictated by the available data and limits precision, since unobserved differences between groups may influence outcomes independently of treatment exposure. Treatment intensity is defined by the size of the bulk-billing incentive, which varies across Modified Monash Model (MMM) classifications. The available data does not report appointment length, and thus, I assume all appointments for patients in 'treated' age groups are eligible for the bulk-billing incentive.

[9] Aged pension, My aged care card etc..

## 5.1 Identification Assumptions

The key identification assumptions for causal inference from a DiD approach are (i) *parallel trends* prior to treatment, and (ii) the absence of *spillovers* from the policy to the control group.

The *parallel trends* assumption requires that differences between the treatment and the control group are stable prior to treatment. When this is satisfied, post-treatment divergence can be attributed to the policy, as in the absence of treatment, outcomes in the treated group would have evolved similarly to those in the control group. I provide evidence on the extent to which this assumption is satisfied in Section 6.

The *no spillovers* assumption requires that the treatment only affects the treated group and has no effects on the control group. In this case, there are some direct effects on the control group due to imperfect treatment assignment, as a small proportion of the '16-64' group that holds a CHCC. There may also be *true* negative spillovers to the control group, predicted by the model in Section 3, where increasing bulk-billing incentives can lift prices for ineligible patients. I estimate the main results in Section 6 as if treatment assignment is perfect and assume there are no negative spillovers.

## 5.2 Estimation Specification

I use static and dynamic specifications to estimate the causal effect of the policies. The effect on bulk-billing rates is calculated in logit form, measuring the change in the probability of an appointment being bulk-billed, in static form (*Equation 5*) and dynamic form (*Equation 6*).[10] The effect on out-of-pocket costs is calculated with the same controls in linear form.[11]

[10] I use a logit model because the decision to bulk-bill is binary, and the errors are assumed to follow a standard logistic distribution.

[11] The out-of-pocket dynamic estimate is given by $y_{iat} = \alpha_i + \gamma(age \times month) + \delta_t + \sum_{\tau \neq -1} \beta_\tau I(t - T_i = \tau) + \epsilon_{iat}$. The interaction between age and month is to handle some seasonality in the data.

$$\Pr(y_{iat} = 1) = \Lambda(\alpha_i + \gamma_a + \delta_t + \beta\,(Treat_i \times Post_t)) \tag{5}$$

$$\Pr(y_{iat} = 1) = \Lambda\left(\alpha_i + \gamma_a + \delta_t + \sum_{\tau \neq -1} \beta_\tau\, I(t - T_i = \tau)\right) \tag{6}$$

Here, $\alpha_i$ is the LGA fixed effects, $\gamma_a$ is the age group fixed effects, $\delta_t$ is the time fixed effects and $\beta$ is the estimated causal effect (ATT).

The static specification estimates the causal effect on the treated group over the entire treatment period, providing headline results for the policy effect.[12] The dynamic specification estimates the causal effect on the treated group for each period, before and after the policy introduction.[13] The dynamic estimates are presented in event-study plots to shed light upon the *parallel trends* assumption and the temporal dynamics of the policy effect.

# 6 Results

This section presents the estimated effects of the policy changes. Section 6.1 shows the causal estimates for bulk-billing rates and out-of-pocket costs, from the specification in Section 5.2. Section 6.2 reports the estimates for the GP labour supply response and Section 6.3 shows the distributional effects of the policy changes. Finally, Section 6.4 presents the cost-benefit analysis of the 2023 policy changes.

## 6.1 Bulk-Billing Rates & Appointment Costs

The bulk-billing rate estimates are calculated in logit DiD form, as the portability of an appointment being bulk-billed, shown in *Equation 6 and 5.* The out-of-pocket cost

[12] Static estimates are taken using a reference period of 6 months leading up to policy implementation and the entire post-policy period. A window of 6 months prior to policy was selected as the trends between the treated and control groups were plausibly parallel.

[13] These estimates are all compared to the reference period of the month prior to policy implementation (December 2021 and October 2023).

estimates are calculated in linear DiD form with the same variables, other than the dependent variable, which is now log dollars. The results indicate that the 2023 policy immediately caused an increase in the probability of being bulk-billed and caused out-of-pocket costs to fall in the treated groups, relative to the control group.

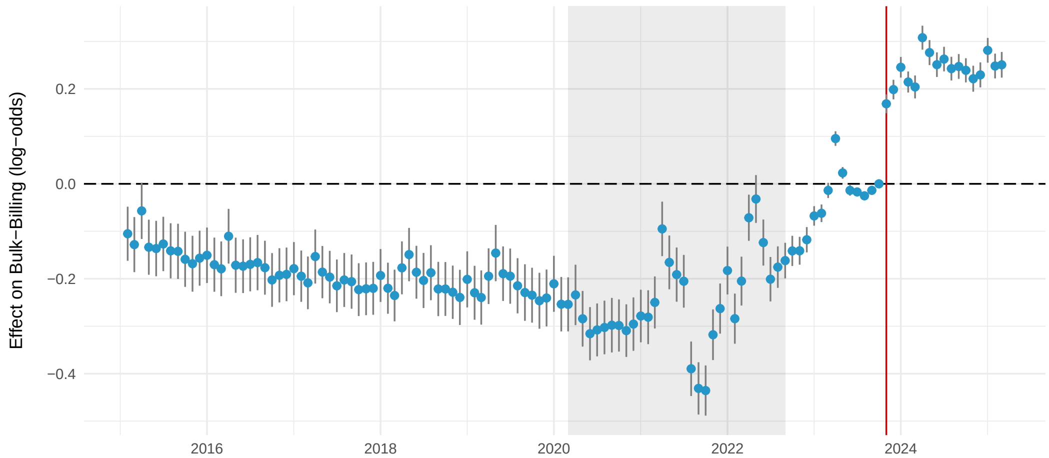
Event-study estimates from the dynamic DiD specification for the probability of being bulk-billed in Figure 8, provide evidence of parallel trends prior to policy implementation. For 5 months leading up to November 2023, there is a stable difference in the probability of being bulk-billed between the treatment and control group.[14] The stable pre-period suggests that the log-odds of being bulk-billed had stabilized in the two groups after the COVID-19 pandemic, and that in the absence of treatment, the treated group's probability of being bulk-billed would not have continued to diverge from the control group's. This is evidence that the *parallel trends* assumption is satisfied for the probability of being bulk-billed.

The event-study estimates in Figure 8 also show a rapid and persistent significant increase in the log-odds of being bulk-billed relative to the control group. In November 2023, there is a significant increase in the log-odds of being bulk-billed by 0.17 points. The difference in log-likelihood relative to the control group continues to grow over the following 6 months, peaking at an increase of 0.31 log-odd points, before stabilizing around 0.25 log-odd points higher than the control group. The event study suggests that the causal effect of the policy on bulk-billing rates occurs rapidly and that the policy has a persistent, positive effect on the probability of being bulk-billed.

Event-study estimates from the dynamic DiD specification for out-of-pocket costs in Figure 9 show some evidence of pre-trends. The difference in log out-of-pocket costs appears volatile in the months prior to treatment and there is the possibility of a downward trend from late 2021 to mid 2024. This highlights a key limitation in the data, as appointment types are unobserved and the COVID-19 related noise is likely due to telehealth appointments, which were initially mandatory to bulk-bill. The

[14] The single-month jump in bulk-billing likelihood coincides with the timing of policy announcement.

**Figure 8:** Logit DiD Bulk-Billing Rate, 2023



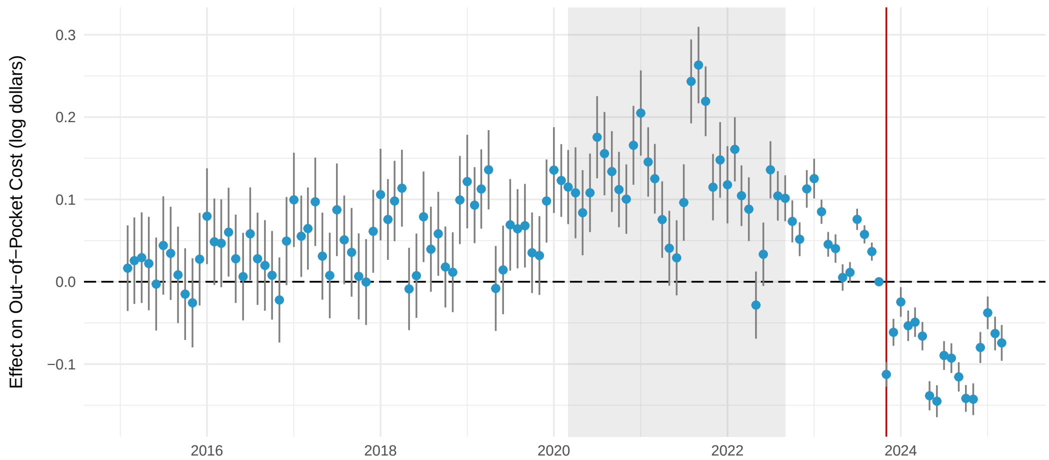

*Note:* Treatment (0–15 & 65+) vs Control (16–64), MMM 1–7. The red line indicates the treatment month, November 2023. The results are normalised against October 2023, the month preceding treatment. The shaded period denotes the COVID-19 pandemic.

three consecutive high months prior to treatment could plausibly reflect noise in the data, which would be consistent with the stable pre-period observed for the bulk-billing likelihood event-study. I present the results for out-of-pocket costs as if causal inference remains valid.

The event-study estimates in Figure 8 also show a persistent significant decrease in out-of-pocket costs, in line with the bulk-billing likelihood estimates. In November 2023, there is a significant decrease in out-of-pocket costs, falling by 0.11 log dollars. The difference fluctuates in the post-treatment period between 0.06 and 0.14 log dollars lower than October 2023. The event study suggests that the policy causes out-of-pocket costs to fall immediately and has a persistent effect, in line with the bulk-billing likelihood event study results.

Table 4 shows the estimated ATT for the probability of being bulk-billed (in log-odds) and the change in the out-of-pocket cost (in log-dollars) for the entire treated group and each treated age group in the first row. The second row reports the ATT values when converted to percentage point changes in the bulk-billing rate and percentage changes in out-of-pocket costs.

**Figure 9:** DiD Log Out-of-Pocket Cost, 2023




*Note:* Treated (0-15 & 65+) v Control (16-64), MMM 1–7. The red line indicates the treatment month, November 2023. The results are normalised against October 2023, the month preceding treatment. The shaded period denotes the COVID-19 pandemic.

**Table 4:** Estimated Causal Effects by Age Category

| | *Panel A: Bulk-billing (Logit)* | | | *Panel B: Out-of-Pocket Costs (OLS)* | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | Treated | 0–15 | 65+ | Treated | 0–15 | 65+ |
| ATT (log-odds / log change) | 0.245*** | 0.252*** | 0.242*** | -0.126*** | -0.179*** | -0.107*** |
| | (0.012) | (0.019) | (0.012) | (0.008) | (0.015) | (0.007) |
| ATT (pp / % change) | 3.01 | 2.95 | 3.13 | -11.86 | -16.39 | -10.11 |
| Observations | 3.14e+08 | 2.07e+08 | 2.78e+08 | 3.14e+08 | 2.07e+08 | 2.77e+08 |

Standard errors in parentheses, clustered by LGA. All models weighted by appointment counts.
All models include LGA and month-year fixed effects.‘Treated’ models include age group fixed effects.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

The estimated average treatment effect on the treated (ATT) was a 3.01 percentage point increase in the bulk-billing rate, from a base of 85%, (0.245 increase in log-odds ratio) and an 11.9% decrease in mean out-of-pocket costs (0.126 decrease in log-dollars), relative to the control group. The increase in log-odds of bulk-billing was consistent for those under 16 (0.252) and over 64 (0.242). The decrease in out-of-pocket costs was larger for those under 16 (0.179 log dollars) compared to those over 64 (0.107 log dollars) at 16.4% and 10.1% respectively.[15] These results suggest that the 2023 caused

[15]The effect was consistent across MMM classifications, and more detailed results can be found in

bulk-billing rates in the treatment group to rise by 3 percentage points and average out-of-pocket costs to fall by 12%.

The estimated causal effects are robust to alternative treatment specifications and when using a probit specification, as shown in Appendix B.1-B.4.[16] There is no measurable effect from the 2023 policy on total appointments, as shown in Appendix B.5. The 2022 policy results are not significantly different from 0 and can be found in Appendix C.

## 6.2 General Practitioner Supply

As a primary purpose of bulk-billing incentives is to maintain and expand affordable access to primary care, a relevant consideration is whether incentive changes increase appointment availability. I estimate the GPs' labour supply response to higher incentives by estimating whether GPs relocate to areas with higher intensity or increase their hours in these areas. I use OLS to estimate the relationship between GP labour supply and treatment intensity using *Equation 7*.

$$Y_{it} = \alpha_i + \delta_t + \beta_1(Post \times E_t) + \beta_2(Post \times I_{it}) + \beta_3(Post \times E_t \times I_{it}) + \epsilon_{it} \quad (7)$$

Where $Y_{it}$ is log number of GPs or log average weekly hours in each LGA. $\alpha_i$ is LGA fixed effects, $\delta_t$ is year fixed effects, $E_{it}$ is the proportion of eligible appointments for each LGA and $I_{it}$ is the log bulk-billing incentive for each year and each LGA.[17]

The results in Table 5 show that there is no evidence that the 2023 policy induced additional GP supply, either through entry or increased working hours. The dependent variables are the log total number of GPs in an LGA (Columns 1-3) and the log average weekly GP hours in an LGA (Columns 4-6).

Appendix B. All estimates for MMM1-6 are significant at the 1 percent level. In MMM7, bulk-billing estimates are significant at the 5 percent level and out-of-pocket estimates are not significant.

[16] B.1 shows static results for all MMM classifications, B.2 shows the probit specification event study, B.3 shows alternative treatment specifications and B.4 shows the MMM 7 event studies.

[17] The proportion of appointments is taken from the 2019 average share of appointments for eligible patients, as a pre-policy period was ideal and avoiding the COVID-19 noise was necessary.

**Table 5:** Measures of GP Supply

| | *Panel A: log(GP Count)* | | | *Panel B: log(Avg Hours)* | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| post×exposure | 0.002 | | -0.214 | -0.051 | | -0.173 |
| | (0.089) | | (0.340) | (0.038) | | (0.157) |
| post×incentive | | | -0.004 | | | -0.002 |
| | | | (0.006) | | | (0.003) |
| post×exposure×incentive | | -0.0001 | 0.009 | | 0.0004 | 0.004 |
| | | (0.002) | (0.012) | | (0.001) | (0.006) |
| Observations | 1,639 | 1,635 | 1,635 | 1,639 | 1,635 | 1,635 |
| $R^2$ | 0.998 | 0.998 | 0.998 | 0.868 | 0.868 | 0.868 |

Standard errors in parentheses, clustered by LGA. All models weighted by total appointments.
Exposure is defined as the proportion of eligible appointments in 2019.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

The estimates for the effect on the number of GPs and average weekly GP hours are close to 0 and statistically insignificant. Columns (1) & (4) indicate that GPs were no more likely to move to an LGA with a higher concentration of eligible people or to work more hours in those areas. Columns (2) & (4) suggest that the effect is approximately 0 when accounting for the incentive difference. The fully interacted specification (columns (3) & (6)) also shows no evidence that higher exposure or larger incentive increases GP counts or average working hours. These results suggest that there was no meaningful evidence of increased GPs or hours in locations with higher exposure or higher incentives, in the data available.

Additional estimates for the effect of the 2023 policy on total GP labour supply reflect these estimates and can be found in Appendix B.6.

## 6.3 Distributional Effects

A relevant consideration to public policy, which aims to make healthcare more accessible, is understanding which patients benefit from the changes. I estimate the relationship between socioeconomic status (SES) at the LGA level and the estimated causal effect of the policy on bulk-billing rate using the OLS specification in *Equation*

*8.*

$$Y_i = \alpha_i + \delta_i + \beta_1(SES_i) + \epsilon_i \tag{8}$$

Where $Y_i$ is the estimated ATT for bulk-billing rates for each LGA, $\alpha_i$ is MMM fixed effects and $\delta_i$ is a control for the bulk-billing rate pre-policy for each LGA. The coefficient $\beta_1$ reports the relationship between the SES percentile of any LGA and the estimated treatment effect for bulk-billing rates on the treated.

**Table 6:** SES Percentile

| | *Dependent variable: Estimated ATT (pp)* | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| SES Percentile | $0.020^{***}$ | $0.027^{***}$ | 0.002 |
| | (0.008) | (0.011) | (0.011) |
| Pre-Policy Bulk-Billing Rate | | | $-0.138^{***}$ |
| | | | (0.020) |
| MMM FE | No | Yes | Yes |
| Observations | 206 | 206 | 206 |

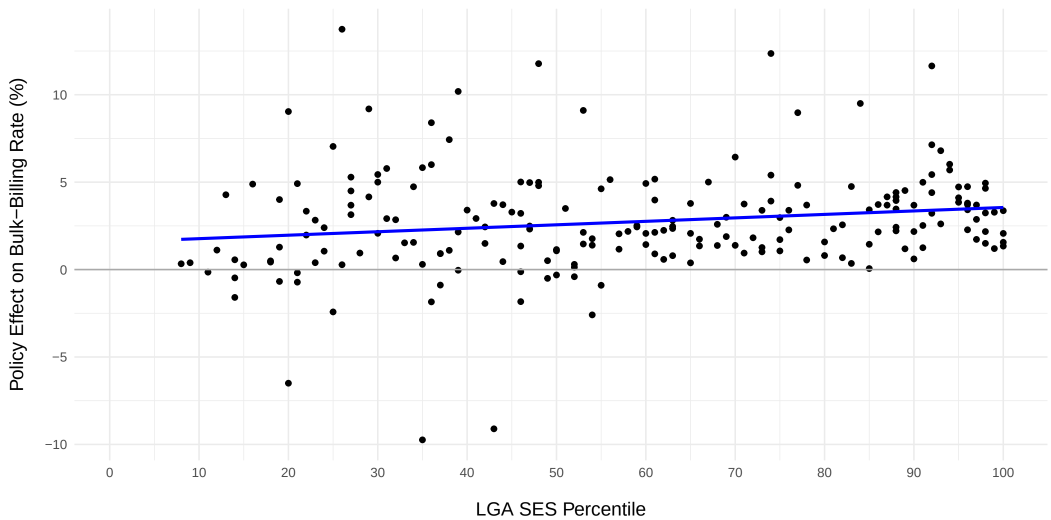
*Notes:* Standard errors in parentheses. Pre-bulk-billing rate given by October 2023 bulk-billing rate.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

The results in Table 6 show that the increase in bulk-billing is significantly higher in affluent areas and that this is driven by lower baseline levels of bulk-billing in these areas. The coefficient on SES percentile in column (2) means that a 1 percentage point increase in SES predicted a 0.027 percentage point increase in the estimated causal effect. This means that the causal increase in bulk-billing rates was approximately 1.1 percentage points higher in the 80th percentile vs the 40th percentile. *Figure 10* shows the relationship between SES percentile and change in bulk-billing rates visually and is analogous to model (1).

The coefficient in column (3) shows that the SES percentile has no relationship with the ATT when controlling for the bulk-billing rate before the policy was introduced. This means that the larger effect in more affluent areas, driven by the bulk-billing rates prior to policy having been lower, than in poorer areas, directly rather than socioeconomic status itself driving the relationship directly.

The distributional effects of the 2023 policy in each MMM classification are fairly

**Figure 10:** 2023, Socioeconomic Distribution of BB Rate Change




consistent, as shown in Appendix B.7.

## 6.4 Cost-Benefit Analysis

An essential consideration for public policy is how cost-effective this approach is in achieving its desired outcome. The results in Section 6.1 confirm that the 2023 policy caused bulk-billing rates to increase and out-of-pocket costs to fall, in the treated group relative to the control group; however, this does not provide any insight into how efficient the policy was. To give insight into the costs and benefits of the policy, I estimate the government expenditure and the patient savings from an additional '*free*' appointment caused by the policy in *Equation 7 & 8* respectively.[18]

$$\widehat{COST}_{per\, switched\, app} = \frac{\Delta\, incentive\ \times\ \overline{bb\ rate}_{pre} +\ \ incentive\ \times\ \Delta\, bb\ rate}{\Delta\, bb\ rate} \tag{9}$$

$$\widehat{SAVING}_{per\, switched\, app} = \frac{\Delta OPC}{\Delta\, bb\ rate} \tag{10}$$

[18]These estimates are based on the assumption that all new bulk-billed appointments existed previously as non-bulk-billed appointments. Results on Total Appointments (Appendix B.5) and GP supply (Section 6.1) validate this assumption.

Table 7 reports the estimated values for costs and savings associated with an additional marginal appointment being bulk-billed due to the 2023 policy.[19] The column (1) reports the relevant treated group(s), and column (2) reports the average increase in the bulk-billing for that respective group. The column (3) reports the estimate for the government expenditure per additional 'free' appointment and column (4) reports the estimate for the patient saving from the appointment becoming 'free'.

**Table 7:** Marginal Appointment Cost Estimates, 2023 Policy

| | **Incentive Increase** | **Appointment Cost** | **Patient Saving** |
|---|---|---|---|
| Treated | \$15.99 | \$480.16 | \$21.77 |
| 0–15 | \$15.46 | \$484.03 | \$27.85 |
| 65+ | \$16.18 | \$464.81 | \$18.42 |
| MMM 1 | \$13.80 | \$421.95 | \$18.23 |
| MMM 2 | \$21.00 | \$692.02 | \$35.25 |
| MMM 3 | \$22.30 | \$829.86 | \$35.88 |
| MMM 4 | \$22.30 | \$796.37 | \$31.02 |
| MMM 5 | \$23.70 | \$801.02 | \$27.59 |
| MMM 6 | \$25.00 | \$518.15 | \$25.26 |
| MMM 7 | \$26.55 | \$1014.48 | \$5.28 |

*Note:* MMM 1–7 results are based on causal estimates reported in Appendix B.

I estimate the government spends \$480.16 for each additional appointment that becomes bulk-billed due to the 2023 policy change, at the national level. The patients' savings from this appointment being bulk-billed is estimated at \$21.77. The estimates for the expenditure and savings are similar for those under 16 (\$484, \$28) and those over 64 (\$465, \$18). There is a positive relationship between expenditure and rurality, with the cheapest and most expensive 'free' appointments being in MMM 1 (\$421) and MMM 7 (\$1014) areas respectively, in line with larger incentives in rural areas. Patient savings, by location, are between \$18 (MMM 1) and \$36 (MMM 3).[20]

The national estimates mean the government spends \$22.05 for every \$1 a patient saves

[19] I do not provide estimates for the 2022 policy as there is no evidence that this policy caused a change in bulk-billing rates or patient out-of-pocket costs.

[20] The patient savings in MMM 7 are implausibly small, as the existing bulk-billing incentive was larger than the estimated appointment cost. The reason for this estimate is that out-of-pocket costs did not significantly fall after the policy was introduced.

due to the 2023 policy change. The additional \$21.05, on top of the patient saving, is a direct transfer to GPs for appointments which were already being bulk-billed. This indicates that the primary effect of the policy was to transfer large amounts to GPs as additional income and that there is a much smaller secondary effect to the marginal patient who is now bulk-billed.

The 2023 policy change was estimated to cost \$3.5 billion between 2023 & 2027, and the 2022 policy change was estimated to cost \$65.8 million between 2022 & 2025.[21] The cost-benefit analysis suggests that \$3.3 billion of the 2023 policy expenditure, and plausibly the entire \$65.8 million of the 2022 policy expenditure, is transferred directly to general practitioners as higher revenue for appointments which already would have been bulk-billed.[22] These estimates provide strong evidence that increasing conditional subsidies is an expensive approach to increasing participation when compliance rates are already high.

# 7 Discussion & Conclusion

This section interprets the main results, considers the policy implications, discusses the limitations of this research, and identifies possibilities for future work.

The results show that the 2023 policy caused bulk-billing rates to increase by 3 percentage points, from a base of 85%, and reduced patient out-of-pocket costs by 12%, in the treatment group relative to the control group, thus achieving the aim of making healthcare more affordable. These estimates are consistent with the theoretical model predictions for the effect of increasing bulk-billing incentives. The estimated GPs' labour supply response indicates that the policy had no short-term impact on hours worked or the number of GPs in rural areas. Distributional analysis reveals that individuals in affluent areas were more likely to benefit from the policy change, suggesting

[21] Policy Cost estimates from The Hon Greg Hunt MP (2021), The Hon Mark Butler MP (2023).

[22] The \$3.3 billion and \$65.8 million claims rely on the government cost estimates being accurate. The claim about the 2022 policy follows from the policy having no causal effect, as shown in Appendix C.

that the policy was a net transfer to wealthier patients.

The cost-benefit analysis clearly shows that the primary beneficiaries were general practitioners, who had significant boosts to income. The estimates indicate that the policy cost over \$480 for each additional bulk-billed appointment and, in exchange, saved the patient approximately \$22 at the point of service. This means that \$3.3 billion of the estimated \$3.5 billion policy cost is transferred to GPs in the form of higher income for appointments which would have been bulk-billed without any policy intervention.

These findings are directly relevant to the upcoming expansion of bulk-billing incentives scheduled for November 2025, but also have broader relevance for policy design. They demonstrate the limits of using conditional subsidies to increase compliance, where large fiscal transfers may only generate small behavioural changes. This can be directly applied to other domains, including childcare and university subsidies, as well as tax concessions for electric vehicles.

The foremost limitation is imposed by the available data on appointments, which is reported as monthly observations at the LGA level for each age group. This aggregation limits the accuracy of the estimates in this paper, as I am unable to observe treatment eligibility directly for all groups and services. The age group reporting means that treatment and control status are assigned to wide groups that differ in underlying characteristics that cannot be fully accounted for in this data. Individual appointment data would help resolve both of these issues and would allow for much of the COVID-19 noise to be delineated by excluding telehealth appointments.

Beyond reducing the accuracy of the estimates in this paper, the above limitation also makes it impossible to test whether there are any true spillovers from the incentive increase to the control group, as the theoretical model in Section 3 predicts. A simple-difference test, reported in Appendix B.8, fails to find any negative spillovers from treatment, but the estimate is limited by imperfect assignment and potentially conflates common location-specific shocks with treatment effects. Use of microdata would allow for more careful testing for spillovers.

Further, the available data on the number of GPs and their weekly hours is reported annually, making it impossible to observe any immediate supply responses in the available data. This constraint is unlikely to be critical, as relocation and workforce adjustments are costly and typically occur over longer horizons. A more significant limitation, for estimating supply responses, is the timing of this research which prevents the observation of any long-term effects. However, in November 2025, the incentive eligibility will be expanded to more patients and thus isolating the effects of each policy over long periods will remain difficult irrespective of research timing.

To the extent that these limitations affect the accuracy of the results in this paper, they should tend to cause the empirical approach to underestimate the policy effects and overestimate the policy costs.[23] Further, the magnitude of the cost estimates implies that inaccuracy would need to be very large for the policy to be anything other than extraordinarily expensive and inefficient.

Future work on the effects of bulk-billing incentives should involve more precise estimates using individual-level microdata on appointments, and could incorporate the effects of the upcoming November 2025 policy to accurately estimate the long-term GP labour supply effects. Other avenues may include extending the theoretical model to further address demand responses and the GPs' choice of hours or applying the existing model to alternative situations.

This paper shows that the 2023 change to bulk-billing incentives caused bulk-billing rates to increase and out-of-pocket costs to fall, for eligible patients relative to ineligible patients. The analysis shows that this approach was extremely expensive and inefficient, with the vast majority of the fiscal outlay going directly to GPs who did not change their behaviour. There was no justification for this policy on the basis of higher access, as supply did not increase, or on the basis of equity, as the benefits were larger in more affluent areas. This case study of increases to bulk-billing incentives in Australia shows that increasing conditional subsidies, when compliance rates are

[23]Assuming that measurement from imperfect treatment assignment has a larger effect than *true* negative spillovers to the control group.

already high, is an expensive route to greater access.

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# Appendix

The Appendix is structured as follows. Section A contains mathematical derivations and proofs relevant to the theoretical model contained in Section 3. Section B provides additional results for the effects of the 2023 policy. Section C provides the results from the 2022 policy.

# A Theoretical Model Derivations and Proofs

## A.1 Model Derivation

The GP provides services $s \in S$ to each patient group $g \in G$ and chooses prices $\{p_{sg}\}$ to allocate their time to maximise income, subject to a time constraint $h$. Time required for each appointment $t_s > 0$ and rebates $r_{sg} \geq 0$ are exogenous. A bulk-billing incentive $b_{sg} \geq 0$ is available if and only if the $(sg)$ is eligible and $p_{sg} = 0$. For each $(sg)$, demand $n_{sg}(p)$ is twice differentiable, strictly decreasing $(n'_{sg}(p) < 0)$ and weakly concave $(n''_{sg}(p) \leq 0)$. $\lambda \geq 0$, captures the value of a marginal unit of the GPs time. I assume if demand from all $(sg)$ is maximized, the GPs' time constraint is exceeded, $\int_S \int_G n_{sg}(0) > h$.

The GPs maximisation problem is given by

$$
\begin{aligned}
Y &= \max_{\{p_{sg}\}} \left\{ \int_S \int_G \left[ (r_{sg} + b_{sg} + p_{sg})\, n_{sg}(p_{sg}) \right] \; ds\, dg \right\} \\
\text{s.t.} \quad & h \geq \int_S \int_G \left[ n_{sg}(p_{sg}) t_s \right] \; ds\, dg
\end{aligned}
$$

Use Lagrangian and FOC to find profit $\pi_{sg}$ as function of $\lambda$ for gap fee and bulk-billing

Lagrangian

$$L = \int_S \int_G \{[r_{sg} + b_{sg} + p_{sg}]n_{sg}(p_{sg}) - \lambda[n_{sg}(p_{sg})t_s]\}\, ds, dg + \lambda h$$

FOC:

$$\frac{\partial L}{\partial p_{sg}} : [r_{sg} + b_{sg} + p_{sg}]n'_{sg}(p_{sg}) + n_{sg}(p_{sg}) - \lambda n'_{sg}(p_{sg})t_s = 0$$

To find optimal price for each $(sg)$ pair given some fixed $\lambda$;

Define $\pi_{sg}$ so total income decomposes as $Y = \int_S\int_G \pi_{sg}\, ds\, dg$, with

$$\pi_{sg}(p_{sg}, \lambda) = [r_{sg} + p_{sg} + b_{sg}]\, n_{sg}(p_{sg}) - \lambda\, n_{sg}(p_{sg})\, t_s$$

So if the GP does not bulk-bill and charges $(p_{sg} > 0)$, the profit function and implied value of $\lambda$ are;

$$\pi^p_{sg} = [r_{sg} + p_{sg}]\, n_{sg}(p_{sg}) - \lambda\, n_{sg}(p_{sg})\, t_s \qquad \lambda \;=\; \frac{n_{sg}(p^*_{sg}) + [r_{sg} + p^*_{sg}]\, n'_{sg}(p^*_{sg})}{n'_{sg}(p^*_{sg})\, t_s}$$

If the GP does bulk-bill and charges $(p_{sg} = 0)$, the profit function and implied value of $\lambda$ are;

$$\pi^{bb}_{sg} = [r_{sg} + b_{sg}]\, n_{sg}(0) - \lambda\, n_{sg}(0)\, t_s \qquad \lambda \;=\; \frac{n_{sg}(0) + [r_{sg} + b_{sg}]\, n'_{sg}(0)}{n'_{sg}(0)\, t_s}$$

The bulk-billing cut-off point is given when the GP is indifferent between bulk-billing and charging the optimal price given lambda $p_{sg}(\lambda)$.

$$\lambda \;\leq\; \frac{\overbrace{[r_{sg} + b_{sg}]\, n_{sg}(0)}^{\text{Revenue if BB}} \;-\; \overbrace{[r_{sg} + p^*_{sg}(\lambda)]\, n_{sg}(p^*_{sg}(\lambda))}^{\text{Revenue if charge } p^*_{sg}}}{\underbrace{t_s\,(\, n_{sg}(0))}_{\text{Time if BB}} - \underbrace{t_s\,(n_{sg}(p^*_{sg}(\lambda)))}_{\text{Time if charge } p^*_{sg}}}\,,$$

## A.2 Lemma 1 Proofs

### A.2.1 Claim 1 Proof

**Claim 1:** *When $p^*_{sg}(\lambda) > 0$, the first-order condition implies $p^*_{sg}(\lambda)$ increases with $\lambda$; since $n'_{sg}(p) < 0$, $n_{sg}\big(p^*_{sg}(\lambda)\big)t_s$ strictly decreases in $\lambda$.*

*Proof.* Consider a fixed $(s, g)$ where $p^*_{sg}(\lambda) > 0$. The first-order condition is

$$n_{sg}(p_{sg}) + [r_{sg} + p_{sg} - \lambda t_s]\, n'_{sg}(p_{sg}) = 0.$$

Define $F(p, \lambda) = n_{sg}(p)+[r_{sg}+p-\lambda t_s]n'_{sg}(p)$. At the interior optimum $F(p^*_{sg}(\lambda), \lambda) = 0$.

Compute partial derivatives:

$$F_\lambda(p, \lambda) = -t_s n'_{sg}(p) > 0, \qquad F_p(p, \lambda) = 2n'_{sg}(p) + [r_{sg} + p - \lambda t_s]n''_{sg}(p).$$

Using the FOC, $r_{sg} + p^*_{sg} - \lambda t_s = -n_{sg}(p^*_{sg})/n'_{sg}(p^*_{sg})$, so

$$F_p(p^*_{sg}, \lambda) = 2n'_{sg}(p^*_{sg}) - \frac{n_{sg}(p^*_{sg})n''_{sg}(p^*_{sg})}{n'_{sg}(p^*_{sg})} < 0,$$

given $n'_{sg} < 0$, $n_{sg} \geq 0$, $n''_{sg} \leq 0$. By the Implicit Function Theorem,

$$\frac{dp^*_{sg}}{d\lambda} = -\frac{F_\lambda}{F_p} > 0.$$

Hence, the optimal price $p^*_{sg}(\lambda)$ strictly increases in $\lambda$. Since $n'_{sg}(p) < 0$, time used $t_s n_{sg}(p^*_{sg}(\lambda))$ strictly decreases in $\lambda$. □

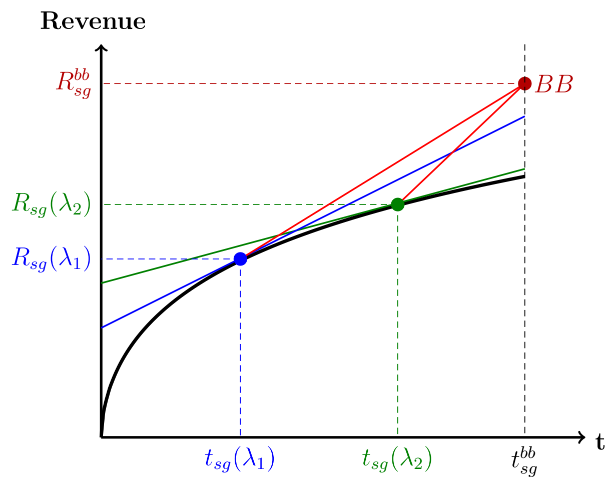
### A.2.2 Claim 2 Proof

**Claim 2:** *When $p^*_{sg}(\lambda) = 0$, if bulk-billing is optimal at some $\lambda_1$, it remains optimal for all $\lambda_2 < \lambda_1$; raising $\lambda$ cannot make bulk-billing newly optimal, so time used weakly* *decreases in $\lambda$.*

**Geometric proof** given by Figure 11.

The figure shows that switching to bulk-billing is preferred at $\lambda_1$ because the additional revenue compensates the GP for the additional time. This is represented by the fact the the line to bulk-billing is steeper than the line given by $\lambda_1$ Clearly, for any $\lambda_2 < \lambda_1$ it is also preferable to bulk-bill.

**Figure 11:** Geometric Proof for Lemma 1, Claim 2




*Note:* The figure shows that switching to bulk-billing is preferred at $\lambda_1$ because the additional revenue compensates the GP for the additional time. This is represented by the fact the the line to bulk-billing is steeper than the line given by $\lambda_1$ Clearly, for any $\lambda_2 < \lambda_1$ it is also preferable to bulk-bill.

*Proof.* For ease of notation: The total revenue is given by $R_{\lambda i}$ and $R_{bb}$, where $R_{\lambda i} = [r_{sg} + p^*_{sg}]n_{sg}(p^*_{sg})$ and $R_{bb} = [r_{sg} + b_{sg}]n_{sg}(0)$. The optimal price is determined by the $\lambda_i$. This means $R_{\lambda_1}$ would be the total revenue for when price is set optimally given $\lambda_1$. The total time spent providing medical services is given by $T_{\lambda i} = n_{sg}(p^*_{sg})t_s$ when prices set optimally price for each $\lambda_i$. As stated in Section 3, $n(p)$ is strictly decreasing and $\int_S \int_G n_{sg}(0)\, t_s\, ds\, dg > h$.

I take $\lambda_{bb}$, $\lambda_1$, $\lambda_2$ as given. The result below shows that there exists a monotone cutoff rule in $\lambda$, given $\int_S \int_G n_{sg}(0)\, t_s\, ds\, dg > h$, such that once it becomes optimal to bulk-bill at some $\lambda_i$ it is also optimal to bulk-bill for all $\lambda_j$ when $\lambda_j \leq \lambda_i$.

1. If it is optimal or indifferent to Bulk-Bill at $\lambda_1$ rather than charge the optimal price $p^*_{sg}(\lambda_1)$, then:

$$\underbrace{R_{bb} - \lambda_1(T_{bb})}_{\text{BB Revenue - BB Time cost}} \quad \geq \quad \underbrace{R_{\lambda_1} - \lambda_1(T_{\lambda_1})}_{\text{Optimal Revenue - Time cost}}$$

   or equivalently

$$R_{bb} \geq R_{\lambda_1} + \lambda_1(T_{bb} - T_{\lambda_1})$$

   If revenue were not high enough to compensate for the additional time required to Bulk-Bill, the GP would instead charge the gap fee and allocate the time to some other set of patients $(s, g)$.

2. If $\lambda_2 < \lambda_1$, and the GPs value of time is given by $\lambda_2$ optimality of $p^*_{sg}(\lambda_2)$ implies:

$$R_{\lambda_2} - \lambda_2 T_{\lambda_2} \geq R_{\lambda_1} - \lambda_2 T_{\lambda_1}$$

   or equivalently

$$R_{\lambda_2} \geq R_{\lambda_1} + \lambda_2(T_{\lambda_2} - T_{\lambda_1})$$

   Otherwise, it would be optimal to charge the higher price $p^*_{sg}(\lambda_1)$ and allocate the additional time to new appointments for some other set of patients $(s, g)$.

3. So when deciding between Bulk-Billing and gap-fee at $\lambda_2$, GP would switch if

$$R_{bb} \geq R_{\lambda_2} + \lambda_2(T_{bb} - T_{\lambda_2})$$

$$R_{bb} \geq R_{\lambda_2} + \lambda_2(T_{bb} - T_{\lambda_1}) - \lambda_2(T_{\lambda_2} - T_{\lambda_1})$$

   from (2.) we sub in $R_{\lambda_2} \geq R_{\lambda_1} + \lambda_2(T_{\lambda_2} - T_{\lambda_1})$

$$R_{bb} \geq [R_{\lambda_1} + \lambda_2(T_{\lambda_2} - T_{\lambda_1})] + \lambda_2(T_{bb} - T_{\lambda_1}) - \lambda_2(T_{\lambda_2} - T_{\lambda_1})$$

$$R_{bb} \geq R_{\lambda_1} + \lambda_2(T_{bb} - T_{\lambda_1})$$

And from (1.) we know

$$R_{bb} \geq R_{\lambda_1} + \lambda_1(T_{bb} - T_{\lambda_1}) \geq R_{\lambda_1} + \lambda_2(T_{bb} - T_{\lambda_1})$$

since $\lambda_1 > \lambda_2$ and $T_{bb} - T_{\lambda_1} \geq 0$. Therefore,

$$R_{bb} \geq R_{\lambda_2} + \lambda_2(T_{bb} - T_{\lambda_2})$$

Thus if it is optimal to switch at $\lambda_1$ and $\lambda_1 > \lambda_2$ then it is also optimal to switch to Bulk-Billing at $\lambda_2$

$\square$

# B Additional 2023 Results

Appendix B sets out additional results, that extend on those shown in Section 6 of the main paper. Section B.1 reports the causal estimates for bulk-billing rates and out-of-pocket costs in each MMM area. Section B.2 reports the estimated effect of the 2023 policy on total appointments. Section B.3 reports further results for GP supply. Section B.4 reports the socioeconomic effects at the MMM level. Section B.5 reports estimates of spillover effects to the control group relevant with the theoretical model predictions in Section 3.

## B.1 2023 Robustness: MMM Results

This section reports estimated casual effect of the 2023 policy change on bulk-billing rates and out-of-pocket costs. *Table 8* reports the static estimates for the effect on bulk-billing rates in each MMM. The first row reports the effect in *log-odds* and the second row reports the effect as a percentage point change in the bulk-billing rate.

*Table 9* reports the static estimates for the effect on log out-of-pocket costs in each MMM. The first row reports the effect in *log-dollars* and the second row reports the effect as a percentage change in the out-of-pocket costs.

The results in MMM 7 for bulk-billing rates are significant at the 5% level, and the results for out-of-pocket costs are insignificant. The provide further clarity to these estimates I include the event-studies in MMM 7, in *Figures 12, 13* respectively.

**Table 8:** Static Logit Regressions by Category and MMM Region

| | *Dependent variable: Bulk-billing indicator (logit)* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| | All Treated | 0–15 | 65+ | MMM1 | MMM2 | MMM3 | MMM4 | MMM5 | MMM6 | MMM7 |
| ATT (log-odds) | 0.245*** | 0.252*** | 0.242*** | 0.210*** | 0.320*** | 0.308*** | 0.336*** | 0.330*** | 0.421*** | 0.254** |
| | (0.012) | (0.019) | (0.012) | (0.012) | (0.033) | (0.021) | (0.040) | (0.036) | (0.125) | (0.101) |
| ATT (pp) | 3.01 | 2.95 | 3.13 | 2.94 | 2.74 | 2.44 | 2.58 | 2.72 | 4.48 | 2.49 |
| Observations | 3.14e+08 | 2.07e+08 | 2.78e+08 | 2.36e+08 | 3.16e+07 | 2.11e+07 | 1.15e+07 | 8.69e+06 | 1.60e+06 | 1.35e+06 |

Standard errors in parentheses, clustered by LGA.
All models include LGA and month-year FE. Age FE included in all models except (2)–(3). Models weighted by appointment counts.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

**Table 9:** Static Logit Regressions by Category and MMM Region

| | *Dependent variable: log Out-of-Pocket Costs* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| | All Treated | 0–15 | 65+ | MMM1 | MMM2 | MMM3 | MMM4 | MMM5 | MMM6 | MMM7 |
| ATT (log change) | -0.126*** | -0.179*** | -0.107*** | -0.100*** | -0.183*** | -0.186*** | -0.191*** | -0.169*** | -0.238*** | -0.036 |
| | (0.008) | (0.015) | (0.007) | (0.008) | (0.022) | (0.014) | (0.027) | (0.020) | (0.065) | (0.082) |
| ATT (% change) | -11.86 | -16.39 | -10.11 | -9.53 | -16.71 | -17.00 | -17.42 | -15.54 | -21.18 | -3.52 |
| Observations | 3.14e+08 | 2.07e+08 | 2.77e+08 | 2.36e+08 | 3.16e+07 | 2.11e+07 | 1.15e+07 | 8.67e+06 | 1.59e+06 | 1.34e+06 |

Standard errors in parentheses, clustered by LGA.
All models include LGA and month-year FE. Age FE included in all models except (2)–(3). Models weighted by appointment counts.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

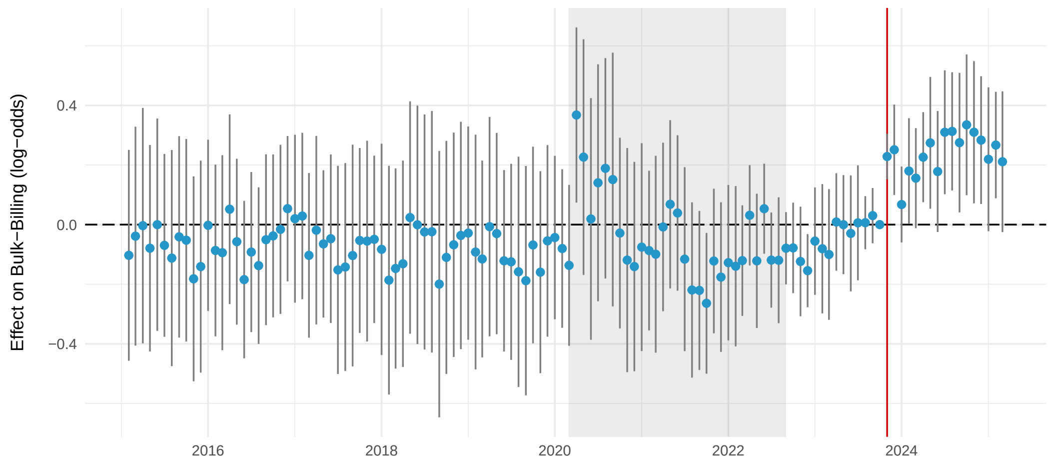
## B.2 2023 Robustness: MMM 7 Results

## B.3 2023 Results: Effect on Total Appointments

*Figure 14* shows the event study for the change in total (log) appointments.[24] In the 12 months preceding the 2023 policy there was a slight uptrend in the number of

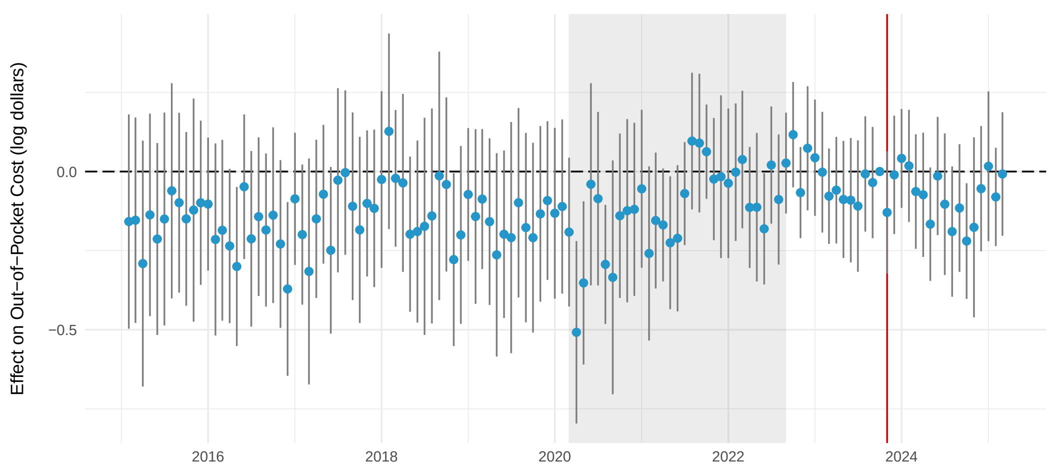
[24]There is no estimate for some months as results were committed due to co linearity with control variables.

**Figure 12:** Logit DiD Bulk-Billing Likelihood, 2023, MMM 7




*Note:* Treated (0-15 & 65+) v Control (16-64), MMM 7. The red line indicates the treatment month, November 2023. The results are normalised against October 2023, the month preceding treatment. The shaded period denotes the COVID-19 pandemic.

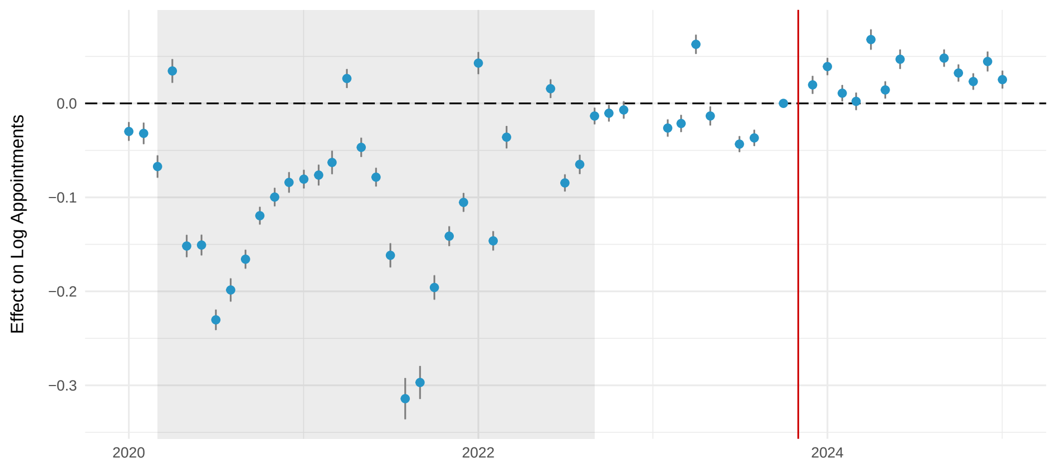
**Figure 13:** DiD Log Out-of-Pocket Costs, 2023, MMM 7




*Note:* Treated (0-15 & 65+) v Control (16-64), MMM 7. The red line indicates the treatment month, November 2023. The results are normalised against October 2023, the month preceding treatment. The shaded period denotes the COVID-19 pandemic.

log appointments in the treatment group relative to the control groups, which persists through the entire post treatment period . This evidence suggests that the null hypothesis, that the policy did not have a causal effect on appointments, cannot be rejected.

**Figure 14:** DiD Log Appointments, 2023




*Note:* Treated (0-15 & 65+) v Control (16-64), MMM 1–7. The red line indicates the treatment month, November 2023. The results are normalised against October 2023, the month preceding treatment. The shaded period denotes the COVID-19 pandemic.

## B.4 2023 Results: Additional GP Labour Supply

In addition to the estimates in Section 6, I also estimate the effect on log total weekly GP hours. The full results are presented in *Table 10*.

## B.5 2023 Results: Socioeconomic Distribution Results MMM Level

*Table 11* shows the how the estimated policy effect on bulk-billing rates changes with an increase in the SES percentile of an LGA. This extends on the results Section 6.3 by providing estimates in each MMM classification seperately.

**Table 10:** Exposure–Incentive Regressions (Appointment-Weighted, LGA-Clustered SEs)

| | *Dependent variable:* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | log(GP Count) | | | log(Avg Hours) | | | log(Total Hours) | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| post:exposure_2019 | 0.002 | | -0.214 | -0.051 | | -0.173 | -0.050 | | -0.387 |
| | (0.089) | | (0.340) | (0.038) | | (0.157) | (0.086) | | (0.324) |
| post:incentive | | | -0.004 | | | -0.002 | | | -0.006 |
| | | | (0.006) | | | (0.003) | | | (0.005) |
| post:exposure_2019:incentive | | -0.0001 | 0.009 | | -0.0004 | 0.004 | | -0.0005 | 0.013 |
| | | (0.002) | (0.012) | | (0.001) | (0.006) | | (0.002) | (0.012) |
| Constant | 5.180*** | 5.180*** | 5.180*** | 3.512*** | 3.512*** | 3.512*** | 8.692*** | 8.692*** | 8.692*** |
| | (0.003) | (0.003) | (0.003) | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) | (0.003) |
| Observations | 1,639 | 1,635 | 1,635 | 1,639 | 1,635 | 1,635 | 1,639 | 1,635 | 1,635 |
| $R^2$ | 0.998 | 0.998 | 0.998 | 0.868 | 0.868 | 0.868 | 0.997 | 0.997 | 0.997 |

*Note:* *p<0.1; **p<0.05; ***p<0.01

**Table 11:** SES Distribution in each MMM Classification

| | *Dependent variable:* | | | | | | |
|---|---|---|---|---|---|---|---|
| | ATT Margin | | | | | | |
| | MMM1 | MMM2 | MMM3 | MMM4 | MMM5 | MMM6 | MMM7 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| percentile | 0.030*** | −0.051 | 0.037 | −0.029 | 0.074** | 0.035 | |
| | (0.009) | (0.037) | (0.023) | (0.057) | (0.028) | (0.027) | |
| Constant | 0.463 | 6.997** | 0.957 | 3.790* | −1.281 | −0.193 | 0.133 |
| | (0.781) | (2.548) | (1.261) | (2.033) | (1.389) | (0.858) | |
| Observations | 75 | 19 | 29 | 37 | 38 | 7 | 1 |
| $R^2$ | 0.127 | 0.101 | 0.088 | 0.008 | 0.162 | 0.259 | 0.000 |
| Adjusted $R^2$ | 0.115 | 0.048 | 0.054 | −0.021 | 0.139 | 0.111 | 0.000 |
| Residual Std. Error | 1.581 (df = 73) | 2.868 (df = 17) | 2.372 (df = 27) | 4.657 (df = 35) | 3.184 (df = 36) | 1.058 (df = 5) | |
| F Statistic | 10.633*** (df = 1; 73) | 1.909 (df = 1; 17) | 2.592 (df = 1; 27) | 0.265 (df = 1; 35) | 6.956** (df = 1; 36) | 1.746 (df = 1; 5) | |

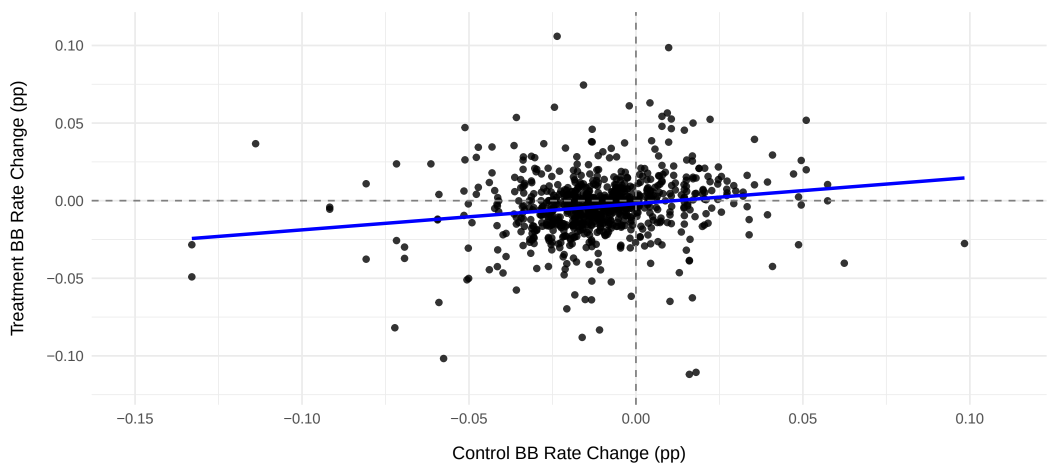
*Note:* *p<0.1; **p<0.05; ***p<0.01

## B.6 2023 Results: Spillover Estimates

To test for spillovers, *which according to the theoretical model should be negative*, I take the simple difference of change in bulk-billing rates in treated groups against the control groups. However, these effects may be dominated by common shocks at the LGA level and by imperfect treatment eligibility observation.

*Figure 15* shows that there is a weakly positive relationship between the differences. This means that place which had larger increases in bulk-billing for the treated group also had larger increases for bulk-billing the control group. *Figure 16* shows the same result, but uses year over year differences to account for some measurement issues which may be induced by seasonal patterns.

**Figure 15:** Simple Difference,Change in Treated vs Control

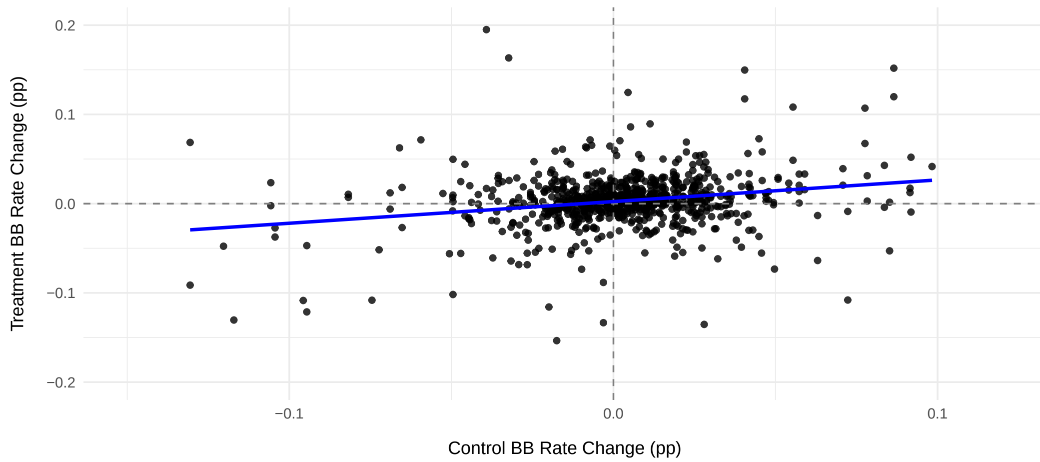



*Note:* Simple Diff, Change in Treated vs Change in Control. Pre-policy: (Oct 23 - Oct 22), Post-policy: (Nov 23 - Nov 22)

# C 2022 Results

This section contains the estimated causal effects of the 2022 policy change on bulk-billing rates and out-of-pocket costs, as mentioned in Section 6. The 2022 policy

**Figure 16:** Simple Difference, YoY Change in Treated vs Control




*Note:* Simple Diff, YoY Change in Treated vs YoY Change in Control. Pre-policy: (Oct 23 - Oct 22), Post-policy: (Nov 23 - Nov 22)

change differed from the 2023 change as treatment was restricted to only MMM 3-7. This allowed me to estimate causal effects with two treatment and control group specifications. *Specification A* was that those aged under 16 and over 64 in MMM 3-7 were the treatment groups and those aged from 16 to 64 in MMM 3-7 were the control group. *Specification B* was that those aged under 16 and over 64 in MMM 3 were the treatment groups and those aged under 16 and over 64 in MMM 2 were the control group.

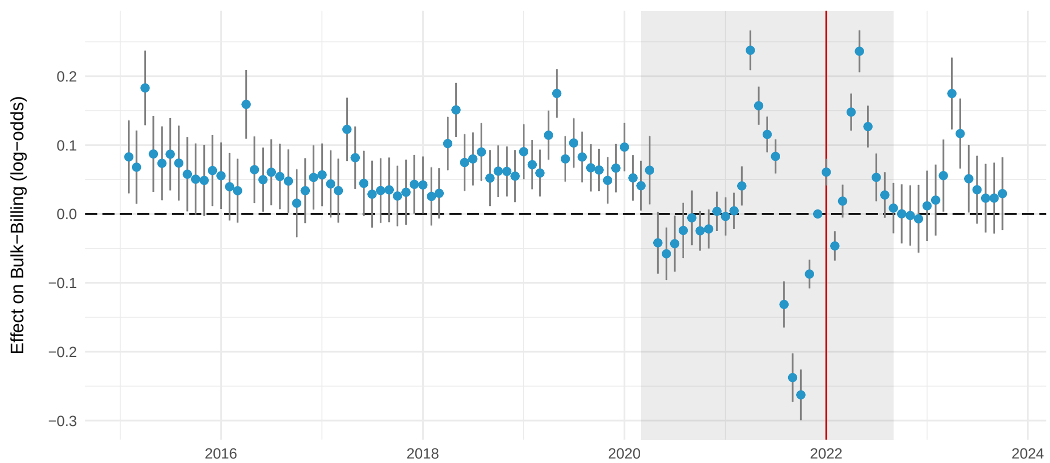
Section C.1 reports the estimated for *Specification A* and Section C.1 reports the estimated for *Specification B*.

## C.1 2022: Treatment & Control Specification A

*Figure 17* shows the event study shows relative likelihood of an appointment being bulk-billed in the treatment group, relative to the control group. There is significant variation in the relative log-likelihoods as the policy was introduced during COVID-19. This variation across the treatment and control groups means it is impossible reject the null hypothesis that the policy had no effect in the short term.

The 2023 policy change provided evidence that there may persistent effects on bulk-billing rates. However, *Figure 17* shows that the relative likelihood of being bulk-billed is not materially different after the COVID-19 compared to the pre-pandemic period. This suggests that there was no significant increase bulk-billing caused by the 2022 policy.

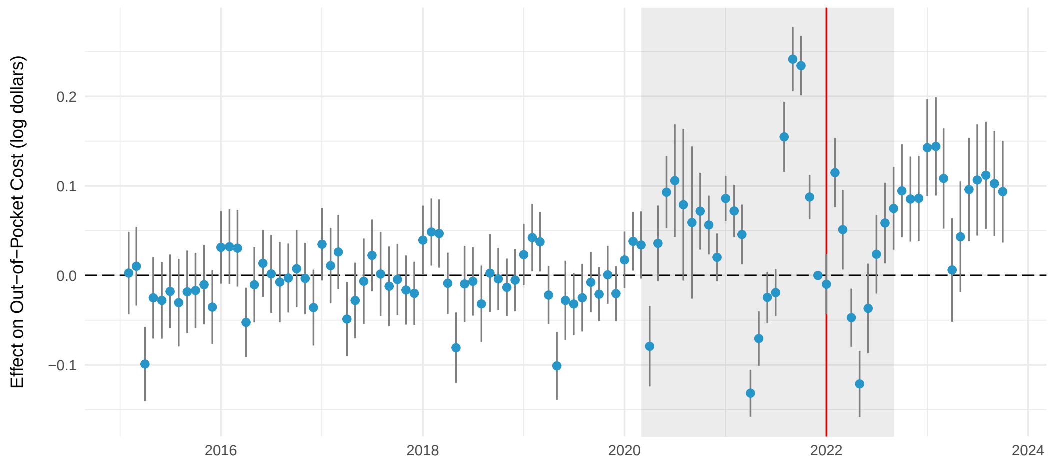
**Figure 17:** Logit DiD Bulk-Billing Likelihood, 2022




*Note:* Specification A: Treated (0-15 & 65+) v Control (16-64), MMM 3–7 only. The red line indicates the treatment month, November 2023. The results are normalised against October 2023, the month preceding treatment. The shaded period denotes the COVID-19 pandemic.

*Figure 18* shows the event study for the causal effect of the 2022 policy change on log out-of-pocket costs. Similarly to *Figure 18*, there is significant variation immediately preceding and following treatment. Consistent with the bulk-billing rate estimates and variation in *conditional out-of-pocket costs*, the changes in the out-of-pocket costs are primarily driven by changes to the bulk-billing rate This interpretation suggests that there is no evidence that the policy change caused out-of-pocket costs to fall at any point in the post-treatment period.

**Figure 18:** DiD Log Out-of-Pocket Costs, 2022




*Note:* Specification A: Treatment (0–15 & 65+) vs Control (16–64), MMM 3–7 only. The red line indicates the treatment month, November 2023. The results are normalised against October 2023, the month preceding treatment. The shaded period denotes the COVID-19 pandemic.

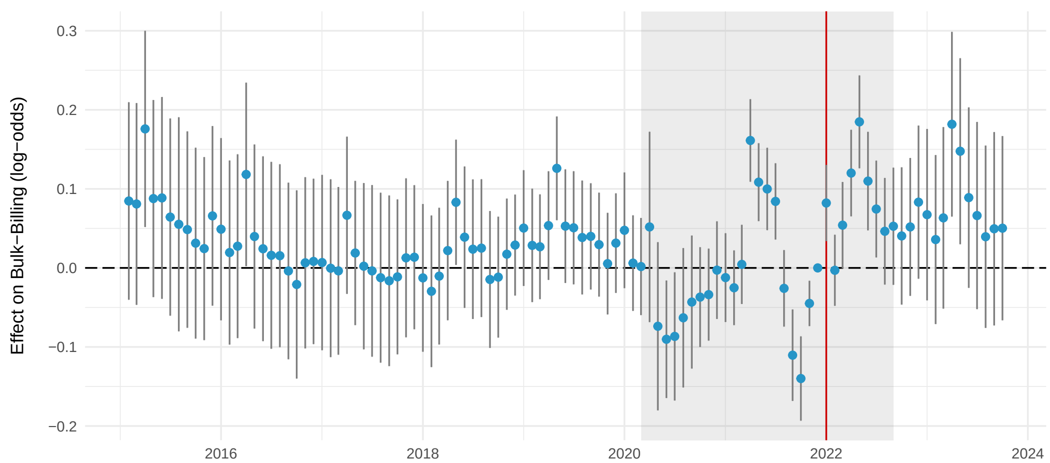
## C.2 2022: Treatment & Control Specification B

*Figure 19* shows the event study shows relative likelihood of an appointment being bulk-billed in the treatment group, relative to the control group. As in *Specification A* the variation makes it impossible to observe short term effects and the long term differences are not significant. This affirms that there was no significant increase bulk-billing caused by the 2022 policy.

These results is consistent with the small changes in bilk-billing incentives of between \$0.60 and \$2.60.

Out-of-pocket costs estimates for *Specification B* are omitted and static results for both specifications are omitted. I do not estimate the effects on total appointments, GP supply or any socioeconomic distributional effects, as there was no measurable effect on bulk-billing rates and out-of-pocket costs.

**Figure 19:** Logit DiD Bulk-Billing Likelihood, 2022




*Note:* Specification B: Treatment (0–15 & 65+ MMM 3) vs Control (0–15 & 65+ MMM 2). The red line indicates the treatment month, November 2023. The results are normalised against October 2023, the month preceding treatment. The shaded period denotes the COVID-19 pandemic.