



UNIVERSITY OF NEW SOUTH WALES
SCHOOL OF ECONOMICS

HONOURS THESIS

Bulk Billing and GP Satisfaction

A study using the MABEL Survey

Author:

Andrew BARICH

Student ID: 5061942

Supervisor:

Prof. Denzil FIEBIG

Dr. Hasin YOUSAF

Bachelor of Economics (Econometrics & Economics) (Honours)

AND

Bachelor of Commerce (Finance)

22nd November, 2019

Declaration

I declare that this thesis is my own work and that, to the best of my knowledge, it contains no material which has been written by another person or persons, except where acknowledgement has been made. This thesis has not been submitted for the award of any degree or diploma at the University of New South Wales Sydney, or at any other institute of higher education.

.....

Andrew Barich
22nd November, 2019

Acknowledgements

First and foremost, I acknowledge the grace of God over this year as I have done my thesis. He has always been near and dear to me and I felt that I could relate to him as a friend through Jesus' death and resurrection. Many times I have called for his power to help and he has answered, either through those mentioned below or others.

To my supervisors Denzil Fiebig and Hasin Yousaf, thank you for your patience, expertise and advice throughout this year. This thesis would not have come as far as it has without both of your encouragements and questionings. Thank you for teaching me that I have barely scratched the surface of empirical econometrics, and that I have a long way to go before I can claim expertise in any field. Thank you also to Pauline Grosjean, Sarah Walker and Tess Stafford for the helpful feedback and discussion, as well as for organizing this years Honours program. I hope next years Honours cohort learns just as much if not more than we have. Thank you as well to the staff of the UNSW Economics faculty who provided feedback and suggestions.

I am grateful to the entire Honours Cohort of 2019, especially, Aaron, Elif, Jonathan, Jack, Nick and Rhea for the multiple discussions which improved this thesis. Thank you as well for the teamwork and argument which pushed me to learn so much more this year than I would have been able to on my own. Cheers too for the banter, pranks and fun. I couldnt be more thankful to have been surrounded by a group of such intelligent and thoughtful people. I wish you all the best with any future career or study and hope that we can all meet together again soon.

A big thank you to Mum, Dad and John for all your support and efforts to keep me on track, not just this year, but all my life. Thank you to all my church friends at St Johns for taking my mind off work and reminding me of the love of God found in Christ, especially Ihsan, Marc and Noah who put up with my economics quirks. A massive thanks to Carl and Tim from CBS, Ollie from Pioneers, and Bruce, David and Ronaldo from St Johns for the pastoral care. Gertrude Dachaigh also deserves a thank you for letting me sleep at her house when the nights became late. Enjoy!

Contents

Declaration	i
Acknowledgement	ii
Table of Contents	iii
Abstract	v
1 Introduction	1
2 Literature Review	4
2.1 General Practice Trends	4
2.2 Economics of General Practice	6
2.3 Endogeneity of Bulk Billing	7
2.4 Job Satisfaction	8
3 Policy Environment	10
3.1 Policy Intervention	10
3.2 Potential Outcomes	11
4 Data	14
4.1 Sample	14
4.2 Variables	14
5 Estimation	18
5.1 Modifying Joyce et. al. 2011	18
5.2 Adding Bulk-Billing as an Explanatory Variable	23
5.2.1 Baseline and Individual Fixed Effects Models	23
5.2.2 Individual Fixed Effects and Controls Model	24
5.3 Revisiting Potential Outcomes	28
6 Discussion	34
6.1 Mechanisms	34

6.2 Limitations	35
7 Conclusion	37
Bibliography	39
A Model Variables Summary	40
B Robustness Tests	43
C Heterogeneity Changes	63
D Miscellaneous Tables and Figures	66

Abstract

We investigate the effect of the continuing decision to bulk-bill on the overall job satisfaction for Australian General Practitioners (GPs). We also look at how the Medicare Benefits Schedule (MBS) indexation freeze has affected both specific work outcomes and bulk-billing rates. The setting we use is a national longitudinal survey of Australian doctors in clinical practice: the Medicine in Australia – Balancing Employment and Life (MABEL) survey, undertaken from 2008 until 2017, which includes over 6000 distinct GPs. We observe the association between job satisfaction and bulk-billing, controlling for year fixed effects, individual fixed effects as well as doctor, job and geographical characteristics. We also observe the effect of the freeze on household income and hours worked for bulk-billing and non-bulk-billing GPs. Our key finding is that bulk-billing is a factor affecting job satisfaction only after the freeze was introduced. We also see that satisfaction was rising significantly prior to the freeze, but this trend plateaued afterwards. Despite this, we see that income is trending upwards and hours worked is trending downwards regardless of whether the doctor bulk-bills. Finally, we provide some potential reasons for these trends.

CHAPTER 1

Introduction

Physician job satisfaction affects the decisions that physicians make, including whether they reduce their working hours (Shrestha and Joyce, 2011) or, more significantly, whether they leave the workforce entirely (Landon, Reschovsky, Pham, and Blumenthal, 2006). General practitioners (hereafter, GPs) satisfaction, is strongly correlated to patient satisfaction for those living in a similar geographic location (DeVoe, Fryer, Straub, McCann, and Fairbrother, 2007). Targeted policy that aims to improve patient and doctor outcomes requires careful thought about the determinants of GP job satisfaction. These outcomes include quality of care and the amount of care provided to patients which are of interest to the population at large.

GPs, provide a particularly good sample to explore the question of job satisfaction since they are relatively flexible in deciding how many hours they want to work. This is especially true for women who work much less full time than men mainly as a result of having children (Lachish, Svirko, Goldacre, and Lambert, 2016). GPs deciding their working hours, and indirectly, their income should therefore allow them to tailor their work in order to maximise job satisfaction and promote a healthier work-life balance.

In 2013, the Australian government halted indexation of service rebates in the process of cutting federal spending. This policy significantly affected the GP working environment by prompting GPs into reviewing their work procedures and decision variables. This thesis explores how GP behaviour and the doctor's perception of their job has changed in relation to this indexation freeze.

In Australia, patients are charged a fee for each service that the GP provides. The fee that the GP charges for each service is unregulated and GPs can and do price discriminate between patients; see for example, Johar (2012). The publicly funded universal health care system, Medicare, ensures that Australian citizens and residents have access to a wide range of medical services, including primary health care provided by GPs. Medicare outlines a fee that they are willing to pay for each service (or item) that GPs (and others) provide through their published Medicare

Benefits Schedule (MBS). This fee may be refunded to patients who pay out of pocket expenses for visiting a GP in the form of a cash rebate, which is not covered by insurance companies. If the GP is willing to provide the service for the fee outlined in the MBS to a certain patient, they are said to ‘bulk-bill’ that patient, in which case, Medicare sends the schedule fee directly to the GP. This means that the patient pays zero out-of-pocket expenses for visiting the GP.

The MBS is reviewed and indexed from time-to-time according to the Department of Finances Wage Cost Index. This review process was halted for a period from 2013 till mid-2017. This halting is referred to as the MBS indexation freeze (hereafter, the freeze). Doctors who bulk-bill a large proportion of their patients depend on the fee that Medicare pays them directly and doctors who do not bulk-bill can and do price discriminate freely. Thus, we would expect that the freeze will impact bulk-billing doctors differently to non-bulk-billing doctors.

Since bulk-billing is a significant decision that a GP has to make regarding their practice, we would like to investigate how the GP’s decision to bulk-bill effects their job satisfaction. Embedded in this question is whether the freeze has affected bulk-billing doctors and non-bulk-billing doctors differently with respect to job satisfaction, working hours and household income. Trends in job satisfaction show that job satisfaction decreases after the freeze. Possible explanations could be decreasing wages or increasing hours as a result of a halt in real wages for bulk-billing GPs. On the other hand, these effects could be compounded by negative spillovers from doctors who stop bulk-billing and start privately billing, leaving the remaining bulk-billing doctors with an increased workload and declining satisfaction.

The aim of this thesis is to explore the impact of bulk-billing on job satisfaction, particularly in relation to the freeze. The data set we use is the Medicine in Australia – Balancing Employment and Life (MABEL) longitudinal survey. MABEL is a national survey of doctors that has run for 10 waves, beginning in 2008. We exploit this large time horizon, with 5 years either side of the beginning of the freeze. The sample includes over 6000 GPs that allows us to explore the relationship between bulk-billing and job satisfaction with greater validity. We also explore how the freeze has affected satisfaction, household income and hours worked differently for bulk-billing and non-bulk-billing doctors.

We first replicate the results of Joyce, Schurer, Scott, Humphreys, and Kalb (2011) over time and include time-invariant, individual-specific fixed effects. Our key finding is that bulk-billing is a key factor that determines job satisfaction only

after the freeze is introduced once we control for individual fixed effects and other controls. After the freeze, a doctor who bulk-bills 50 percentage points more of their patients will, on average, be 3.55 percentage points less likely to be satisfied with their job. We also find that job satisfaction plateaued after the freeze is introduced. We then look at changes in household income and working hours over time for bulk-billing and non-bulk-billing doctors. We see that household income remains trending upwards and working hours remain trending downwards after the freeze. Surprisingly, we also see that the percentage of patients GPs bulk-bill increases after the freeze.

CHAPTER 2

Literature Review

The literature associated with general practice is varied, as there is disagreement in the importance of job satisfaction for GPs. On one hand, it is substantial, particularly in regards to job-satisfaction. However, regarding decisions affecting GPs, the literature proves to be more scarce. This is the nature of understanding job satisfaction and bulk-billing in the Australian healthcare landscape (Shrestha and Joyce, 2011).

2.1 GENERAL PRACTICE TRENDS

The stylised facts of general practice trends in Australia are summarised in the report by Scott and Taylor (2017). They note that female GPs entering into the labour force have been the largest disruption to size and composition of the GP workforce in the last 20 years, despite working much less than full time (Lachish et al., 2016). The report also covers background information about the health market in Australia, policy context for GPs, size and composition trends of the GP workforce, general practice organisation, the financial health of general practice, bulk billing and out-of-pocket payment trends, job satisfaction, and worklife balance trends and effects.

Those of interest are the policy context for GPs, central to which is the indexation freeze of medicare rebates, bulk billing and out-of-pocket payment trends. Specifically, Scott and Taylor (2017) explore how these have changed over time. They also look at job satisfaction trends and how these are correlated with bulk billing trends.

For the policy context, a key issue is that the current, fee-for-service payment arrangement rewards high-volume but not high-quality or cost-effective health care. Internationally, there has been a trend toward linking healthcare funding to quality and outcome. This has fueled the debate about how the primary care sector can be reformed to deliver improvements to the populations health and access to care whilst also restraining rising healthcare costs. This is one of the intended aims of the indexation freeze and is central to my thesis on how the impact of the policy has affected a key sector of the Australian market.

For bulk billing, Figure 5 of Scott and Taylor (2017) (Figure 1a) shows that the proportion of patients bulk-billed is relatively stable over time despite the indexation freeze. Scott and Taylor (2017) hypothesise that the reason for this is that GPs are maintaining hourly earnings through practice efficiencies, shown in Figure 4 of Scott and Taylor (2017) (Figure 1b). The other reason is that doctors have a fear of losing patients to nearby practices. This could lead to a potential loss in patient revenue which is more than the gain in revenue from higher fees and reduced bulk billing. There is evidence from Gravelle, Scott, Sivey, and Yong (2016) showing that competition helps to keep bulk-billing rates high and restrains growth of out-of-pocket expenses for patients.

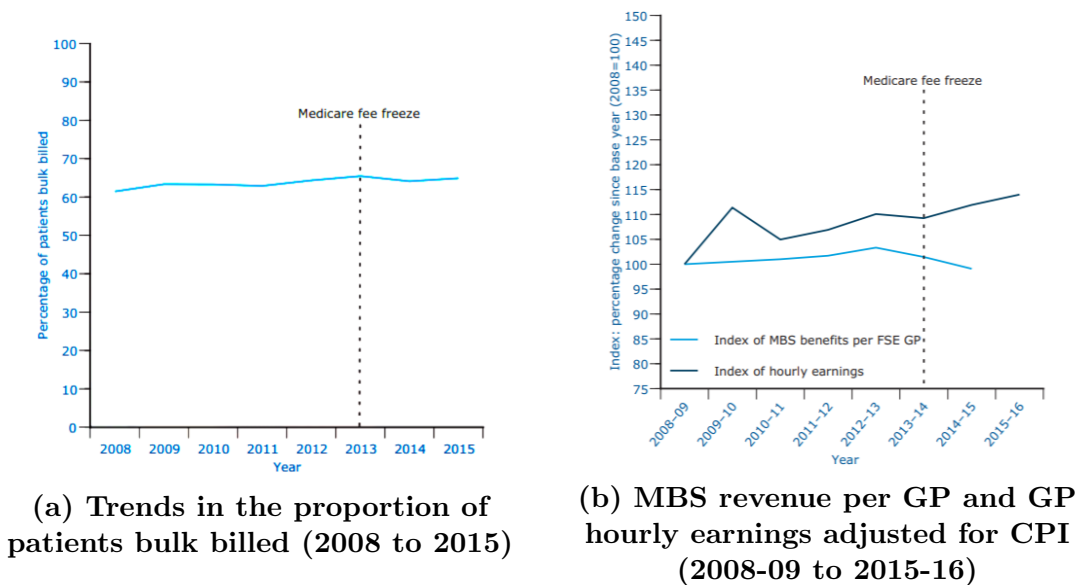


Figure 1: Select figures from Scott and Taylor (2017)

For job satisfaction, we see falling trends in satisfaction since 2013 are concentrated amongst doctors under 45 years of age as well as slight declines for those over 55. This is mirrored in work-life balance, where we see an increasing trend since 2008, but a decline by 1.2 per cent since 2013 when the Medicare indexation freeze was introduced. Scott and Taylor (2017) conclude that although it is not possible to establish causality between the indexation freeze and job satisfaction, an association is prevalent. These trends could point to major issues for general practice in Australia, namely, reducing the attractiveness of general practice as a career choice for junior doctors. This would then compound difficulties in recruitment as well as cause retention issues for older GPs.

2.2 ECONOMICS OF GENERAL PRACTICE

Given the complexity of the topic of general practice, one has to establish the economics behind each aspect of concern for general practitioners. Scott (2000) highlights the differences between general practice arrangements worldwide. He further analyses the GP-Patient relationship as a Principal-Agent problem stating that a prevalent feature of GP agency is that the relationship between the doctor and their patient is usually long term and more likely to be characterised by repeated transactions. He then states that the existence of this long term relationship has implications for patient choice, the nature of competition and the demand for GP services, whilst also asserting that the effect of repeated transactions have not yet been applied to general practice(Scott, 2000).

Looking forward to GP service utilisation, Scott (2000) affirms that the role of GPs as gatekeepers is complemented by the choices of patients, namely, the choice to seek medical care, of which practice to attend, which GP to see and which treatment options to accept. The choice to seek medical care and visit the GP is one alternative in the choice set and the utilisation of GP services have been influenced by access factors (distance and service availability), socioeconomic characteristics, measures of morbidity, age and sex. The choice of practice seems to be driven by doctor-patient relationships rather than practice characteristics indicating that factors other than distance were important in choosing which practice to attend. The choice of general practitioner is based on the patient's perception of the GPs age, sex and interpersonal skills, namely, those related to the doctor-patient relationship. The choice of treatment options is assumed to be exogenously made by the doctor due to informational asymmetry, but there is strong evidence that patients state their preferences to GPs. Although, there is likely considerable variation in patient involvement depending on the condition that the patient presents to the GP.

Scott (2000) then looks at models of GP behaviour, indicating that theoretical models tend to have a basic income-leisure framework; modelling GPs as self-employed individuals supplying their own time and labour rather than strict profit-maximising firms. Looking closer at these models, the main arguments in them include, leisure, consumption of other goods, income, workload, 'ethical constraint', patient welfare, societal welfare, reputation, practice characteristics, autonomy and 'inducement'. Treatment decisions tend to make up the majority of the decision variables in these models, but Scott (2000) notes that this seems to be narrow minded as GPs make many other decisions. One such case is the decision to bulk-bill.

Shifting to explaining variations in patient referrals by GPs, Scott (2000) concludes that the large variation in referrals have been the focus of much analysis and debate. In sum, referral rates vary by factors of three or four between practices and have remained unexplained despite the vast amounts of research. Many use variation in GP referrals to investigate GP decision making.

Scott (2000) also analyses GP incentives by looking at salaries, capitation and fee-for-service. Salary is a fixed payment per unit of time and provides little opportunity to influence specific behaviours, but is administratively simpler. Capitation is a payment for each patient received, independent of service. Each patient can be charged a different amount, which not only provides incentives for GPs to compete but also to cream-skin by picking the healthiest patients. Fee-for-service links income directly to service volume provided and leads to problems controlling expenditures which can be mitigated by fee freezes, though evidence suggests that this also increases volume. Concluding this section, Scott (2000) states that the research has mainly been focussed on incentives for different expenditure based outcomes (such as referrals) rather than on the effects of payment systems on the medical labour market, namely through how they effect job satisfaction and morale. Scott (2000) also asserts the lack of research available on the influence of different payment systems on labour market participation in general practice.

Scott (2000) turns to look at how GPs interact as firms, notably in partnerships and group practice. Models are specified on the trade-off between efficiency and risk spreading by agency models on worker and team behaviour. If income is pooled and shared between cooperating doctors, there is an incentive to free ride, if income is dependent on each physician's output, efficiency is achieved but risk is not shared. Thus, models focus on the extent of risk aversion on determining internal compensation methods and effort of physicians. Scott (2000) finalises his chapter by discussing the effects of vertical integration of GP firms.

2.3 ENDOGENEITY OF BULK BILLING

General practitioners must decide whether to continue to bulk-bill or increase prices to levels that imply patients will incur out-of-pocket fees. This decision means that GPs tend to make a choice based on a variety of demographic characteristics such as competition and prices. Gravelle et al. (2016) constructed a Vickrey-Salop model of GP price and quality competition and determined that proximity to competitors played a role in affecting a GP's decision to bulk-bill.

The model in Gravelle et al. (2016) provides an interesting background on the determinants of bulk-billing. Although it is not comprehensive, it shows that there is some endogeneity that drives a GP's decision to bulk bill, namely the distance between other GP practices. Their model allows for the endogeneity of GP location decisions with measures of area characteristics and area fixed-effects. They assume sufficient variation within areas with the dependent variables and their measure for competition, which allows for the successful estimation of the coefficients of interest. Within areas they have a measure of competition that is GP specific, which is distance to rival GPs. They exploit this variation in three ways; through random area effects, fixed area effects, and Mundlak (1978) models. The data itself shows proof of within-area variations, which allows them to draw interesting conclusions from the empirical results. Their results show that within areas, GPs with more distant competitors charge higher prices and a smaller proportion of their patients make no out-of-pocket payments.

Overall, Gravelle et al. (2016) show that the predictions of their theoretical model are generally supported by the empirical results from their dataset and that there is a relationship between localised competition, measured by the distance between GP practices, and price and quality setting in a market for GP services. Briefly, results show that their preferred measure of competition, that is, distance to third-nearest GP practice, is significantly negatively associated with the proportion of patients who are bulk billed, and is positively associated with the average price to patients who are not bulk billed as well as with the average price to all patients. A one standard deviation (0.975) increase in the log distance to the third nearest GP practice implies a \$0.90 increase in the average gross price and a 3.3 percentage point fall in the number of patients bulk billed. Shifting a GP from the lowest decile of the distribution of distance to third nearest GP (0.29km) to the top decile of the distribution of distance to third nearest GP (3.0km) is associated with \$2.17 increase in the average price and a 7.9 percentage point reduction in the proportion of patients who are bulk billed.

2.4 JOB SATISFACTION

The central question revolves around the effect of the aforementioned bulk-billing decision and this effect on job satisfaction. Joyce et al. (2011) looks at the level and determinants of job satisfaction for all groups of doctors reported in the MABEL survey using part of the baseline cohort in a cross sectional study. The regression model controlled for doctor, job and geographical characteristics in a

logistic regression with interaction terms between doctor type and each independent variables to test various hypotheses that the authors had, (Joyce et al., 2011).

Results show that 85.7% of doctors were moderately or very satisfied with their jobs. There was no difference between satisfaction of GPs, specialists and specialists-in-training whilst the odds of hospital non-specialists being very satisfied was 0.56 compared to GPs. At the 5% level, there was no significant difference in the proportions of men and women who reported being very satisfied and age follows a convex relationship. Family status was insignificantly different from a single doctor for those who had kids or a spouse or both. In summary, the key factors associated with high job satisfaction were realistic patient expectations, good professional support networks, being able to take time off, having family and friends near work, working in a state other than NSW, being younger or closer to retirement, good reported self health, and having a high household income.

These results are also seen over time as Joyce, Wang, and Cheng (2015) highlights. This paper looks at how doctors working hours and satisfaction have changed over the five initial waves of the MABEL survey. It is worthwhile to note that these are prior to the Medicare indexation freeze which was introduced in 2013. They find that working hours significantly declined over the 5 years with greater declines amongst males, older doctors, and doctors with fewer children. Doctor satisfaction increased faster amongst specialists, doctors with poorer health, those whose partners did not work full-time, and those with older children. Intuitively, the more hours the doctor initially worked, the lower satisfaction reported, and thus the greater the increase in satisfaction as the general trend of declining working hours occurred (Joyce et al., 2015).

Ultimately, the literature on general practitioners highlights their importance as gatekeepers for patient access to a wide array of services, as well as how their overall well being is important for labour supply and patient outcomes. Therefore, there are a few potential contributions to be made. First, we contribute by extending Joyce et al. (2011) by replicating their results on job satisfaction in light of the lengthened time span particularly due to the freeze. Also, we contribute by exploring how bulk-billing has affected overall job satisfaction in light of the fee freeze. Finally, we may also contribute by looking at how job satisfaction, household income and hours worked have changed in light of the freeze. We can do this for bulk-billing and non-bulk-billing doctors. A reasonable hypothesis is that the effects of the freeze should have impacted GPs differentially depending on whether they bulk-bill or not.

CHAPTER 3

Policy Environment

3.1 POLICY INTERVENTION

Before we underpin our methodology with an understanding of the theories at work and explain potential outcomes, it is important to have a grasp of the policy intervention involved in this question. Prior to this, an explanation of the Australian healthcare system is worthwhile.

Medicare is a publicly funded universal health care system that ensures that Australian citizens and residents have access to a wide range of medical services, including primary health care, which is provided by GPs. A patient that consults an eligible practitioner, that is, one that has been issued a Medicare provider number, is required to pay for the doctors services based on that GP's self-determined fee. The fee that this eligible GP charges is not regulated and they are free to price discriminate between patients. Johar (2012) shows that they do indeed price discriminate and charge higher income patients more. Medicare then provides a subsidy for the cost of the consultation as determined in the Medicare Benefits Schedule (MBS) to the patient, called the Medicare rebate. As such, the patient is required to pay the excess of the GP fee over the Medicare rebate, called the out-of-pocket expense (or co-payment), which is not covered by insurance companies. However, the GP can choose to 'bulk-bill' a patient, and so accept the Medicare rebate as the full fee for the service such that the excess that the patient is required to pay is zero. In such cases, the GP claims the rebate directly from Medicare. Patients can consult any GP: there is no list system. The MBS is reviewed and indexed from time-to-time according to the Department of Finances Wage Cost Index.

The policy; that is the Medicare Indexation Freeze, was introduced in 2013 as a temporary cost-saving fiscal measure. Initially, the freeze put a temporary halt on the Medicare rebate from indexation for all services in the MBS (Commonwealth of Australia, 2013). However, the policy was made permanent soon after (Commonwealth of Australia, 2014), and in 2016, the policy was extended to 2020. Although the freeze was placed across the board, there has been a phased lifting of the freeze with GP services being lifted in July 2017 onwards. The freeze is expected to cause a

relative income loss of 9.4% , which equates to approximately \$26,300 in the 2019-20 financial year for the average GP, who bills 5,050 consultations a year (Britt, Miller, Henderson, Bayram, Harrison, Valenti, Wong, Gordon, Pollack, Pan, and Charles, 2015). As such, the policy represents a sizeable threat to the GP well being and hence, to their job satisfaction.

3.2 POTENTIAL OUTCOMES

In light of the literature and the freeze, it is important to propose some potential outcomes of job satisfaction. Using our understanding of labour supply, we can say these potential outcomes fall into 2 broad categories. Either job satisfaction will decrease as a result of decreased income or increased working hours, or satisfaction will continue its trend as GPs switch away from bulk-billing. In order to understand these potential effects, we note that as time goes on the effects of the freeze are exacerbated (Harrison, Bayram, Miller, and Britt, 2015). This means that any of the above possibilities can be manifested as doctors modify their work in order to achieve desired outcomes in response to the freeze. Here, the extended time horizon of the data allows us to make a contribution as a lower number of waves would not allow us to see the effects of the freeze. Similarly, longer time frames would complicate the analysis as the freeze is being lifted.

Broadly speaking, labour market supply is determined by individuals supplying their labour to firms for payment, based on the labour-leisure trade-off. GPs operate under this main framework with a few adjustments, namely the payment structure received (Scott, 2000). This means that they are rarely constrained to work for a certain practice as most Australian GPs are paid a fee-for-service (Weel and Mar, 2004). So GPs can theoretically, shift from less favourable conditions in one practice to another practice with better conditions. Aggregate demand for GP services can be assumed to be exogenously set between any given year, particularly in the short term span of the survey.

We can now look at the effect of the indexation freeze on decreased job satisfaction or on-trend job satisfaction. Firstly, we can think about the effect of the indexation freeze on decreased job satisfaction due to decreased income. As the freeze takes effect, GPs who will not choose to work longer hours may decide that they will respond to the freeze by not altering their work choices, which will decrease their real incomes. In Joyce et al. (2011), GP satisfaction increases with higher household income and is significant at conventional significance levels. Although we should observe an effect of the freeze on income, this may not come to fruition until the last few years of the freeze. Scott and Taylor (2017) note why this may be the

case, stating that GPs are maintaining hourly earnings through practice efficiencies. Despite this, we would expect an effect of the freeze on household income, which should then lead to decreased job-satisfaction.

Next, the freeze may result in lower real income per service provided. This would mean that practitioners would need to provide more services in order to maintain their prior income levels. The effect of increased working hours on satisfaction is well documented with Joyce et al. (2011) indicating that GPs are less likely to be satisfied with their job if they work more than 55 hours a week. Hence, the rationale is simple, as the freeze decreases real income, doctors will realise their need to work longer hours to counteract against their falling income, and so, will respond by working more hours, which in turn, decreases overall job satisfaction.

Furthermore, the freeze may result in on-trend job satisfaction as GPs move to a non-bulk-billing practice or start charging patients an out-of-pocket fee in their current practice. This is the least likely scenario out of the three as evidence suggests that GPs will keep bulk-billing if there is a high enough level of competition (Gravelle et al., 2016). Despite this, we might expect GPs to reduce the percentage of patients that they bulk-bill in order to maintain their prior income whilst simultaneously working the same hours. We would expect that these non-bulk-billing doctors are much more satisfied with their jobs than their bulk-billing counterparts.

Short term outcomes on GP well being are not the only potential consequences of the indexation freeze. In the long term, we suspect that the freeze will cause the benefits of switching away from bulk-billing to outweigh the costs. This will lead to less healthcare accessibility for patients with a low socioeconomic status who may not be able to afford the co-payment. Further, as new doctors are trained and enter into the workforce, they may not be as satisfied since they expected to provide healthcare to those who can not afford it. We may also suspect that GPs may not fulfil their role as gatekeepers into the healthcare market. This is because poorer patients will have to access healthcare through Public Hospital Emergency Departments, meaning that the cost of these patients entering into the market is relatively high for the governments to bear.

Furthermore, we would expect long term effects from non-bulk-billing doctors on those that do bulk-bill with higher social pressures and decreased lobbying support for bulk-billing doctors. This will likely have subsequent effects that may be irreversible since it will be harder to incite GPs to provide low-cost care.

Finally, we may also observe the long-term effects of the policy on labour supply for GPs and shed insight into formal models of this labour supply by studying a mechanism that changes this supply, namely; the freeze. The effects on labour supply might be a result of changed prices or hours, but could also be affected by low job satisfaction. This is particularly evident in the model formulated by Kalb, Kuehnle, Scott, Cheng, and Jeon (2018), which show the effects of wages on physician supply and highlight the negative wage elasticities present. As Scott (2000) highlights, health labour supply models usually use a combination of variables as arguments, inclusive of, leisure, income, workload and patient welfare. The findings of this thesis may shed light about the increased importance of job satisfaction for labour supply models.

CHAPTER 4

Data

4.1 SAMPLE

The data used is the Medicine in Australia: Balancing Employment and Life (MABEL) longitudinal survey, which is a helpful tool in answering the research question about the effect of bulk-billing on job satisfaction. The data aims to investigate factors influencing workforce participation, labour supply, speciality choice and doctor mobility. The survey has been running since 2008 and so, has released 10 waves of panel data. Wave 1 consisted of 10,498 doctors, of which 3,873 were GPs, 4,310 were Specialists and 2,315 hospital non-specialists and specialists-in-training. The data places emphasis on healthcare from the perspective of the practitioner and looks at metrics of job satisfaction and bulk-billing rates. Doctors were recruited for the initial wave from the Medical Directory of Australia by AMPCo and have been topped up every wave to account for attrition. Doctors participated through either a secure online portal or through a mail survey. In order to maximise response rate, doctors from remote areas were given an honorarium of \$50. The survey was given approval by the University of Melbourne’s Faculty of Economics and Commerce Human Ethics Advisory Group and the Monash University’s Standing Committee on Ethics in Research Involving Humans (Yan, Cheng, Scott, Joyce, Humphreys, Kalb, and Leahy, 2011).

For this thesis, only variables that were relevant to GPs were kept, while the others were dropped. These were identified using table 20 of the publicly accessible ‘MABEL User Manual’ (Szawlowski, Taylor, Scott, and Leahy, 2018).

4.2 VARIABLES

The key outcome variables of interest for this thesis are overall job satisfaction, total hours worked per week and gross annual household earnings with the key control variable being bulk-billing percentage. The other controls are gender, age, family status (which include having a partner or children), self-assessed health, poor support network of similar doctors, difficulty to take time off work, whether they do on-call work, basic medical school degree location, patient expectations, social status in their work location, work-region classification and binary year variables to help identify the effects of the freeze.

Several issues were raised with respect to sample selection. Firstly, observations were dropped due to incoherence, including incorrect coding of key variables such as those outside the scope of Table 11 of the user manual (Szawlowski et al., 2018) and the values that the variables could take. Secondly, missing value conventions from Szawlowski et al. (2018) were re-coded to missing so that statistical analysis could be conducted. All administrative surveys were dropped, which include all responses from the survey managers response sheet and sampling pool. Observations with over 120 hours were dropped, which corresponds to 17 hours a day. In total 758 observations were dropped, of which, 723 were administrative surveys. All aforementioned summary statistics are in Table 1 below.

Table 1: Summary Statistics

	Mean	Std. Dev.	Min	Max
Overall job satisfaction ¹	3.219	0.848	0	4
Work-Life balance satisfaction ¹	2.384	1.092	0	4
Annual household income	264310	177405	0	2812500
Hours worked per week	36.491	15.703	0	120
Bulk-Billing percentage	62.854	31.353	0	100
Gender ²	0.512	0.500	0	1
Age ³	4.468	2.285	1	9
Family status: living with partner	0.860	0.347	0	1
Family status: number of children	1.224	1.162	0	3
Self-Assessed health ⁴	1.024	0.957	0	4
Poor support network of similar doctors ¹	1.615	1.096	0	4
Difficult to take time off work ¹	1.725	1.199	0	4
Doing on-call work	0.400	0.490	0	1
Degree obtained outside Australia	0.221	0.415	0	1
Patients have unrealistic expectations ¹	2.057	0.999	0	4
Few friends and family locally ¹	1.523	1.299	0	4
ASGC remoteness area ⁵	1.535	0.749	1	3
Year of survey completion	2012.358	2.910	2008	2017
Total Observations				34169

¹ 0 = Very Dissatisfied, 1 = Dissatisfied, 2 = Not Sure, 3 = Satisfied, 4 = Very Satisfied

² 1 = Female

³ 1 = 'Under 35' then 5-year age bands until 9 = 'above 70'

⁴ 0 = Excellent, 1 = Very good, 2 = Good, 3 = Fair, 4 = Poor

⁵ 1 = Major City, 2 = Inner Regional, 3 = Outer Regional, Remote and Very Remote

In the MABEL survey, participants rate their satisfaction across several intrinsic and extrinsic components of working as a doctor. Participants rank themselves on a five-point Likert scale from “very dissatisfied” having a value of 0 to “very satisfied” having a value of 4. From Table 1 and Figure 7, most doctors are moderately satisfied or very satisfied with their jobs and so it seemed appropriate to convert overall job satisfaction into a binary variable with very satisfied being equal to one and zero otherwise. This also follows the convention of Joyce et al. (2011).

Appropriate controls were determined using Joyce et al. (2011) as a baseline and then ensuring that we control for only time varying characteristics in our fixed-effects model. These would include all variables mentioned above except for gender and age, which has one group for ‘under 35, and then 5-year age bands and top-coded at 70+. This was transformed to reflect the mean value of their bins. For example the 35-39 bin is recoded from a value of 2, to that of 37. A log transformation of annual household income was chosen for interpretative purposes with zero observations being converted to 1 prior to log transforming. There were no variables with a value of 1 that would over-exaggerate the mass of zero observations of household income. The two measures of family status, whether the GP lived with a partner or not and the number of kids they had was made into a single family status measure which combined these outcomes into the person being single with no kids, being a single parent, having a partner with no kids, and having a partner and kids. The last two categories of self assessed health were combined into a single category due to having a small number of observations. The variables “poor support network of similar doctors”, “difficult to take time off work”, “patients have unrealistic expectations” and “few friends and family locally” are also five-point Likert scale measures coded like our satisfaction measures. But these variables were transformed into three-point measures with strongly agreeing or strongly disagreeing with the statement being combined with the milder agree or disagree measure, with neutral remaining as it is. This is due to the convention of Joyce et al. (2011).

A full summary of the variables is in Appendix A. The final sample has 13,141 observations before the freeze for 4,893 distinct GPs and 11,687 observations after the freeze for 4,769 distinct GPs with a total number of 34,169 observations and 8021 distinct GPs.

Methodologically, we will first run Joyce et al. (2011) with individual and year fixed effects. This will help to see the robustness of Joyce et al. (2011) over time and accounting for fixed effects.

The main findings link into a few related models. Firstly, we run a regression using ordinary least squares estimation of my binary measure of job satisfaction on bulk-billing, without controls or individual fixed effects, both before and after the freeze. Secondly, we run the same model as the first, but account for individual fixed effects without adding in the other controls. Then, we run a third model controlling for time-invariant factors and individual fixed effects. This method means we will employ a more flexible version of a Difference-in-Differences model. This model will allow all the point estimates for my controls to change whilst also calculating the difference between GPs who bulk-bill and those who do not, both before and after the freeze.

Finally, we also look at the effect of the freeze on household income and working hours for bulk-billing and non-bulk-billing doctors.

CHAPTER 5

Estimation

5.1 MODIFYING JOYCE ET. AL. 2011

In order to understand the broad strokes of how bulk-billing may affect job-satisfaction, it seemed worthwhile to replicate how Joyce et al. (2011) find the determinants of job satisfaction for GPs. Generally speaking, the model that Joyce et al. (2011) uses is a logistic regression with the same binary overall job satisfaction that we have specified in the previous section. They include doctor type as a categorical explanatory variable to test if job satisfaction is different between doctor types. They use Wald tests of joint significance for each set of coefficients relating to each categorical or continuous variable to assess whether the variable was associated with job satisfaction. Below is a brief equation of their model.

$$\frac{\text{Prob}(\text{Job Satisfaction}=1)}{1 - \text{Prob}(\text{Job Satisfaction}=1)} = \exp(\alpha_0 + \alpha_1 \text{Doctor Type} + \alpha_2 \text{Job Characteristics} + \alpha_3 \text{Geographical Factors} + \alpha_4 \text{Doctor Characteristics})$$

The result of their cross-sectional study are in Table 2 below with coefficients rather than odds ratios. This is done using our data rather than the dataset used in Joyce et al. (2011) which means doctor type was not included.

In our modification, we have included individual and year fixed effects to Joyce et al. (2011) model to help with controlling for time-invariant variables like age and gender, as well as to see the effect of the freeze in the year fixed effects. Hence the model is,

$$\text{Job Satisfaction}_{it} = \alpha_i + \beta \text{Controls}_{it} + \gamma \text{Year Dummies} + u_{it}$$

where, Job Satisfaction is the binary measure used by Joyce et al. (2011) and α_i is the unobserved time-invariant individual effect for person i . The controls are the time varying controls that Joyce et al. (2011) uses, γ is a vector of coefficients where each signifies the change in job satisfaction in a certain year over the base year of 2012 and u_{it} is the error term.

Table 2: Joyce et. al. (2011) with Individual and Year Fixed Effects

Overall Job Satisfaction	2008 Cohort	Fixed Effects
Doctor Characteristics		
Female	0.0272 (0.0189)	
Age	-0.0232*** (0.00660)	
Age square	0.000279*** (0.0000668)	
Family status (reference: single)		
Partner, no children	0.00167 (0.0334)	-0.0247 (0.0187)
Children, no partner	0.00607 (0.0434)	-0.0508** (0.0233)
Partner & children	0.00592 (0.0302)	-0.0278 (0.0187)
Self-assessed health (reference: excellent)		
Very good	-0.0653*** (0.0206)	-0.0463*** (0.00890)
Satisfactory	-0.152*** (0.0228)	-0.0920*** (0.0121)
Bad or poor	-0.167*** (0.0270)	-0.108*** (0.0164)
Annual household income	0.00504 (0.00972)	0.00577 (0.00526)
Degree obtained outside Australia (yes=1)	0.0234 (0.0212)	-0.0103 (0.0720)
Job Characteristics		
Poor support network of similar doctors (reference: neutral)		
Disagree	0.0700*** (0.0219)	0.0472*** (0.00845)
Agree	-0.0318 (0.0222)	-0.0228** (0.00920)
Difficult to take time off work (reference: neutral)		
Disagree	0.0708*** (0.0254)	0.0403*** (0.00927)
Agree	0.00801 (0.0252)	-0.0312*** (0.00984)

Hours worked per week (reference: 35-54)

≤ 35	0.0171 (0.0206)	0.0376*** (0.00982)
55-59	-0.0137 (0.0320)	-0.0344** (0.0139)
≥ 60	-0.0138 (0.0262)	-0.0289** (0.0132)
Doing on-call work (yes=1)	0.0115 (0.0176)	0.00153 (0.00904)

Patients have unrealistic expectations (reference: neutral)

Disagree	0.148*** (0.0228)	0.0253*** (0.00844)
Agree	-0.0967*** (0.0199)	-0.0550*** (0.00782)

Geographic Characteristics**Few friends and family locally (reference: neutral)**

Disagree	0.0698*** (0.0260)	0.0387*** (0.00999)
Agree	-0.00413 (0.0274)	0.00574 (0.0105)

ASGC remoteness area (reference: major city)

Inner regional	0.0178 (0.0213)	-0.00117 (0.0198)
Outer regional, remote and very remote	0.0388 (0.0239)	0.0429* (0.0235)

Year fixed effects (base=2012)

2008		-0.0685*** (0.0113)
2009		-0.0336*** (0.0111)
2010		-0.0248** (0.0108)
2011		-0.0358*** (0.0105)
2013		0.00754 (0.0109)
2014		0.00897 (0.0111)

2015		0.00775 (0.0113)
2016		-0.00865 (0.0116)
2017		-0.00928 (0.0121)
Constant	0.623*** (0.194)	0.348*** (0.0704)
Observations	3007	25534
Distinct GPs	3007	6886
σ_u		0.380
σ_e		0.362
ρ		0.524

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results we have obtained from our dataset, do not differ substantially from the results from Joyce et al. (2011). The exception to this is our reported insignificance of annual household income, which Joyce et al. (2011) finds is a significant determinant of satisfaction with the GPs odds of reporting being very satisfied is 1.36.

Doctor characteristics, beginning with gender has an insignificant effect on Job satisfaction which mirror the results of Joyce et al. (2011). Age has a convex relationship with the turning point occurring at approximately 42 years of age. Family status, follows the reverse trend to Joyce et al. (2011) when we include individual fixed effects, with having children, but no partner having a strong negative effect on job satisfaction compared to the reference of being single. It seems that the effect of having children has resulted in doctors being less satisfied when controlling for GP and year fixed effects, potentially because these doctors have to work longer to provide for their kids. Self-assessed health is strongly significant and negative compared to the reference group of doctors who self-reported excellent health, following the results of Joyce et al. (2011). A one percentage point increase in annual household income results in a significant 1.9 percentage point increase in job satisfaction. Having a foreign degree does not significantly affect job satisfaction.

In regards to job characteristics, having a support network of like-minded doctors and being able to take time off contribute significantly to reporting higher overall job-satisfaction. The converse characteristics of not having a support network of

like-minded doctors and being unable to take time off contribute to reporting lower overall job-satisfaction at the 10% and 5% significance level. In contrast to Joyce et al. (2011), working hours significantly affects job satisfaction, with lower hours contributing positively and higher hours contributing negatively. Similar to Joyce et al. (2011) findings, doing on call work does not significantly affect job satisfaction. Patient expectations have the same effect as in Joyce et al. (2011), with realistic expectations having a 5.8 percentage point increase in reporting being very satisfied with the job compared to those who reported neutrally. Unrealistic expectations decrease the probability of reporting high job satisfaction by 7.6 percentage points compared to those who reported neutrally.

Moving on to geographical factors, having friends and family in the GP's current work location significantly results in high job satisfaction whereas not having many friends and family in the GPs current work location does not have a significant effect. The ASGC classification for where the GP works also differs from Joyce et al. (2011) findings with doctors who work in regional and remote areas reporting significantly higher job satisfaction compared to their 'city-slicking' counterparts. This is potentially confounded by the fact that Joyce et al. (2011) controlled for state fixed effects and found that living in New South Wales was a significant factor causing a strong negative effect on job satisfaction. However, these variables were not included in the public version of the dataset we obtained.

Finally we can look at the added benefits of running a fixed effects regression model, which include σ_u , σ_e and ρ . The coefficient σ_u is defined as the standard deviation of the residuals within each individual across the panels and is 0.267. The coefficient σ_e is defined as the standard deviation of the residuals overall and is 0.362. The coefficient ρ is defined as the proportion of variation due to differences across panels and is 35.2%.

To summarise, Joyce et al. (2011) findings that the key factors that are associated with high job satisfaction involve doctor characteristics, job characteristics and geographical factors. For the doctor characteristics, these are particular family status, good self-reported health and high household income show a significant association. Job characteristics that show this correlation are good professional support networks, being able to take time off, number of working hours as well as realistic patient expectations. The geographical factors are whether the GP is surrounded by friends and family in their current work location and working outside of a major city.

5.2 ADDING BULK-BILLING AS AN EXPLANATORY VARIABLE

5.2.1 BASELINE AND INDIVIDUAL FIXED EFFECTS MODELS

In order to isolate the effect of bulk-billing with respect to the freeze, we ran an ordinary least squares regression of job satisfaction with bulk-billing percentage being the sole explanatory variable. This was done for both before and after the freeze to isolate the raw correlation between bulk-billing percentage and job satisfaction in response to the policy. This is the no fixed effects model. Individual fixed effects were then added to the model to see how that would change the estimates of the association between bulk-billing percentage and job satisfaction. This meant we could control for time-invariant individual characteristics. Again, we analysed the models separately with respect to whether the freeze was in place or not. This is our fixed effects model. The results of both of these models are in Table 3 below.

Table 3: OLS Regression of Job Satisfaction on Bulk-Billing Percentage

Overall Job Satisfaction	No Fixed Effects		Fixed Effects	
	Before	After	Before	After
Bulk-Billing Percentage	-0.000718*** (0.000120)	-0.000996*** (0.000131)	-0.000240 (0.000252)	-0.000780*** (0.000257)
Constant	0.419*** (0.00832)	0.492*** (0.00945)	0.390*** (0.0154)	0.478*** (0.0166)
Observations	16696	14753	16696	14753
Distinct GPs	5547	5486	5547	5486
σ_u	-	-	0.409	0.427
σ_e	-	-	0.354	0.359
ρ	-	-	0.572	0.586

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As is clear, both before and after the freeze, the results show that there is a significant correlation between bulk-billing and overall job satisfaction both before and after the freeze. It also shows that the higher the bulk-billing percentage of the GP, the less probability they report being very satisfied with their job.

Interestingly, we see that when controlling for individual fixed effects the effect of bulk-billing percentage before the freeze has now becomes much smaller and insignificant after we control for individual fixed effects. The effect of bulk-billing percentage after the freeze has decreased in magnitude from -0.000996 in the simple

regression model to -0.000780 in the model that includes individual fixed effects. It is still significant showing that, bulk-billing has a significant association with overall job satisfaction when the freeze is in place.

The standard deviation of the residuals within each individual across the panels is 0.409 before the freeze and 0.427 after. The standard deviation of the residuals overall is 0.354 before the freeze and 0.359 after. The proportion of variation due to differences across panels and is 57.2% before the freeze and 58.6% after.

5.2.2 INDIVIDUAL FIXED EFFECTS AND CONTROLS MODEL

Our main model is one that adds in the controls used in Joyce et al. (2011) uses and considers the effects of the freeze on GPs. The model is,

$$\text{Job Satisfaction}_{ijt} = \alpha_{ij} + \beta_j \text{Controls}_{ijt} + \lambda_j \text{Bulk Billing} + \gamma_j \text{Year Dummies} + u_{ijt}$$

where, Job Satisfaction is the same binary measure used above and α_{ij} is the unobserved time-invariant individual effect for person i in state j (before or after the freeze). The controls are the time varying controls that Joyce et al. (2011) uses, γ is a vector of that each signifies the change in job satisfaction in a certain year over the base year of 2008 for before the freeze, 2013 for after the freeze and u_{ijt} is the overall error term in state j .

The results for this model are in Table 4 below.

The variable of main concern, bulk-billing percentage, remains similar to Table 3, with a negative effect of around -0.00071, albeit less significant than Table 3. An interesting note is that the effect of bulk-billing is decreasing as we control for more variables. Practically, these results show that if a GP bulk-bills 50 percentage points more of their patients, they will be 3.55 percentage points less likely to report being very satisfied with their job. It is important to note here that a causal interpretation of this result would require bulk-billing to be considered exogenous after controlling for individual fixed effects and other time varying covariates. This causal interpretation is threatened to the extent that these controls are not sufficient and that bulk-billing is in fact, endogenous. Clearly, doctors choose whether they bulk-bill or not and so this endogeneity threat is real. Nonetheless, the freeze, teases out the true effect, while fixed effects and the other controls reduce our concerns about the endogeneity of bulk-billing.

The year fixed effects in the period before the freeze show us that overall job

satisfaction was trending upwards with a 6.39 percentage point increased likelihood to report being very satisfied in 2012 compared to 2008. This was until the freeze took effect when job satisfaction plateaued and then started to decrease with 2016 and 2017 showing a decreasing amount of satisfaction compared to the base year of 2013, when the freeze took effect. This decline was significant in the latter years of the freeze with an approximately 2.66 percentage point decreased likelihood to report being very satisfied in 2016 and 2017 compared to the base year of 2013.

Table 4: Job Satisfaction with Individual Fixed Effects and Controls

Overall Job Satisfaction	Before	After
Bulk-Billing percentage	-0.000127 (0.000287)	-0.000711** (0.000294)
Year fixed effects (Base=2008,2013)		
2009, 2014	0.0317*** (0.0103)	-0.00442 (0.0121)
2010, 2015	0.0410*** (0.0110)	-0.00679 (0.0126)
2011, 2016	0.0317*** (0.0115)	-0.0266** (0.0130)
2012, 2017	0.0639*** (0.0123)	-0.0265* (0.0138)
Doctor Characteristics		
Family status (reference: single)		
Partner, no children	-0.0423 (0.0287)	-0.0142 (0.0349)
Children, no partner	-0.0940*** (0.0331)	-0.00758 (0.0435)
Partner & children	-0.0569* (0.0293)	-0.0236 (0.0355)
Self-assessed health (reference: excellent)		
Very good	-0.0297** (0.0135)	-0.0570*** (0.0144)
Satisfactory	-0.0684*** (0.0179)	-0.104*** (0.0197)
Bad or poor	-0.0778*** (0.0237)	-0.124*** (0.0282)
Annual household income	-0.00140 (0.0110)	0.0247* (0.0137)
Degree obtained	-0.0731	-0.0535

outside Australia (yes=1)	(0.106)	(0.119)
Job Characteristics		
Poor support network of similar doctors (reference: neutral)		
Disagree	0.0437*** (0.0115)	0.0506*** (0.0139)
Agree	-0.0256** (0.0128)	-0.00886 (0.0152)
Difficult to take time off work (reference: neutral)		
Disagree	0.0393*** (0.0136)	0.0219 (0.0147)
Agree	-0.0215 (0.0141)	-0.0565*** (0.0165)
Hours worked per week (reference: 35-54)		
≤ 35	0.0360** (0.0156)	0.0322** (0.0159)
55-59	-0.0363* (0.0189)	-0.0450* (0.0250)
≥ 60	-0.0314* (0.0182)	-0.0243 (0.0239)
Doing on-call work (yes=1)	-0.0149 (0.0130)	0.0175 (0.0167)
Patients have unrealistic expectations (reference: neutral)		
Disagree	0.0332*** (0.0125)	0.00850 (0.0132)
Agree	-0.0635*** (0.0115)	-0.0377*** (0.0132)
Geographic Characteristics		
Few friends and family locally (reference: neutral)		
Disagree	0.0312** (0.0149)	0.0410*** (0.0156)
Agree	-0.00215 (0.0155)	0.0210 (0.0165)
ASGC remoteness area (reference: major city)		
Inner regional	-0.0321 (0.0332)	0.0268 (0.0374)
Outer regional, remote and very remote	0.0402 (0.0459)	0.102** (0.0398)
Constant	0.427***	0.172

	(0.139)	(0.175)
Observations	13141	11687
σ_u	0.393	0.410
σ_e	0.349	0.354
ρ	0.559	0.572

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Although certain family status variables are significant before the freeze, these effects dissipate after the freeze is implemented. Self-assessed health remains significant regardless of whether the freeze is in place or not. But notice that the effects are larger when the freeze is in place. It moves in the expected direction with worsened self-assessed health leading to GPs being less likely to report being very satisfied with their job. For example, someone with poor self-assessed health before the freeze would be 7.8 percentage points less likely to report being very satisfied with their work compared to someone who reported excellent health. This is contrasted to after the freeze where the negative effect increases in magnitude to 12.4 percentage points. Household income becomes significant at the 10% level during the freeze with a one percentage point increase in annual household income resulting in a 2.47 percentage point increased likelihood of reporting being very satisfied with one's overall job and is not significant prior to the freeze. Having a foreign degree does not significantly contribute to doctors satisfaction.

Continuing down to job characteristics we observe that having a support network of similar doctors affects job satisfaction before and after the freeze in a significantly positive way with a 4.37 percentage point increased likelihood to report being very satisfied before the freeze and 5.06 percentage points after. On the other hand, a poor support network is only associated with decreased likelihood of a GP reporting being very satisfied with their job before the freeze. Being able to take time off work is only significant in the period before the freeze. Contrastingly, being unable to take time off work only affects the GPs overall job satisfaction after the freeze with the effect being a 5.65 percentage point decreased likelihood to report being very satisfied. This may be due to the freeze increasing the opportunity cost of taking time off for GPs. The amount a doctor works is significant if the doctor works fewer hours compared to the base work amount of 35-54 hours. Working between 55-59 hours per week significantly decreased likelihood to report being very satisfied with a larger magnitude of 4.5 percentage points after the freeze compared to 3.63 percentage points before the freeze. Working very long hours effects GP

satisfaction before the freeze at the 10% level but, interestingly, has no effect after the freeze. Doing on call work does not significantly contribute to doctors satisfaction. Having realistic patient expectations seems to have an effect only before the freeze. Unrealistic expectations decrease the probability of reporting high job satisfaction by 6.3 percentage points before the freeze compared to those who reported neutrally, whereas this effect is smaller and only decreases this probability by 3.8 percentage points after the freeze.

Geographical factors, such as having friends and family in the current work location of the GP significantly results in high job satisfaction whereas not having many friends and family in the GPs current work location does not have a strong effect. This positive effect is exacerbated by the freeze, where the effect is larger and more significant with those who disagree with the statement after the freeze, 4.1 percentage points more likely to report being very satisfied compared to 3.1 percentage points before the freeze. The effect of ASGC classification has changed significantly from Table 2 where only those working in outer regional and remote areas significantly being more likely to report being very satisfied with their job overall by 10.2 percentage points compared to major city GPs after the freeze.

The standard deviation of the residuals within each individual across the panels is 0.393 before the freeze and 0.410 after. The standard deviation of the residuals overall is 0.349 before the freeze and 0.354 after. The proportion of variation due to differences across panels and is 55.9% before the freeze and 57.2% after.

These results are fairly robust. Specifically, we changed the model specification to a traditional difference-in-differences, used the ordinal measure of job satisfaction, changed bulk-billing to a binary variable, checked for attrition bias and used alternative measures of satisfaction. For details of the robustness tests we conducted, see Appendix B. We also check to see whether bulk-billing disproportionately affects one gender over another. Our findings show that bulk billing is a much more significant determinant of job satisfaction for women than men after the freeze.

5.3 REVISITING POTENTIAL OUTCOMES

In section 3.2 we explored some of the potential outcomes that may have occurred as a result of the indexation freeze. Now we see whether these outcomes did in fact manifest themselves in the data. We look at the effect of the freeze on log-transformed household income and hours worked by using the year dummies and comparing the years before the freeze (2008-2012) to those after (2013-2017). Unlike the previous analysis, here bulk-billing is converted into a binary variable, where a

bulk-billing doctor is defined as one who bulk-bills at least 50% of their patients. On average, the trend for overall job satisfaction is Figure 2. These support our result found in Table 4. The trend for log-transformed household income is Figure 3 and the trend for hours worked is Figure 4

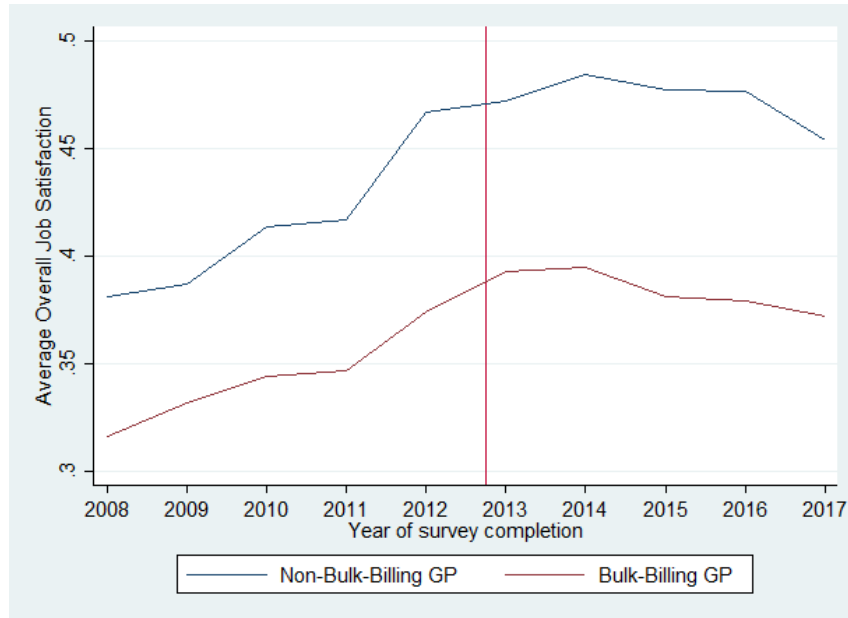


Figure 2: Average time trend of overall job satisfaction

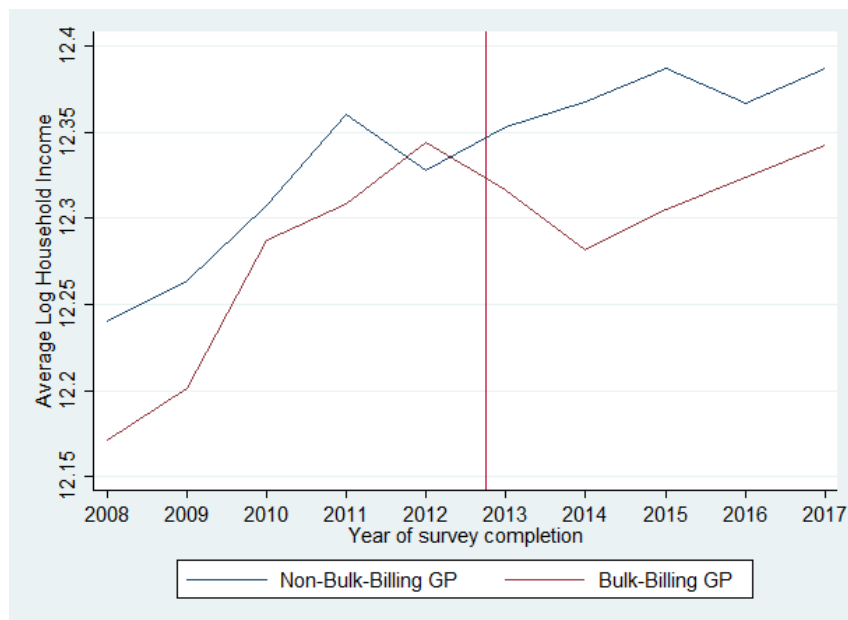


Figure 3: Average time trend of log-transformed household income

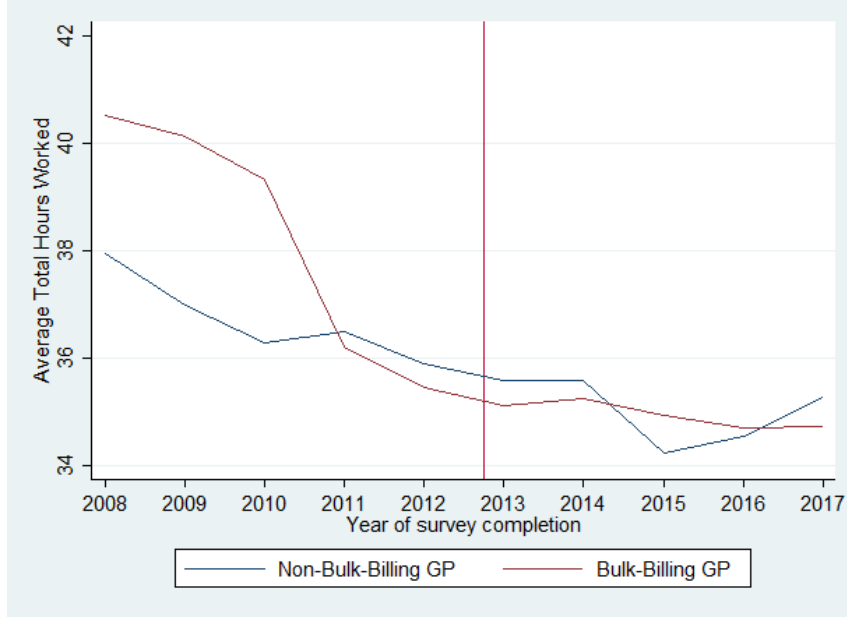


Figure 4: Average time trend of hours worked

In order to see how these overall patterns change when introducing controls, we estimate the following model,

$$\text{Outcomes}_{ijt} = \alpha_{ij} + \beta_j \text{Controls}_{ijt} + \gamma_j \text{Year Dummies} + u_{ijt}$$

where, the outcomes are job satisfaction, log household income or hours worked and α_{ij} is the unobserved time-invariant individual effect for person i of type j (bulk-billing or non-bulk-billing). The controls are the time varying controls that Joyce et al. (2011) uses, γ is a vector of parameters that each signifies the change in job satisfaction in a certain year over the base year of 2012 for after and u_{ijt} is the overall error term of type j .

The results for this model are in Table 5 below.

We observe that for both bulk-billing and non-bulk-billing GPs, log-transformed household income was increasing prior to the freeze, and significantly so. For bulk-billing doctors, income in 2012 was 17.3 percentage points higher than it was in 2008. Similarly for non-bulk-billing doctors, income in 2012 was 12.6 percentage points higher than it was in 2008. It seems that bulk-billing GPs had faster growing household income than non-bulk-billing GPs. This general upward trend continued after the freeze, but was characterised with faster growth in household income for non-bulk-billing GPs as bulk-billing GP income growth grew much slower. This is likely to be a direct result of the fact that the freeze disproportionately affects bulk-billing GPs. This is broadly consistent with the trends seen in Figure 3.

Continuing with hours worked, we see that before the freeze, bulk-billing GPs were working significantly higher hours with their hours decreasing by 1.48 hours a week in 2012 compared to 2008. This trend was not followed by non-bulk-billing doctors who experienced statistically no change in hours worked prior to the freeze. Following the freeze, we see that the decreasing trend for bulk-billing GPs continued with a further decrease of 1.68 hours a week in 2017 compared to 2012. This trend was mimicked by non-bulk-billing GPs who also decreased working hours albeit less than bulk-billing GPs. On average, non-bulk-billing GPs worked 1.55 less hours in 2017 compared to 2012. These findings are broadly consistent with the trends seen in Figure 4.

Although it may be worthwhile to check for the significance of the difference between bulk-billing and non-bulk-billing doctors using a joint estimation model, this does not seem necessary as we are trying to see the trends for bulk-billing and non-bulk-billing doctors separately.

Table 5: Effects of the freeze on satisfaction, household income and hours worked

	Log Household Income		Hours Worked	
	Bulk-Billing	Non-Bulk-Billing	Bulk-Billing	Non-Bulk-Billing
Year fixed effects (base=2012)				
2008	-0.173***	-0.126***	1.480***	0.654
2009	-0.139***	-0.111***	1.085***	0.269
2010	-0.0758***	-0.0807***	0.732***	0.0821
2011	-0.0344**	-0.0186	0.630***	0.341
2013	0.0159	0.0264	-0.311	-0.244
2014	-0.0169	0.0652***	-0.777***	-0.824**
2015	0.0400*	0.0847***	-1.607***	-1.325***
2016	0.0506**	0.0951***	-1.615***	-1.602***
2017	0.0659***	0.111***	-1.680***	-1.554***
Observations	18413	7121	18133	7022
Distinct GPs	5779	2660	5745	2639
σ_u	0.754	0.716	12.01	13.02
σ_e	0.574	0.419	7.302	6.493
ρ	0.634	0.745	0.730	0.801

For detailed results see Table 14

*** p<0.01, ** p<0.05, * p<0.1

The other potential outcome could be that the freeze leads to bulk-billing declining so that GPs maintain on-trend job satisfaction. We can check for this with the model below and again, looking at the year dummies,

$$\text{Bulk-Billing}_{it} = \alpha_i + \beta \text{Controls}_{it} + \gamma \text{Year Dummies} + u_{it}$$

where, α_i is the unobserved time-invariant individual effect for person i . The controls are the time varying controls that Joyce et al. (2011) uses, γ is a vector of coefficients where each signifies the change in job satisfaction in a certain year over the base year of 2012 and u_{it} is the overall error term.

On average, the time trend is in Figure 5

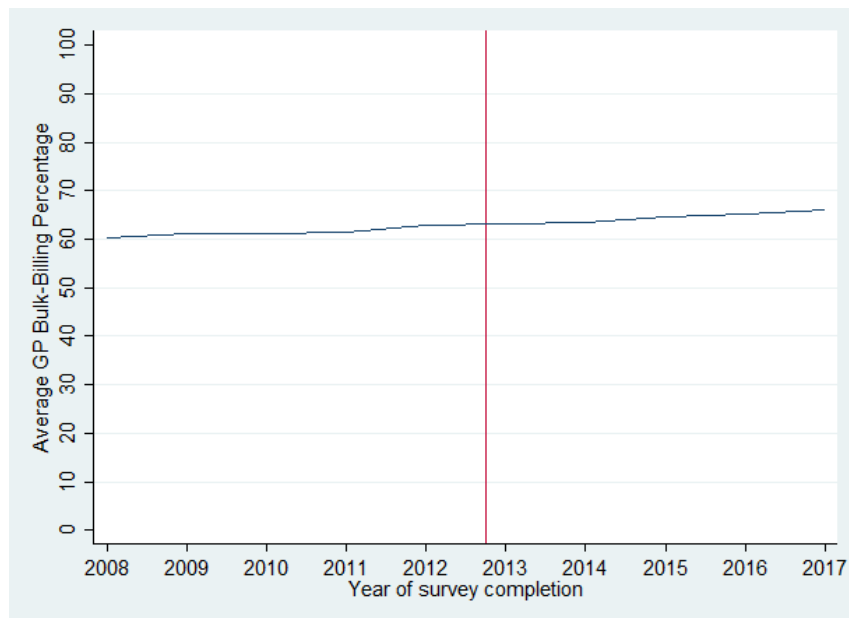


Figure 5: Average time trend of bulk-billing percentage

The results for the model above are in Table 6 below.

Contrary to expectations, we see that bulk-billing percentages are significantly increasing compared to 2012 with an increase by 2.04 percentage points before the freeze. This continued after the freeze, with a steep increase in 2016 by 2.51 percentage points compared to 2012. This trend dropped in 2017 with a slight decline to 1.86 percentage points higher than 2012 levels.

Table 6: Effects of the freeze on satisfaction, household income and hours worked

Bulk-Billing Percentage	
Year Fixed Effects (base=2012)	
2008	-2.040***
2009	-1.938***
2010	-1.878***
2011	-1.222***
2013	0.331
2014	0.698
2015	2.235***
2016	2.513***
2017	1.859***
Observations	24867
Distinct GPs	6789
σ_u	28.45
σ_e	16.34
ρ	0.752
For detailed results see Table 15	
*** p<0.01, ** p<0.05, * p<0.1	

CHAPTER 6

Discussion

6.1 MECHANISMS

In the last chapter, we found that bulk-billing is a significant factor affecting job satisfaction only during the freeze and also saw the effect of the freeze on household income and working hours. Now it is time to reconcile all of these results together.

It is important to realise what the freeze is doing across our key variables. For job satisfaction, we find that there is a flattened trend after the freeze. Despite this, household income is significantly increasing for both bulk-billing and non-bulk-billing doctors from 2008 until 2017. In the same period, hours worked are trending lower with bulk-billing and non-bulk-billing doctors working approximately 1.6 hours less per week. In summary, GP satisfaction ceased trending upwards once the freeze was introduced. But income has increased and working hours have decreased despite the introduction of the freeze. We also see that the answer to why this is the case is not that GPs are bulk-billing less since bulk billing was significantly higher after the freeze. We have also seen that the freeze has adversely affected bulk-billing doctors. The continuing decision to bulk-bill was not a significant determinant of job satisfaction before the freeze, but after the freeze, becomes a significant determinant of job satisfaction. We present a few reasons for these effects below.

One key reason that may be causing hours worked to decrease is that the trends we observe would be larger if the freeze was not put in place. That is, doctors hours would have been declining more and income would have been increasing more if the freeze was not in place. GPs, observing this, realise their opportunity cost and respond accordingly with lower job satisfaction. In this way, we can consider that the freeze had an adverse effect on key job satisfaction variables, namely working hours and income. More research is required to determine the exact effects of the freeze, but if this is the reason for the trend, there may be an explanation to continue enacting the freeze despite its motivation to curtail health costs.

Another potential explanation for these trends is the steady introduction of GPs entering the market, particularly as women participate in providing GP services. Despite this, we see that aggregate hours supplied by GPs is relatively stable (Scott

and Taylor, 2017). The implication is that there are more GPs in the market to do the same (or slightly higher) amount of work, thus causing an individual's working hours to decrease. There is evidence that suggests that an increase in supply does not reduce medical fees (Richardson, Peacock, and Mortimer, 2006). Bringing these two findings together we see that the resulting trends can be explained by an influx of GPs, particularly women, entering the workforce but allowing fees to float, causing an increase in income. However, since doctors do not think that income has kept up with inflation, they are increasingly less satisfied with their jobs.

Further, a weak but still possible reason for this trend is that the freeze causes doctors to lose control of their job decisions. Prior to the freeze, doctors may have felt more autonomous in how they supplied their hours. They may have felt that this control over their own lives was taken away after the freeze, whereby the government was not increasing their fees. Evidence suggests that doctors are not totally in control of whether they bulk-bill or not (Gravelle et al., 2016). Despite this, doctors may have felt like the decision to continue bulk-billing was a voluntary choice, as opposed to one that is, at least partially, determined by market forces. In so doing, doctors, as before the freeze, must bulk-bill because of increasing competition and have less perceived control over their career choices. This may have implications for long-term supply of general practitioners. This is caused by medical graduates, particularly domestic students, not choosing to enter general practice, but rather deciding to pursue specialist medicine.

6.2 LIMITATIONS

The greatest limitation of my model framework is not being able to account for all sources of endogeneity, in particular to do with bulk-billing percentage. The amount that a GP bulk-bills is strongly subject to a wide variety of variables, many of which are accounted for by observable differences across doctors and by the individual specific fixed effects. Despite this, it is worth noting that exploring the effect of location choice is key to understanding bulk-billing more clearly (Gravelle et al., 2016).

Also, we may want to search for instrumental variables of bulk-billing. It might be work location or something related, but having a strong instrument would help account for the endogeneity associated with bulk-billing.

Another limitation is whether the trends we see are solely due to the freeze or whether there may be confounding with a wide variety of factors, such as increased levels of cream-skimming, whether technological advancements were being made in

the same period, general attitudes about the future of the profession. Our data set has very little in accounting for these factors and each of them would warrant a study in more detail.

Another key limitation is in controlling for factors that are not time-invariant. It is worthwhile to explore the effect of location, practice size as well as number of colleagues and the number of practices they are in. Further analysis would require more granular research into determinants of job satisfaction over time. Although this paper begins this work, it is ideal to use other country longitudinal data sets to have a rigorous framework for understanding job satisfaction.

Finally, this paper is limited in the accuracy of self-reported bulk-billing percentages, having public healthcare data on bulk-billing percentages for physicians over time will help ‘tease out’ the effect much more clearly.

CHAPTER 7

Conclusion

This thesis attempts to answer the question of whether the decision to bulk-bill affects the overall job satisfaction of general practitioners in Australia. Throughout the course of our analysis, we find that rather than an exogenous decision to bulk-bill, the GP makes a continuing decision based on a number of factors including competition. We contribute to the literature in finding that the results of Joyce et al. (2011) are consistent over time. This builds directly on the previous literature showing the effect of time on job satisfaction levels using GPs in the MABEL longitudinal survey.

Our key finding is that bulk-billing is a statistically significant albeit economically small contributor to job satisfaction for GPs in Australia only during the period when the freeze is active. This is the first study into the effects of the Medicare indexation freeze on doctors job satisfaction. We also show that the freeze has affected household income and working hours trends in similar ways for bulk-billing and non-bulk-billing doctors. We find that household income is still rising and working hours are still falling during the freeze despite job satisfaction plateauing.

We postulate that the reason for this could be due to is the effect of increasing doctor supply on income and hours, steeper trends diminishing and loss of autonomy as a result of the freeze. Further research is required to see the effect of the freeze and the reason for the declining satisfaction more clearly.

In the future, it seems worthwhile to continue researching the determinants of bulk-billing in order to find suitable instrumental variables for it. Similarly, we can try to find controls that can give us enough certainty about the effect of bulk-billing on job satisfaction. Despite this, we believe that controlling for individual fixed effects gives us reasonable certainty about the results we have presented. It also seems wise to continue looking at the trends in physician job satisfaction as well as other determinants for job satisfaction given their importance for patient outcomes.

Bibliography

- Britt, H., G. C. Miller, J. Henderson, C. Bayram, C. Harrison, L. Valenti, C. Wong, J. Gordon, A. J. Pollack, Y. Pan, and J. Charles (2015). *General practice activity in Australia 2014-15*. 38. Sydney University Press.
- Cheng, T. C. and P. K. Trivedi (2015). Attrition bias in panel data: A sheep in wolf's clothing? a case study based on the mabel survey. *Health Economics* 24(9), 1101–1117.
- Commonwealth of Australia (2013). *Budget Paper No. 2 2013-14*. Commonwealth of Australia.
- Commonwealth of Australia (2014). *Budget Paper No. 2 2014-15*. Commonwealth of Australia.
- DeVoe, J., G. Fryer, A. Straub, J. McCann, and G. Fairbrother (2007, January). Congruent satisfaction: Is there geographic correlation between patient and physician satisfaction? *Medical Care* 45(1), 88–94.
- Gravelle, H., A. Scott, P. Sivey, and J. Yong (2016). Competition, prices and quality in the market for physician consultations. *The Journal of Industrial Economics* 64(1), 135–169.
- Harrison, C., C. Bayram, G. C. Miller, and H. C. Britt (2015). The cost of freezing general practice. *Medical Journal of Australia* 202(6), 313–316.
- Johar, M. (2012). Do doctors charge high income patients more? *Economics Letters* 117(3), 596 – 599.
- Joyce, C., S. Schurer, A. Scott, J. Humphreys, and G. Kalb (2011). Australian doctors satisfaction with their work: results from the mabel longitudinal survey of doctors. *Medical Journal of Australia* 194(1), 30–33.
- Joyce, C., W. Wang, and T. Cheng (2015). Changes in doctors working hours: A longitudinal analysis. *Medical Care Research and Review* 72(5), 605621.

- Kalb, G., D. Kuehnle, A. Scott, T. C. Cheng, and S.-H. Jeon (2018). What factors affect physicians' labour supply: Comparing structural discrete choice and reduced-form approaches. *Health Economics* 27(2), 101–119.
- Lachish, S., E. Svirko, M. J. Goldacre, and T. Lambert (2016). Factors associated with less-than-full-time working in medical practice: results of surveys of five cohorts of uk doctors, 10 years after graduation. *Human Resources for Health* 14(62).
- Landon, B. E., J. D. Reschovsky, H. H. Pham, and D. Blumenthal (2006, March). Leaving medicine: The consequences of physician dissatisfaction. *Medical Care* 44(3), 234–242.
- Mundlak, Y. (1978). On the pooling of time series and cross section data. *Econometrica* 46(1), 69–85.
- Richardson, J. R. J., S. J. Peacock, and D. Mortimer (2006). Does an increase in the doctor supply reduce medical fees? an econometric analysis of medical fees across australia. *Applied Economics* 38(3), 253–266.
- Scott, A. (2000). Chapter 22 economics of general practice. In *Handbook of Health Economics*, Volume 1, pp. 1175 – 1200. Elsevier.
- Scott, A. and T. Taylor (2017). Health sector report - general practice trends. Technical report, ANZ Melbourne Institute.
- Shrestha, D. and C. Joyce (2011). Aspects of work-life balance of australian general practitioners: determinants and possible consequences. *Australian Journal of Primary Health* 17(1), 40–47.
- Szawlowski, S.-M., T. Taylor, A. Scott, and A. Leahy (2018). Mabel user manual: Wave 10 release. Technical report, Melbourne Institute of Applied Economic and Social Research, The University of Melbourne.
- Weel, C. V. and C. B. D. Mar (2004). How should gps be paid? *Medical Journal of Australia* 181(2), 98–99.
- Yan, W., T. Cheng, A. Scott, C. Joyce, J. Humphreys, G. Kalb, and A. Leahy (2011). Medicine in australia: Balancing employment and life (mabel). *The Australian Economic Review* 44(1), 102–112.

APPENDIX A

Model Variables Summary

All the variables used in the analysis done in this thesis are summarised in Table 7.

Table 7: Model Variables Summary

Category	Variable	Survey Question	Response	Comments
Satisfaction	Remuneration	Please indicate how satisfied or dissatisfied you are with your remuneration	0 = Not As Satisfied 1 = Very Satisfied	Recoded from 5 point Likert scale from 0 to 4 inclusive.
Satisfaction	Hours Worked	Please indicate how satisfied or dissatisfied you are with your hours of work	0 = Not As Satisfied 1 = Very Satisfied	Recoded from 5 point Likert scale from 0 to 4 inclusive.
Satisfaction	Job Overall	Taking everything into consideration, how do you feel about your work?	0 = Not As Satisfied 1 = Very Satisfied	Recoded from 5 point Likert scale from 0 to 4 inclusive.
Satisfaction	Work-Life Balance	The balance between my personal and professional commitments is about right	0 = Don't Agree 1 = Strongly Agree	Recoded from 5 point Likert scale from 0 to 4 inclusive.
Bulk Billing	Bulk-Billing percentage	Approximately what percentage of patients do you bulk bill/charge no co-payment?	Numeric	When binary, ≥ 50 is classified as bulk-billing
Year Effects	Year	Year of survey completion	Numeric	Imputed from longitudinal waves

Table 7 continued from previous page

Category	Variable	Survey Question	Response	Comments
Doctor Characteristics	Gender	What is your gender?	0 = Male 1 = Female	Imputed from AMPCo Medical Database
Doctor Characteristics	Age	What is your age?	Numeric	Imputed. One group for 'under 35 then 5-year age bands and top-coded at 70+
Doctor Characteristics	Age Square	N/A	N/A	Transformation of Age variable
Doctor Characteristics	Family Status: Partner	Are you currently living with a partner or spouse?	1 = Yes 0 = No	
Doctor Characteristics	Family Status: Children	Do you have any dependent children?	1 = Yes 0 = No	Recoded from the number of dependent children the GP has
Doctor Characteristics	Self-Assessed health	In general, would you say your health is:	0 = Excellent 1 = Very good 2 = Satisfactory 3 = Bad or poor	Recoded from 5 point Likert scale from 0 to 4 inclusive.
Doctor Characteristics	Annual household income	Annual gross household income (before tax)	Numeric	This was log-transformed in all models with zero observations recoded with a value of 1
Doctor Characteristics	Degree obtained outside Australia	In which country did you complete your basic medical degree?	1 = Foreign 0 = Local	Created a binary variable from a written question

Table 7 continued from previous page

Category	Variable	Survey Question	Response	Comments
Job Characteristics	Poor support network of similar doctors	I have a poor support network of other doctors like me	0 = Disagree 1 = Neutral 2 = Agree	Recoded from 5 point Likert scale from 0 to 4 inclusive.
Job Characteristics	Difficult to take time off work	It is difficult to take time off when I want to	0 = Disagree 1 = Neutral 2 = Agree	Recoded from 5 point Likert scale from 0 to 4 inclusive.
Job Characteristics	Hours worked per week	Total weekly hours worked	Numeric	Imputed. Top-coded at 120 hours (\approx 17 hours a day)
Job Characteristics	Doing on-call work	Do you do any after hours or oncall yourself?	1 = Yes 0 = No	
Job Characteristics	Patients have unrealistic expectations	My patients have unrealistic expectations about how I can help them	0 = Disagree 1 = Neutral 2 = Agree	Recoded from 5 point Likert scale from 0 to 4 inclusive.
Geographic Characteristics	Few friends and family locally	I dont have many friends or family members in my current work location	0 = Disagree 1 = Neutral 2 = Agree	Recoded from 5 point Likert scale from 0 to 4 inclusive.
Geographic Characteristics	ASGC remoteness area	ASGC classification of main place of work	1 = Major City 2 = Inner Regional 3 = Remote	Imputed based on postcode of the main place of work

APPENDIX B

Robustness Tests

Robustness testing is required to show that results are not a function of the model but that the results are inherent to the system they are a part of. As such, the imperative for any good applied econometrician is to ensure that the results can withstand reasonable changes in the model. Below we test 5 shocks to Table 4 to ensure that the results are robust. These changes are

- Difference-in-Differences Estimation with Pretrends Analysis
- Ordinal Job Satisfaction
- Binary Bulk-Billing
- Balanced Panel Estimation
- Other Satisfaction Measures

DIFFERENCE-IN-DIFFERENCES ESTIMATION WITH PRETRENDS ANALYSIS

Our headline results act as a flexible difference-in-differences estimation allowing all the coefficients to change after the policy impact. Consequentially, we can actually change the model to do a more traditional difference-in-differences estimation with the following framework

$$\begin{aligned} \text{Job Satisfaction}_{it} = & \alpha_i + \beta \text{Controls}_{it} + \lambda \text{Bulk Billing} + \gamma \text{Year Dummies} \\ & + \tau \text{Bulk Billing} \times \text{Year Dummies} + u_{it} \end{aligned}$$

The results using this analysis are in Table 8

Table 8: Difference in Differences Estimation of Job Satisfaction

Overall Job Satisfaction	DiD
Bulk-Billing percentage	-0.000596* (0.000304)
Year fixed effects (base=2012)	
2008	-0.0766*** (0.0252)
2009	-0.0684*** (0.0248)
2010	-0.0454* (0.0250)
2011	-0.0684*** (0.0250)
2013	0.00716 (0.0248)
2014	0.0104 (0.0258)
2015	0.0143 (0.0267)
2016	-0.00493 (0.0266)
2017	0.00217 (0.0281)
Bulk-Billing interacted with year (base=2012)	
Bulk-Billing percentage × 2008	0.0000940 (0.000362)

Bulk-Billing percentage × 2009	0.000507 (0.000353)
Bulk-Billing percentage × 2010	0.000275 (0.000357)
Bulk-Billing percentage × 2011	0.000516 (0.000351)
Bulk-Billing percentage × 2013	0.0000412 (0.000360)
Bulk-Billing percentage × 2014	-0.0000289 (0.000369)
Bulk-Billing percentage × 2015	-0.000132 (0.000375)
Bulk-Billing percentage × 2016	-0.000101 (0.000379)
Bulk-Billing percentage × 2017	-0.000173 (0.000404)
Doctor Characteristics	
Family status (reference: single)	
Partner, no children	-0.0287 (0.0193)
Children, no partner	-0.0583** (0.0240)
Partner & children	-0.0329* (0.0194)
Self-assessed health (reference: excellent)	
Very good	-0.0484*** (0.00906)
Satisfactory	-0.0932*** (0.0124)
Bad or poor	-0.111*** (0.0168)
Annual household income	0.00499 (0.00527)
Degree obtained	-0.00708
outside Australia (yes=1)	(0.0723)
Job Characteristics	
Poor support network of similar doctors (reference: neutral)	
Disagree	0.0450***

	(0.00851)
Agree	-0.0222**
	(0.00926)
Difficult to take time off work (reference: neutral)	
Disagree	0.0409***
	(0.00934)
Agree	-0.0296***
	(0.00998)
Hours worked per week (reference: 35-54)	
≤ 35	0.0374***
	(0.0100)
55-59	-0.0345**
	(0.0142)
≥ 60	-0.0282**
	(0.0135)
Doing on-call work (yes=1)	0.00256
	(0.00927)
Patients have unrealistic expectations (reference: neutral)	
Disagree	0.0241***
	(0.00855)
Agree	-0.0570***
	(0.00791)
Geographic Characteristics	
Few friends and family locally (reference: neutral)	
Disagree	0.0387***
	(0.0102)
Agree	0.00465
	(0.0107)
ASGC remoteness area (reference: major city)	
Inner regional	-0.00581
	(0.0206)
Outer regional, remote and very remote	0.0324
	(0.0249)
Constant	0.406***
	(0.0728)
<hr/>	
Observations	24867
Distinct GPs	6789
σ_u	0.381
<hr/>	

σ_e	0.362
ρ	0.526
Robust standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Although we state the full results here, the focus is on the key finding that job satisfaction is significantly and negatively affected by bulk-billing. The results here show bulk-billing is a determinant of job satisfaction. This is not the case for our interaction terms which are statistically zero.

In order to ensure that these results are interpreted appropriately, we need to check the parallel trends assumption associated with this new specification. The parallel trends assumption requires that the trend of a variable for a treated and control group to be similar before the policy shock. As an informal graphical check, we can explore the average trends of job satisfaction for bulk-billing and non-bulk-billing doctors. We define a bulk-billing doctor as someone who bulk-bills at least 50% of their patients and a non-bulk-billing doctor someone who bulk-bills less. Figure 6 below shows these average trends before and after the freeze.

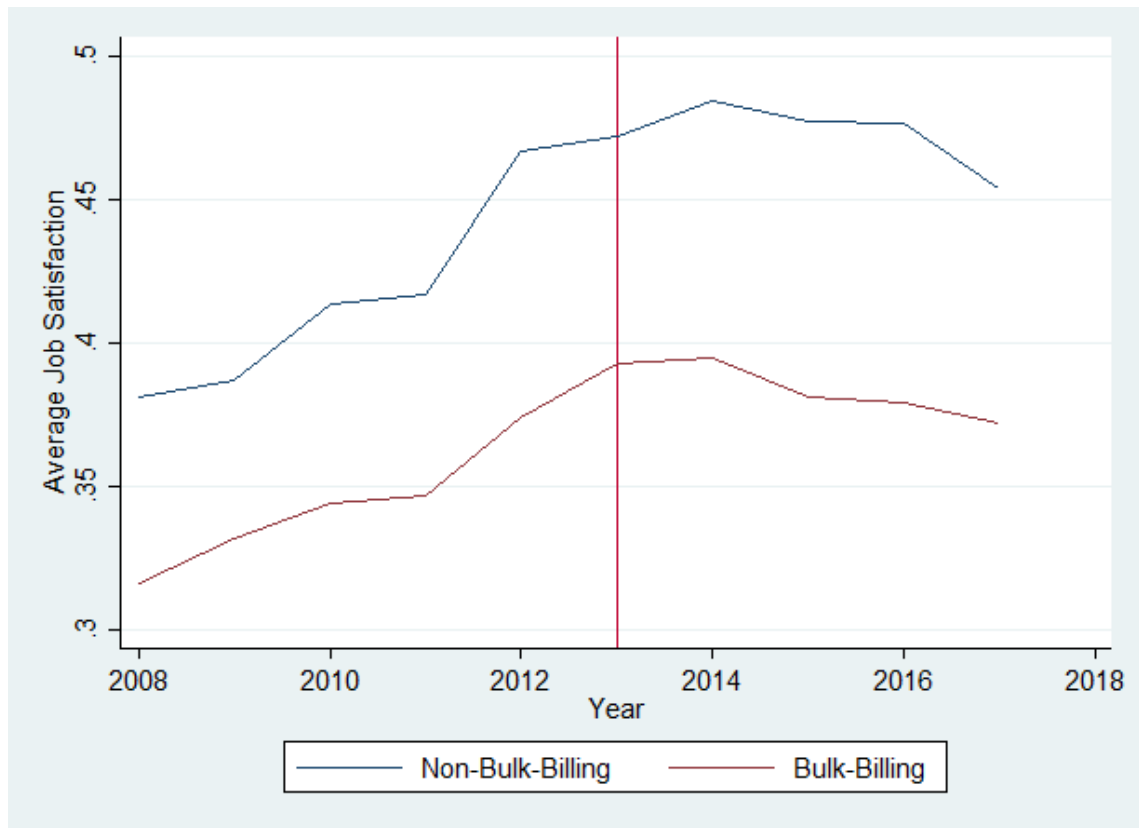


Figure 6: Pretrends Analysis for Parallel Trends Assumption

Hence, we see that the trends of job satisfaction for bulk-billing and non-bulk-billing

doctors are relatively parallel prior to the freeze. Since this is true, we can defend our results in Table 8 which indicate that the results in Table 4 are robust.

ORDINAL JOB SATISFACTION

We also changed our definition of job satisfaction from the binary measure used by Joyce et al. (2011) to the original results from the MABEL survey. That is, we used the 5 point Likert scale measure as the dependent variable. Doing this yields the results below in Table 9

Table 9: Ordinal Job Satisfaction

Overall Job Satisfaction	Before	After
Bulk-Billing Percentage	-0.000746 (0.000489)	-0.00113** (0.000453)
Year fixed effects (Base=2008, 2013)		
2009, 2014	0.0598*** (0.0192)	-0.00382 (0.0186)
2010, 2015	0.0728*** (0.0198)	-0.0119 (0.0196)
2011, 2016	0.0678*** (0.0196)	-0.0578*** (0.0207)
2012, 2017	0.124*** (0.0217)	-0.0220 (0.0208)
Doctor Characteristics		
Family status (reference: single)		
Partner, no children	-0.0540 (0.0545)	0.0101 (0.0585)
Children, no partner	-0.121* (0.0623)	0.0320 (0.0702)
Partner & children	-0.0919* (0.0549)	-0.00209 (0.0611)
Self-assessed health (reference: excellent)		
Very good	-0.0190 (0.0214)	-0.0620** (0.0246)
Satisfactory	-0.139*** (0.0303)	-0.199*** (0.0353)
Bad or poor	-0.288*** (0.0496)	-0.307*** (0.0562)
Annual household income	-0.00296 (0.0127)	0.0115 (0.0162)

Degree obtained	0.0511	-0.0976
outside Australia (yes=1)	(0.216)	(0.199)
Job Characteristics		
Poor support network of similar doctors (reference: neutral)		
Disagree	0.0766***	0.0823***
	(0.0203)	(0.0227)
Agree	-0.0434*	-0.0697***
	(0.0234)	(0.0263)
Difficult to take time off work (reference: neutral)		
Disagree	0.0701***	0.0740***
	(0.0221)	(0.0233)
Agree	-0.0593**	-0.0657**
	(0.0242)	(0.0281)
Hours worked per week (reference: 35-54)		
≤ 35	0.0404	0.0498*
	(0.0267)	(0.0263)
55-59	-0.0422	-0.114**
	(0.0375)	(0.0500)
≥ 60	-0.0523	-0.0179
	(0.0363)	(0.0427)
Doing on-call work (yes=1)	-0.0166	-0.000699
	(0.0222)	(0.0279)
Patients have unrealistic expectations (reference: neutral)		
Disagree	0.0148	0.0217
	(0.0207)	(0.0205)
Agree	-0.0997***	-0.0870***
	(0.0197)	(0.0206)
Geographic Characteristics		
Few friends and family locally (reference: neutral)		
Disagree	0.0403	0.0573**
	(0.0256)	(0.0269)
Agree	-0.0110	0.00948
	(0.0282)	(0.0285)
ASGC remoteness area (reference: major city)		
Inner regional	-0.110*	0.0754
	(0.0631)	(0.0660)
Outer regional, remote and very remote	-0.00558 and	0.108 very

Constant	3.298*** (0.177)	3.204*** (0.207)
Observations	13067	11571
Distinct GPs	4889	4759
σ_u	0.734	0.685
σ_e	0.610	0.554
ρ	0.592	0.604

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Again, our key finding is replicated in this model. Bulk-billing is a significant and negative determinant of job satisfaction only after the freeze although somewhat larger than our finding in Table 4 since the outcome variable is no longer binary. Here we see that a 50 percentage point increase in bulk-billing is associated with a 0.565 decrease in job satisfaction, *ceteris paribus*.

Thus, we see that our headline result holds for changing the definition of the outcome variable.

BINARY BULK-BILLING

In a similar vein, we changed our definition of our key determinant of job satisfaction. Rather than keeping bulk-billing as a continuous variable, we defined it as a binary variable taking the value of 1 if a doctor bulk-bills at least 50% of their patients and 0 otherwise.¹ The results are in Table 10.

Our main concern is the effect of bulk-billing. We see that the effect of being a bulk-billing doctor on job satisfaction is insignificant before the freeze. But that our results are robust for changing our definition of bulk-billing with a bulk-billing doctor being 3.69 percentage points less likely to report being very satisfied with their work.

Again, we see that our headline results hold for changing the definition of our key determinant of interest.

Table 10: Binary Bulk Billing with Job Satisfaction

Overall Job Satisfaction	Before	After
Bulk-Billing	-0.0223	-0.0369**

¹We tested this threshold significantly and found that the results were consistent, albeit insignificant for other thresholds. Note, there is no threshold that defines a doctor as bulk-billing in the literature.

	(0.0139)	(0.0159)
Year fixed effects (base=2008)		
2009, 2014	0.0336***	-0.00165
	(0.0101)	(0.0120)
2010, 2015	0.0431***	-0.00144
	(0.0108)	(0.0124)
2011, 2016	0.0310***	-0.0197
	(0.0112)	(0.0128)
2012, 2017	0.0650***	-0.0226*
	(0.0120)	(0.0135)
Doctor Characteristics		
Family status (reference: single)		
Partner, no children	-0.0326	-0.0129
	(0.0275)	(0.0336)
Children, no partner	-0.0776**	-0.00244
	(0.0322)	(0.0411)
Partner & children	-0.0467*	-0.0216
	(0.0281)	(0.0343)
Self-assessed health (reference: excellent)		
Very good	-0.0271**	-0.0557***
	(0.0132)	(0.0143)
Satisfactory	-0.0685***	-0.104***
	(0.0175)	(0.0192)
Bad or poor	-0.0759***	-0.121***
	(0.0232)	(0.0273)
Annual household income	-0.00323	0.0174*
	(0.00588)	(0.00990)
Degree obtained	-0.0738	-0.0589
outside Australia (yes=1)	(0.106)	(0.118)
Job Characteristics		
Poor support network of similar doctors (reference: neutral)		
Disagree	0.0465***	0.0505***
	(0.0114)	(0.0137)
Agree	-0.0262**	-0.00919
	(0.0127)	(0.0150)
Difficult to take time off work (reference: neutral)		
Disagree	0.0412***	0.0191
	(0.0134)	(0.0145)

Agree	-0.0211 (0.0138)	-0.0619*** (0.0161)
Hours worked per week (reference: 35-54)		
≤ 35	0.0391** (0.0152)	0.0314** (0.0157)
55-59	-0.0373** (0.0186)	-0.0452* (0.0246)
≥ 60	-0.0327* (0.0179)	-0.0260 (0.0238)
Doing on-call work (yes=1)	-0.0182 (0.0126)	0.0147 (0.0164)
Patients have unrealistic expectations (reference: neutral)		
Disagree	0.0346*** (0.0122)	0.00666 (0.0131)
Agree	-0.0612*** (0.0113)	-0.0383*** (0.0130)
Geographic Characteristics		
Few friends and family locally (reference: neutral)		
Disagree	0.0288** (0.0146)	0.0446*** (0.0154)
Agree	-0.00268 (0.0152)	0.0213 (0.0163)
ASGC remoteness area (reference: major city)		
Inner regional	-0.0303 (0.0314)	0.0354 (0.0364)
Outer regional, remote and very remote	0.0394 (0.0420)	0.107*** (0.0390)
Constant	0.444*** (0.0820)	0.238* (0.130)
Observations	13501	12033
Distinct GPs	4966	4856
σ_u	0.392	0.408
σ_e	0.350	0.356
ρ	0.556	0.568
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1		

BALANCED PANEL ESTIMATION

To ensure that the results were robust to attrition in the sample, we restricted the sample to whether they had completed a minimum of 6 waves, 7 waves and 8 waves. In doing so, we were guaranteed to have observations in both periods prior to the freeze and during the freeze. With 6 waves, we guarantee at least 1 observation on both sides of the freeze, 7 waves guarantees at least 2 observations and 8 waves guarantees at least 3 observations. The results are in Table 11 below.

We see that our main results are consistent and significant when participants have completed at least 6 waves of the MABEL survey with a 50 percentage points increase in bulk-billing percentage resulting in an approximately 3.5 percentage point increased likelihood to report being very satisfied. This is only true after the indexation freeze. Thus our headline results hold in the case of 6 waves.

When we increase the minimum number of waves to 7, our main results remain consistent but lose their significance at all conventional levels. For this specification, a 50 percentage points increase in bulk-billing percentage results in an approximately 3 percentage point increased likelihood to report being very satisfied. Although they are not significant, we see that the results are larger in magnitude after the freeze than before. Hence the broad strokes of our headline results are true in the 7 waves case.

When we again increase the minimum number of waves to 8, our main results remain consistent but lose their significance at all conventional levels. For this specification, a 50 percentage points increase in bulk-billing percentage results in an approximately 2.58 percentage point increased likelihood to report being very satisfied after the freeze. Again, although they are not significant, we see that the results are larger in magnitude after the freeze than before. Hence the broad strokes of our headline results are true in the 8 waves case also.

Thus, we can see the results are robust to attrition in the sample. This finding is backed up by Cheng and Trivedi (2015) who explore the question of attrition in the MABEL survey and find that the impact of attrition for looking at GP earnings is small.

Table 11: Balanced Panel Estimation of Job Satisfaction

Overall Job Satisfaction	6 Waves		7 Waves		8 Waves	
	Before	After	Before	After	Before	After
Bulk-Billing Percentage	-0.000152 (0.000345)	-0.000699* (0.000378)	-0.000358 (0.000370)	-0.000603 (0.000408)	-0.000294 (0.000405)	-0.000516 (0.000423)
Year fixed effects (base=2008, 2013)						
2009, 2014	0.0340*** (0.0125)	-0.00257 (0.0131)	0.0344*** (0.0133)	-0.00179 (0.0136)	0.0377*** (0.0143)	-0.00258 (0.0144)
2010, 2015	0.0376*** (0.0131)	0.00150 (0.0139)	0.0360** (0.0140)	-0.00207 (0.0145)	0.0443*** (0.0151)	-0.00179 (0.0151)
2011, 2016	0.0302** (0.0133)	-0.0390*** (0.0144)	0.0344** (0.0142)	-0.0376** (0.0151)	0.0354** (0.0153)	-0.0475*** (0.0156)
2012, 2017	0.0673*** (0.0139)	-0.0218 (0.0154)	0.0715*** (0.0148)	-0.0198 (0.0162)	0.0762*** (0.0159)	-0.0294* (0.0168)
Doctor Characteristics						
Family status (reference: single)						
Partner, no children	-0.0392 (0.0371)	0.0142 (0.0441)	-0.0543 (0.0396)	0.0122 (0.0469)	-0.0861** (0.0416)	0.0249 (0.0498)
Children, no partner	-0.111*** (0.0415)	-0.0147 (0.0542)	-0.115*** (0.0443)	-0.00653 (0.0594)	-0.126** (0.0491)	0.0151 (0.0554)
Partner & children	-0.0640* (0.0370)	-0.0209 (0.0433)	-0.0797** (0.0394)	-0.0358 (0.0469)	-0.117*** (0.0410)	-0.0353 (0.0482)
Self-assessed health (reference: excellent)						

Overall Job Satisfaction	6 Waves		7 Waves		8 Waves	
	Before	After	Before	After	Before	After
Very good	-0.0357** (0.0160)	-0.0334** (0.0169)	-0.0383** (0.0171)	-0.0409** (0.0175)	-0.0431** (0.0182)	-0.0340* (0.0187)
Satisfactory	-0.0781*** (0.0216)	-0.0788*** (0.0231)	-0.0801*** (0.0230)	-0.0896*** (0.0242)	-0.0839*** (0.0250)	-0.0767*** (0.0255)
Bad or poor	-0.0668** (0.0282)	-0.0896*** (0.0334)	-0.0599* (0.0310)	-0.106*** (0.0346)	-0.0661* (0.0340)	-0.0875** (0.0359)
Annual household income	-0.00359 (0.00797)	0.0142 (0.0104)	-0.00434 (0.00808)	0.0222 (0.0139)	-0.00251 (0.00939)	0.0180 (0.0143)
Degree obtained outside Australia (yes=1)	-0.184 (0.173)	-0.139 (0.213)	-0.256 (0.225)	0.100*** (0.0351)	0.0214 (0.0298)	0 (.)
Job Characteristics						
Poor support network of similar doctors (reference: neutral)						
Disagree	0.0411*** (0.0135)	0.0483*** (0.0162)	0.0422*** (0.0146)	0.0497*** (0.0172)	0.0445*** (0.0154)	0.0401** (0.0176)
Agree	-0.0138 (0.0153)	-0.0285 (0.0177)	-0.0166 (0.0165)	-0.0212 (0.0188)	-0.0115 (0.0176)	-0.0247 (0.0196)
Difficult to take time off work (reference: neutral)						
Disagree	0.0341** (0.0157)	0.00552 (0.0170)	0.0439*** (0.0165)	-0.000558 (0.0180)	0.0441** (0.0176)	0.00459 (0.0186)
Agree	-0.0215 (0.0162)	-0.0718*** (0.0190)	-0.0151 (0.0174)	-0.0858*** (0.0204)	-0.0307 (0.0189)	-0.0699*** (0.0212)

Overall Job Satisfaction	6 Waves		7 Waves		8 Waves	
	Before	After	Before	After	Before	After
Hours worked per week (reference: 35-54)						
≤ 35	0.0338*	0.0263	0.0277	0.0316	0.0191	0.0374*
	(0.0178)	(0.0191)	(0.0187)	(0.0200)	(0.0199)	(0.0212)
55-59	-0.0426*	-0.0600**	-0.0418*	-0.0737**	-0.0513**	-0.0911***
	(0.0228)	(0.0289)	(0.0236)	(0.0303)	(0.0254)	(0.0315)
≥ 60	-0.0437**	-0.0343	-0.0612***	-0.0338	-0.0554**	-0.0357
	(0.0208)	(0.0264)	(0.0226)	(0.0286)	(0.0238)	(0.0301)
Doing on-call work (yes=1)	-0.0152	0.00436	-0.0111	0.00695	-0.0164	0.0215
	(0.0153)	(0.0206)	(0.0164)	(0.0213)	(0.0173)	(0.0221)
Patients have unrealistic expectations (reference: neutral)						
Disagree	0.0364**	-0.00719	0.0377**	-0.0220	0.0373**	-0.0234
	(0.0144)	(0.0149)	(0.0151)	(0.0154)	(0.0163)	(0.0162)
Agree	-0.0641***	-0.0433***	-0.0627***	-0.0418***	-0.0511***	-0.0323*
	(0.0132)	(0.0157)	(0.0141)	(0.0162)	(0.0152)	(0.0170)
Geographic Characteristics						
Few friends and family locally (reference: neutral)						
Disagree	0.0371**	0.0573***	0.0359*	0.0563***	0.0411**	0.0600***
	(0.0175)	(0.0186)	(0.0185)	(0.0193)	(0.0198)	(0.0203)
Agree	0.00104	0.0223	-0.00339	0.0188	-0.000943	0.0241
	(0.0180)	(0.0191)	(0.0190)	(0.0203)	(0.0199)	(0.0212)
ASGC remoteness area (reference: major city)						

Overall Job Satisfaction	6 Waves		7 Waves		8 Waves	
	Before	After	Before	After	Before	After
Inner regional	-0.0396 (0.0435)	0.0302 (0.0519)	-0.00413 (0.0473)	0.0599 (0.0544)	0.00715 (0.0488)	0.0599 (0.0590)
Outer regional, remote and very remote	0.0273 (0.0577)	0.0952* (0.0551)	0.0101 (0.0642)	0.0976* (0.0556)	0.0489 (0.0652)	0.0586 (0.0601)
Constant	0.488*** (0.112)	0.322** (0.143)	0.520*** (0.118)	0.192 (0.181)	0.471*** (0.128)	0.234 (0.185)
Observations	8647	7454	7538	6627	6507	5872
Distinct GPs	2387	2265	1989	1901	1664	1592
σ_u	0.373	0.392	0.375	0.383	0.359	0.378
σ_e	0.351	0.350	0.350	0.349	0.351	0.349
ρ	0.530	0.556	0.534	0.546	0.511	0.540

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

OTHER SATISFACTION MEASURES

We can again change our dependant variable to other measures of job satisfaction that the MABEL questionnaires asks the GPs. The three apparent alternatives are work-life balance, satisfaction with hours worked and satisfaction with remuneration. We again convert these measures to binary measures of satisfaction in order to keep the interpretation of the coefficients consistent with our headline results. Again, we will only consider the effect of bulk-billing on these satisfaction measures.

For the model with work-life balance as the dependant variable, we see that for both before and after the freeze, bulk-billing is insignificant. For this specification, a 50 percentage points increase in bulk-billing percentage results in an approximately 1.2 percentage point increased likelihood to report being very satisfied after the freeze. Although they are not significant, we see that the results are larger in magnitude after the freeze than before and that the results are consistent. Hence the broad strokes of the headline results are true for the work-life balance specification.

For the model with satisfaction with hours worked as the dependant variable, we see that for both before and after the freeze, bulk-billing is insignificant. For this specification, a 50 percentage points increase in bulk-billing percentage results in an approximately 1.31 percentage point increased likelihood to report being very satisfied after the freeze. Although they are not significant, we see that the results are larger in magnitude after the freeze than before and that the results are consistent. Hence the broad strokes of the headline results are true for the satisfaction with hours worked specification.

For the model with satisfaction with remuneration as the dependant variable, we see that for before the freeze, bulk-billing is insignificant. However, after the freeze, bulk-billing becomes a significant determinant of satisfaction with remuneration. For this specification, a 50 percentage points increase in bulk-billing percentage results in an 3.5 percentage point increased likelihood to report being very satisfied after the freeze. Again, we see that the results are consistent. Hence the headline results are true for the satisfaction with remuneration specification.

Thus, we can see that the results are robust to alternative measures of satisfaction, namely work-life balance, satisfaction with hours worked and satisfaction with remuneration.

Table 12: Alternative Satisfaction Measures

	Work-Life Balance		Satisfaction: Hours Worked		Satisfaction: Work Remuneration	
	Before	After	Before	After	Before	After
Bulk-Billing percentage	0.000159 (0.000228)	-0.000240 (0.000220)	-0.0000434 (0.000305)	-0.000263 (0.000312)	-0.000175 (0.000264)	-0.000708** (0.000281)
Year fixed effects (base=2008, 2013)						
2009, 2014	-0.00996 (0.00729)	0.000542 (0.00869)	0.0321*** (0.0105)	0.0214* (0.0121)	0.0106 (0.00889)	0.00241 (0.0108)
2010, 2015	0.00981 (0.00800)	-0.00206 (0.00947)	0.0255** (0.0112)	0.00386 (0.0131)	0.0181* (0.00961)	-0.0176 (0.0113)
2011, 2016	0.0116 (0.00832)	0.00222 (0.00923)	0.0295*** (0.0114)	-0.00140 (0.0136)	0.0247** (0.0100)	-0.0273** (0.0119)
2012, 2017	0.00129 (0.00896)	0.0116 (0.0101)	0.0325*** (0.0118)	0.00622 (0.0140)	0.0274** (0.0107)	-0.0211* (0.0126)
Doctor Characteristics						
Family status (reference: single)						
Partner, no children	-0.0130 (0.0234)	0.00779 (0.0232)	-0.0511 (0.0333)	0.0202 (0.0360)	-0.00564 (0.0279)	-0.0372 (0.0322)
Children, no partner	-0.0252 (0.0222)	0.00318 (0.0273)	-0.0725** (0.0347)	-0.00407 (0.0450)	-0.0305 (0.0337)	0.0175 (0.0356)
Partner & children	-0.0250 (0.0233)	-0.0216 (0.0249)	-0.0762** (0.0323)	0.0228 (0.0379)	-0.0190 (0.0277)	-0.0180 (0.0329)
Self-assessed health (reference: excellent)						

	Work-Life Balance		Satisfaction: Hours Worked		Satisfaction: Work Remuneration	
	Before	After	Before	After	Before	After
Very good	-0.0256** (0.0102)	-0.0162 (0.0110)	-0.0277** (0.0126)	-0.0195 (0.0145)	-0.0123 (0.0115)	0.000308 (0.0129)
Satisfactory	-0.0462*** (0.0130)	-0.00972 (0.0139)	-0.0448*** (0.0173)	-0.0355* (0.0191)	0.000548 (0.0151)	-0.00180 (0.0172)
Bad or poor	-0.0611*** (0.0149)	-0.00683 (0.0202)	-0.0656*** (0.0231)	-0.0688** (0.0283)	-0.0308 (0.0199)	-0.0145 (0.0239)
Annual household income	-0.000648 (0.00482)	-0.00866 (0.00544)	-0.00965* (0.00569)	-0.0113 (0.0105)	0.00737 (0.00735)	0.0203*** (0.00652)
Degree obtained outside Australia (yes=1)	-0.0236** (0.0106)	-0.000489 (0.0846)	-0.100 (0.110)	0.199** (0.0909)	-0.0376 (0.116)	0.0204 (0.0754)
Job Characteristics						
Poor support network of similar doctors (reference: neutral)						
Disagree	0.0111 (0.00798)	0.0204** (0.00937)	-0.00172 (0.0117)	0.0278* (0.0142)	0.0168 (0.0107)	0.0336*** (0.0124)
Agree	0.0106 (0.00895)	0.00692 (0.0106)	-0.0302** (0.0127)	0.0167 (0.0161)	-0.0159 (0.0116)	0.0163 (0.0136)
Difficult to take time off work (reference: neutral)						
Disagree	0.0271*** (0.00924)	0.0217** (0.00874)	0.0631*** (0.0140)	0.0716*** (0.0152)	0.00322 (0.0114)	0.0239* (0.0134)
Agree	-0.00726 (0.00900)	-0.00232 (0.00884)	-0.0278* (0.0142)	-0.0582*** (0.0169)	-0.0274** (0.0121)	-0.0150 (0.0139)

	Work-Life Balance		Satisfaction: Hours Worked		Satisfaction: Work Remuneration	
	Before	After	Before	After	Before	After
Hours worked per week (reference: 35-54)						
≤ 35	0.0538*** (0.0118)	0.0361*** (0.0116)	0.112*** (0.0165)	0.114*** (0.0176)	0.0222 (0.0136)	0.00516 (0.0142)
55-59	-0.0140 (0.0102)	-0.00596 (0.0113)	-0.0545*** (0.0152)	-0.0507** (0.0227)	-0.0323** (0.0164)	-0.0425** (0.0196)
≥ 60	-0.00782 (0.0102)	0.0156 (0.0121)	-0.0164 (0.0173)	-0.0328 (0.0233)	-0.0114 (0.0165)	-0.0143 (0.0204)
Doing on-call work (yes=1)	0.00311 (0.00932)	-0.00999 (0.0124)	-0.0422*** (0.0133)	-0.0254 (0.0189)	-0.0147 (0.0114)	-0.000200 (0.0143)
Patients have unrealistic expectations (reference: neutral)						
Disagree	0.0172* (0.00896)	0.0178* (0.0102)	0.0133 (0.0120)	0.00802 (0.0142)	0.00710 (0.0112)	0.00348 (0.0118)
Agree	-0.0147* (0.00797)	0.00301 (0.00941)	-0.0650*** (0.0118)	-0.00889 (0.0136)	-0.0378*** (0.0101)	-0.0146 (0.0120)
Geographic Characteristics						
Few friends and family locally (reference: neutral)						
Disagree	0.00161 (0.00992)	0.0181 (0.0115)	0.0120 (0.0145)	0.00527 (0.0161)	0.00724 (0.0134)	0.0110 (0.0141)
Agree	0.00789 (0.0108)	0.00313 (0.0114)	0.000558 (0.0152)	-0.00956 (0.0167)	-0.00109 (0.0138)	0.0181 (0.0142)
ASGC remoteness area (reference: major city)						

	Work-Life Balance		Satisfaction: Hours Worked		Satisfaction: Work Remuneration	
	Before	After	Before	After	Before	After
Inner regional	0.0292 (0.0236)	0.0314 (0.0295)	0.0338 (0.0344)	0.00580 (0.0395)	-0.0311 (0.0317)	-0.0326 (0.0406)
Outer regional, remote and very remote	-0.0300 (0.0238)	0.0811** (0.0325)	-0.0155 (0.0433)	0.0843** (0.0420)	0.00109 (0.0467)	0.134*** (0.0404)
Constant	0.118* (0.0653)	0.188** (0.0759)	0.533*** (0.0848)	0.419*** (0.136)	0.166* (0.0997)	0.00635 (0.0919)
Observations	13160	11707	13160	11707	13160	11707
Distinct GPs	4898	4777	4898	4777	4898	4777
σ_u	0.256	0.276	0.379	0.405	0.344	0.366
σ_e	0.256	0.262	0.350	0.369	0.308	0.316
ρ	0.500	0.526	0.539	0.546	0.556	0.573

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

APPENDIX C

Heterogeneity Changes

We can also look at the gender differences across the headline results found in Table 4. We enact this by splitting the sample into males and females and then fitting a fixed effects regression model for whether the freeze is in place or not. Doing this we get the results in Table 13.

What we see is that bulk billing is a much more significant determinant of job satisfaction for women than men after the freeze. For females, a 50 percentage point increase in bulk-billing percentage results in a 4.69 percentage point decreased likelihood to report being very satisfied. For males, this same change in bulk-billing percentage results in 2.05 percentage point decreased likelihood to report being very satisfied. Although, we see that the result for males is not significant, it remains consistent with our headline results. Since females work less than full time disproportionately more than men, it may be that their job is significantly affected by the decision to bulk-bill patients. Research may look at whether this is the case for bread winning females.

Table 13: Table 4 differentiating between Males and Females

Overall Job Satisfaction	Before		After	
	Male	Female	Male	Female
Bulk-Billing percentage	-0.000135 (0.000380)	-0.0000843 (0.000433)	-0.000410 (0.000398)	-0.000938** (0.000421)
Year fixed effects (base=2008, 2013)				
2009, 2014	0.0306** (0.0132)	0.0318* (0.0163)	0.0228 (0.0157)	-0.0333* (0.0184)
2010, 2015	0.0291** (0.0146)	0.0542*** (0.0168)	0.0155 (0.0169)	-0.0277 (0.0184)
2011, 2016	0.0291* (0.0152)	0.0349** (0.0174)	-0.00402 (0.0171)	-0.0493** (0.0194)
2012, 2017	0.0604*** (0.0161)	0.0698*** (0.0187)	-0.00340 (0.0187)	-0.0439** (0.0201)
Doctor Characteristics				
Family status (reference: single)				

Overall Job Satisfaction	Before		After	
	Male	Female	Male	Female
Partner, no children	-0.0491 (0.0405)	-0.0369 (0.0412)	-0.0448 (0.0409)	0.0347 (0.0548)
Children, no partner	-0.0685 (0.0474)	-0.124*** (0.0471)	0.0870* (0.0522)	-0.0686 (0.0621)
Partner & children	-0.0675 (0.0419)	-0.0488 (0.0413)	-0.0245 (0.0429)	-0.0102 (0.0543)
Self-assessed health (reference: excellent)				
Very good	-0.0280 (0.0186)	-0.0321 (0.0197)	-0.0169 (0.0205)	-0.0909*** (0.0201)
Satisfactory	-0.0576** (0.0239)	-0.0796*** (0.0267)	-0.0559** (0.0279)	-0.145*** (0.0274)
Bad or poor	-0.0534* (0.0299)	-0.111*** (0.0388)	-0.0476 (0.0354)	-0.200*** (0.0453)
Annual household income	-0.0104 (0.00708)	0.0133 (0.0108)	0.0173 (0.0147)	0.00959 (0.0109)
Degree obtained outside Australia (yes=1)	0.0985 (0.0912)	-0.369** (0.183)	-0.128 (0.159)	0.0683 (0.157)
Job Characteristics				
Poor support network of similar doctors (reference: neutral)				
Disagree	0.0449*** (0.0141)	0.0423** (0.0194)	0.0429** (0.0181)	0.0594*** (0.0219)
Agree	-0.0285* (0.0166)	-0.0192 (0.0203)	-0.0125 (0.0192)	-0.00191 (0.0245)
Difficult to take time off work (reference: neutral)				
Disagree	0.0444** (0.0180)	0.0338 (0.0208)	0.00299 (0.0194)	0.0375* (0.0219)
Agree	-0.00469 (0.0182)	-0.0443** (0.0223)	-0.0537** (0.0217)	-0.0637** (0.0251)
Hours worked per week (reference: 35-54)				
≤ 35	0.0171 (0.0212)	0.0512** (0.0227)	0.0493** (0.0222)	0.0192 (0.0226)
55-59	-0.0115 (0.0214)	-0.136*** (0.0390)	-0.0264 (0.0270)	-0.0951* (0.0576)
≥ 60	-0.0198 (0.0210)	-0.0628* (0.0361)	-0.0193 (0.0278)	-0.0265 (0.0448)
Doing on-call work (yes=1)	-0.0165 (0.0178)	-0.0159 (0.0188)	0.0327 (0.0209)	-0.00315 (0.0269)

Overall Job Satisfaction	Before		After	
	Male	Female	Male	Female
Patients have unrealistic expectations (reference: neutral)				
Disagree	0.0461*** (0.0165)	0.0189 (0.0192)	0.0226 (0.0185)	-0.00956 (0.0189)
Agree	-0.0513*** (0.0150)	-0.0801*** (0.0180)	-0.00798 (0.0187)	-0.0679*** (0.0187)
Geographic Characteristics				
Few friends and family locally (reference: neutral)				
Disagree	0.0238 (0.0188)	0.0432* (0.0244)	0.0455** (0.0197)	0.0353 (0.0251)
Agree	-0.00768 (0.0199)	0.00846 (0.0246)	0.0230 (0.0205)	0.0138 (0.0272)
ASGC remoteness area (reference: major city)				
Inner regional	-0.0479 (0.0457)	-0.00998 (0.0481)	0.0647 (0.0531)	-0.00187 (0.0523)
Outer regional, remote and very remote	0.0488 (0.0743)	0.0317 (0.0563)	0.137** (0.0583)	0.0641 (0.0535)
Constant	0.496*** (0.105)	0.302** (0.144)	0.195 (0.198)	0.404*** (0.145)
Observations	7138	6022	5780	5920
Distinct GPs	2555	2343	2289	2486
σ_u	0.391	0.428	0.425	0.405
σ_e	0.339	0.361	0.336	0.372
ρ	0.571	0.585	0.616	0.542
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

APPENDIX D

Miscellaneous Tables and Figures

JOB SATISFACTION DENSITY

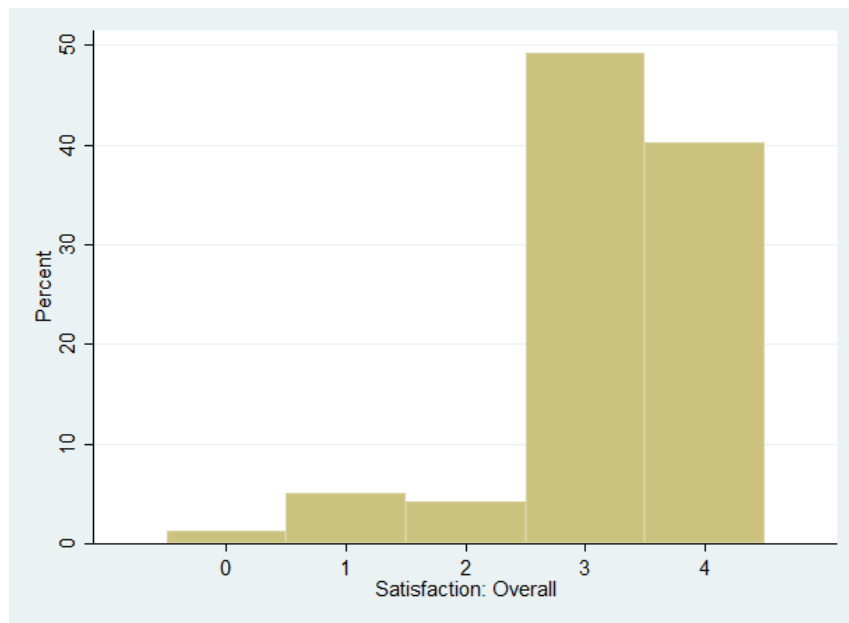


Figure 7: Density of Overall Job Satisfaction

TABLE 5

	Log Household Income		Hours Worked	
	Bulk-Billing	Non-Bulk-Billing	Bulk-Billing	Non-Bulk-Billing
Year fixed effects (base=2012)				
2008	-0.173*** (0.0221)	-0.126*** (0.0236)	1.480*** (0.298)	0.654 (0.441)
2009	-0.139*** (0.0233)	-0.111*** (0.0384)	1.085*** (0.300)	0.269 (0.394)
2010	-0.0758*** (0.0157)	-0.0807*** (0.0212)	0.732*** (0.257)	0.0821 (0.386)
2011	-0.0344** (0.0147)	-0.0186 (0.0197)	0.630*** (0.234)	0.341 (0.352)
2013	0.0159 (0.0157)	0.0264 (0.0229)	-0.311 (0.250)	-0.244 (0.407)
2014	-0.0169 (0.0199)	0.0652*** (0.0200)	-0.777*** (0.251)	-0.824** (0.377)
2015	0.0400* (0.0211)	0.0847*** (0.0209)	-1.607*** (0.280)	-1.325*** (0.448)
2016	0.0506** (0.0198)	0.0951*** (0.0239)	-1.615*** (0.285)	-1.602*** (0.469)
2017	0.0659*** (0.0252)	0.111*** (0.0271)	-1.680*** (0.327)	-1.554*** (0.511)
Doctor Characteristics				

	Log Household Income		Hours Worked	
	Bulk-Billing	Non-Bulk-Billing	Bulk-Billing	Non-Bulk-Billing
Family status (reference: single)				
Partner, no children	0.224*** (0.0493)	0.278*** (0.0508)	0.411 (0.525)	0.0947 (0.938)
Children, no partner	0.0477 (0.0681)	0.0478 (0.0857)	-0.562 (0.712)	0.471 (1.020)
Partner & children	0.216*** (0.0553)	0.266*** (0.0544)	-0.786 (0.550)	-0.974 (0.950)
Self-assessed health (reference: excellent)				
Very good	0.0142 (0.0178)	-0.0269 (0.0213)	0.131 (0.221)	-0.227 (0.301)
Satisfactory	0.00258 (0.0281)	-0.0339 (0.0233)	-0.163 (0.322)	-0.439 (0.472)
Bad or poor	-0.0234 (0.0476)	-0.0990** (0.0414)	-1.055** (0.504)	-1.465* (0.853)
Annual household income			1.166*** (0.201)	1.649*** (0.466)
Degree obtained outside Australia (yes=1)	0.104 (0.0711)	0.0612 (0.0581)	0.147 (1.030)	12.14** (5.014)
Job Characteristics				
Poor support network of similar doctors (reference: neutral)				
Disagree	-0.0118	-0.0255	-0.130	0.550*

	Log Household Income		Hours Worked	
	Bulk-Billing	Non-Bulk-Billing	Bulk-Billing	Non-Bulk-Billing
	(0.0163)	(0.0263)	(0.202)	(0.322)
Agree	-0.0131	-0.0295	0.0254	0.752**
	(0.0198)	(0.0230)	(0.243)	(0.375)
Difficult to take time off work (reference: neutral)				
Disagree	0.0134	-0.0231	-1.567***	-0.779**
	(0.0183)	(0.0180)	(0.229)	(0.331)
Agree	0.0279	-0.00735	1.456***	2.098***
	(0.0192)	(0.0215)	(0.264)	(0.394)
Hours worked per week (reference: 35-54)				
≤ 35	-0.0775***	-0.102***		
	(0.0178)	(0.0213)		
55-59	0.0558	0.0198		
	(0.0346)	(0.0311)		
≥ 60	0.0770***	0.0152		
	(0.0203)	(0.0313)		
Doing on-call work (yes=1)	0.0361**	0.00392	2.301***	1.917***
	(0.0167)	(0.0181)	(0.256)	(0.415)
Patients have unrealistic expectations (reference: neutral)				
Disagree	-0.00620	0.00235	-0.446**	-1.260***
	(0.0134)	(0.0157)	(0.199)	(0.291)
Agree	0.00177	0.0395**	0.564***	0.113

	Log Household Income		Hours Worked	
	Bulk-Billing	Non-Bulk-Billing	Bulk-Billing	Non-Bulk-Billing
	(0.0141)	(0.0184)	(0.197)	(0.311)
Geographic Characteristics				
Few friends and family locally (reference: neutral)				
Disagree	0.0406*	0.0350	0.273	-0.641
	(0.0235)	(0.0399)	(0.233)	(0.416)
Agree	0.0132	0.0230	0.359	-0.708
	(0.0302)	(0.0407)	(0.252)	(0.488)
ASGC remoteness area (reference: major city)				
Inner regional	0.0258	-0.0809*	0.129	1.524
	(0.0349)	(0.0418)	(0.604)	(1.096)
Outer regional, remote and very remote	0.165***	0.0449	2.795***	4.120**
	(0.0404)	(0.0597)	(0.895)	(1.869)
Constant	12.03***	12.16***	23.79***	14.24**
	(0.0570)	(0.0543)	(2.551)	(5.811)
Observations	18413	7121	18133	7022
Distinct GPs	5779	2660	5745	2639
σ_u	0.754	0.716	12.01	13.02
σ_e	0.574	0.419	7.302	6.493
ρ	0.634	0.745	0.730	0.801
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

TABLE 6

	Bulk-Billing Percentage
Year Fixed Effects	
2008	-2.040*** (0.538)
2009	-1.938*** (0.514)
2010	-1.878*** (0.471)
2011	-1.222*** (0.417)
2013	0.331 (0.451)
2014	0.698 (0.478)
2015	2.235*** (0.520)
2016	2.513*** (0.560)
2017	1.859*** (0.588)
Doctor Characteristics	
Family status (reference: single)	
Partner, no children	1.961* (1.107)
Children, no partner	-0.546 (1.269)
Partner & children	0.655 (1.102)
Self-assessed health (reference: excellent)	
Very good	-0.00117 (0.425)
Satisfactory	0.114 (0.576)
Bad or poor	0.935 (0.878)
Annual household income	0.139 (0.228)

Degree obtained outside Australia (yes=1)	4.956* (2.880)
Job Characteristics	
Poor support network of similar doctors (reference: neutral)	
Disagree	-0.700* (0.394)
Agree	0.367 (0.430)
Difficult to take time off work (reference: neutral)	
Disagree	0.0961 (0.439)
Agree	1.084** (0.483)
Hours worked per week (reference: 35-54)	
≤ 35	-1.200** (0.523)
55-59	0.0604 (0.690)
≥ 60	-0.477 (0.692)
Doing on-call work (yes=1)	0.0201 (0.496)
Patients have unrealistic expectations (reference: neutral)	
Disagree	0.176 (0.373)
Agree	0.789** (0.392)
Geographic Characteristics	
Few friends and family locally (reference: neutral)	
Disagree	-0.490 (0.457)
Agree	-0.0336 (0.495)
ASGC remoteness area (reference: major city)	
Inner regional	-2.838* (1.488)
Outer regional, remote and very remote	5.714*** (1.952)

Constant	59.79*** (3.113)
Observations	24867
Distinct GPs	6789
σ_u	28.45
σ_e	16.34
ρ	0.752
Robust standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	