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Abstract

This paper analyses doctors' supply of after-hours care, and how it is affected by personal and family circumstances as well as the earnings structure. We use detailed survey data from a large sample of Australian General Practitioners to estimate a structural, discrete-choice model of labour supply and after-hours care. This allows us to jointly model how many daytime-weekday hours a doctor works, and his or her probability of providing after-hours care. The underlying utility function varies across individual and family characteristics. We simulate labour supply responses to an increase in doctors' hourly earnings, both in a daytime-weekday setting and for after-hours care. Among doctors overall, men and women increase their daytime-weekday working hours if their hourly earnings in this setting increases, but only to a very small extent. Men's labour supply elasticities do not change if their family circumstances change, but for women the small behavioural response disappears completely if they have preschool-aged children. Doctors are somewhat more likely to provide after-hours care if their hourly earnings in that setting increases, but again the effect is very small and is only evident in some sub-groups. Moreover, higher earnings in weekday-daytime practice reduces the probability of providing after-hours care, particularly for men. Increasing doctors' earnings appears to be at best relatively ineffective in encouraging increased provision of after-hours care, and may even prove harmful if incentives are not well-targeted.

JEL classification: I11, J22, J44, J21

Keywords: Labour supply, after-hours care, wage elasticity, health workforce, MABEL

1. Introduction

Access to high quality health care outside of usual working hours is a major issue in many developed countries. In addition to hospital services during weekends and emergency services, primary health care is often the first point of contact for patients 'after hours', and historically patients would expect to be seen at home by their own General Practitioner (GP). Though this is still the case in many rural communities, changing work-life balance expectations have over time changed the provision and nature of after-hours services provided by GPs. In most developed countries, after-hours care (AHC) is usually delivered in a variety of organisational models that all involve GP provision. The most common forms of organisational models include deputising services, co-operatives or roster arrangements, practice or clinics with extended hours during evenings and weekends. In the past few decades, many countries have faced serious challenges in the provision of AHC caused by shortages of GPs who are willing to provide after-hours services on a regular basis. In primary care the decision by GPs to provide after-hours services is important as the provision of AHC can potentially alleviate the burden on the hospital sector through reduced utilisation of more expensive Emergency Department (ED), out-patient and in-patient care, though the evidence here is largely descriptive (O'Malley et al., 2012; Lowe et al., 2005; Huntley et al., 2014; O'Malley, 2013)

In the UK, the requirement for GPs to provide 24-hour care was removed from their contracts with the National Health Service (NHS) in 2004. Australia's first National Primary Health Care Strategy highlighted the importance of achieving the right balance of financial incentives and funding arrangements to deliver efficient, accessible and appropriate after-hours services (Australian Commonwealth Government 2010). Between 1999 and 2009 there was a large fall in home-visiting rates by GPs in Australia and the delivery of AHC has been shifting away from individual and group GP practices with local after-hours on-call schedules toward large-scale deputising services or networks (Britt et al., 2014), which has also been the trend in the UK. These trends are also associated with changing demographics and work-life preferences of the medical workforce, with more young doctors and female doctors entering the profession who are often less inclined to provide AHC and need to be more substantially incentivised. AHC and on-call have been consistently ranked as the most important job characteristic by GPs in the UK and Australia (Scott, 2001; Scott et al., 2013) who would be willing to pay a large proportion of their annual income to avoid it.

Facing these challenges, it is critical to understand GPs' decisions in the provision of AHC and whether they respond to policies that attempt to increase their supply of AHC. Financial incentives that reward GPs for increased after-hours services are often sought as a natural policy instrument in the health sector. In the US, it is suggested that future payment reform under patient-centred medical homes and bundled payments should begin to address the issue of insufficient compensation for AHC (O'Malley, 2013).

The design of future funding schemes or payment reforms to compensate doctors for working after hours, requires evidence on doctors' responses to financial incentives targeted at AHC. There has been a small literature examining the labour supply behaviour of doctors, focusing on doctors' decisions on overall working hours in response to their hourly earnings. These studies have different types of labour supply models, including more recently structural discrete choice models and dynamic and panel models. (Rizzo and Blumental, 1994; Showalter and Thurston, 1997; Thornton and Eakin, 1997; Thornton, 1998; Sæther, 2005; Cheng et al., 2013; Kalb et al., 2015; Baltagi et al. 2005; Andreassen et al. 2013). However, none of these studies has explicitly focused on doctors' labour supply behaviour outside of normal working hours.

Only a limited number of studies have documented important factors that are associated with doctors' supply of after-hours or on-call services. Gravelle and Guiffrida (2001) found that GPs were more likely to provide visits themselves after an increase in fees for these visits, though they did not report the magnitude of the effect. Gravelle and Hole (2007) found that the presence of children reduces the hours of on-call of male and female GPs with the effect on female GPs being smaller, while non-UK qualified GPs spent more hours on average being on-call than UK-qualified GPs. Crighton et al. (2005), using Canadian data, found that GPs practising in academic and community clinics, or in after-hours clinics, and GPs offering selective medical services (emergency care, palliative care, house calls) were more likely to provide AHC. Female physicians, those practising in walk-in clinics, or physicians primarily paid by fee-for-service were less likely to do so. Pham and McRae (2015) found that Australian GPs who were employees rather than partners in a practice, female, older or lived in urban areas were less likely to provide AHC themselves. GPs in solo practice and GPs who were partners in the practice were more likely to have a heavier after-hours workload.

None of these studies explicitly modelled doctors' decisions of regular working hours and after-hours labour supply simultaneously. It is important to separate these two decisions and

model these choices simultaneously because doctors are likely to choose these two types of working hours on different margins, and they are likely to be jointly determined. The extent to which doctors respond to policies targeted at improving AHC will depend on its earnings elasticity. From a policy perspective, it is essential to jointly estimate GPs' earnings elasticities in these two different settings, and to allow them to vary across GPs with different individual and family circumstances.

This paper seeks to answer two questions. First, we aim to identify the important socio-economic characteristics that affect GPs' decisions in the provision of AHC. Second, we attempt to address whether financial incentives influence the provision of AHC, and whether the effects of financial incentives vary by the presence of children, doctor's age, presence of a partner and the partner's employment status. We employ a structural discrete choice labour supply model to study GPs' choices of working hours within and outside of regular office hours, and to estimate their earnings elasticities in these two settings. Our methodology provides an advantage over the often-used reduced-form model because the structural model can be used in a second step to simulate behavioural responses to changes in financial incentives incorporated in the model. We use a unique longitudinal data set from the Medicine in Australia Balancing Life and Employment (MABEL) study, which provides information on doctors' labour supply in both settings, as well as rich information on the characteristics of the Australian doctors.

The paper is structured as follows. The institutional context in Australia is briefly described in Section 2, followed by the estimation strategy in Section 3. The data are introduced in Section 4 with a discussion of the summary statistics. Section 5 presents the estimation results focussing on the earnings elasticities. Section 6 concludes.

2. Institutional context

GPs in Australia are paid by fee-for-service. They can charge patients what the market will bear, and patients receive a fixed subsidy from Medicare, the tax-financed national universal insurance scheme. This results in varying co-payments by patients. GPs operate in small private practices similar to those in the UK NHS, though in Australia there is a longer history of corporate ownership of GP practices. AHC has been organised in a number of ways, including provision by GPs and practices themselves, rotas across practices, co-operatives, private deputising services, national phone lines, and through hospital emergency

departments. The government has provided funding for GP-provided AHC through the Medicare Benefit Schedule (MBS) items that provide subsidies for after-hours consultations by GPs in practices, patient's homes or aged care facilities. These payments are 2 to 3 times higher than subsidies for daytime office visits. Between 1999 and 2013, GPs were also paid through the Practice Incentives Programme After Hours (PIPAH) incentives to provide AHC. In July 2013 the PIPAH incentive scheme was removed and funding was transferred to Medicare Locals, Australia's regional primary care organisations, who were given responsibility to co-ordinate AHC in their locality. Following a review of AHC funding for primary care (Jackson, 2014) and the abolition of Medicare Locals in 2015, the PIPAH incentives were re-designed and re-instated. Per patient payments are provided that now more clearly differ depending on the nature of AHC provided, with higher payments for GPs who provided more care themselves, and lower payments if care was outsourced to a Medical Deputising Service (MDS).

In 2013, under the old PIPAH incentives, 66% of all accredited practices (about 65% of all general practices in Australia) reported arrangements for AHC provided to patients through their claims for PIPAH incentives. Of these, 23% provided at least 10 hours of AHC, including through deputising services, and 17% provided 24-hour care themselves. Sixty four percent of rural practices provided 24-hour access compared to 18% in metropolitan areas. The number of accredited MDS's has increased from 16 in 2006 to 83 in 2014, and in 2009 around 60% of GPs subscribed to an MDS (National Association of Medical Deputising Services, 2014). This has fuelled an increase in claims for after-hours MBS items of 68% in the six year period until 2013/14, including a 112% increase in the number of after-hours home visits, and a 201% increase in after-hours services provided in residential aged care facilities (Jackson, 2014). MDS schemes act as a substitute for GPs who choose not to provide their own AHC, and so their growth may reflect either unmet need for AHC, or increasing numbers of GPs choosing not to provide it themselves.

3. Estimation Strategy

We use a structural model of labour supply to estimate a doctor's utility function. The advantage of a structural model over the often-used reduced form model is that the structural model can be used in a second step to simulate behavioural responses to changed earnings or other changes in financial incentives incorporated in the model.

The arguments of the doctor's utility function used in this paper are the number of working hours and their income (representing consumption of goods) which are usually included in the utility function when aiming to explain and predict labour supply decisions. However in addition to these two arguments, an indicator for providing AHC is included. The regular working hours and the provision of AHC combined determine consumption of leisure. Selected preference parameters in the utility function vary with a range of personal characteristics such as age, health status and the presence of children and a partner.

We estimate labour supply as a discrete choice, similar to the method proposed by Van Soest (1995). Each doctor i can choose between alternatives j from a set of m combinations of income and working hours in two different settings $\{(y_{ijk}, h_{ij}, a_{ik}); j = 1, 2, ..., m, k= 0,1\}$ where j is one of m different possible choices regarding the number of weekly working hours, and k denotes whether AHC is provided on top of regular working hours or not; a_{ik} indicates whether doctor i chooses to provide AHC; $h_{ij,}$ is the number of regular working hours doctor i chooses, and y_{ij1} is the corresponding household income if the GP provides AHC (a_{i1} =1) and y_{ij0} is the corresponding household income if the GP does not provide AHC (a_{i0} =0).

Ten different labour supply points j, with or without additional provision of AHC, can be chosen by the doctor.[1,2] The discrete labour supply points are chosen in such a way that the actual labour supply is represented as well as possible.[3] This results in 20 different choices. Every individual is assumed to choose the alternative that leads to the highest utility. Utility is specified as a quadratic function of working hours and household income, plus a random disturbance that is assumed to follow a type I extreme value distribution. The probability that individual i chooses alternative j and k (from the 2m alternatives) is thus:

$$Pr\left(U_{ijk} > U_{irs}, \{j,k\} \neq \{r,s\}\right) = {exp\left(U_{ijk}\right)}\Big/{\sum_{k=0}^{1}\sum_{j=1}^{m} exp\left(U_{ijk}\right)} \qquad (1)$$

[1] Individuals can work the following intervals: (0,18], (18,25] (25,35], (35,43) [43, 48), [48, 53), [53,58), [58, 63), [63, 68), [68,80]. We have also estimated the model with fewer choices (eight) and more choices (fifteen), which did not alter our findings substantially.

[2] Unfortunately, the data does not allow us to model the intensity of AHC supply. It is recorded whether doctors supply any AHC at all, and if so, how many hours they supplied in the week before the interview. However, variation in AHC supply from one week to the next is likely to be large and reflect practice rotas and scheduling as well as doctors' preferences. Last week's supply is thus not necessarily a good representation of a doctor's usual labour supply and therefore only the extensive margin can be included in the model.

[3] For regular working hours, the number of working hours follows straightforward from the intervals and is assumed to be 16, 20, 30, 40, 45, 50, 55, 60, 65 or 70 hours per week. The number of hours in after-care work would vary from week to week, and is set to the average number of hours in after-hours care provided by doctors in the given regular working hours interval who do in fact provide after-hours care. This ranges from 4 hours of after-hours care per week (for women who have less than 18 regular working hours per week) to 36 hours of after-hours care per week (for men who work more than 68 hours of regular work per week).

with

$$U_{ijk} = \beta_0 y_{ijk} + \beta_1 y_{ijk}^2 + \left(\beta_2 h_{ij} + \beta_3 h_{ij}^2 + \beta_4 h_{ij} y_{ijk}\right) + \beta_5 a_{ik} + \varepsilon_{ijk} \qquad (2)$$

We can vary some of the parameters of the utility function with personal characteristics such as age and presence of children in the household. In our specification, we allow β_0 and β_2 to depend on individual and household characteristics. Specifying ε_{ijk} as an Extreme Value type I distribution leads to the computationally convenient conditional logit model.

Estimation of the probabilities in (1) requires that we determine the household net income associated with each choice *j* and *k*. Hourly earnings for regular work and average hourly earnings for the provision of AHC are derived from a wage regression. We explain earnings in regular work and AHC with a range of job characteristics (such as number of doctors in or location of the practice) and personal characteristics (such as experience or number of qualifications). Once the hourly earnings for both work settings are calculated, total annual income before tax follows from multiplying hourly earnings with the number of weekly work hours and again with the number of working weeks per year, and adding other household income such as partner income and non-labour income.[4] We then apply relevant regulations from the tax transfer system to derive the annual household income after-tax y_{ijk}.[5]

The coefficients β of the model are estimated using a maximum likelihood approach based on (1). Once the utility function is estimated, we can simulate an increase in hourly earnings before tax, newly calculate the resulting annual household income after tax that is now associated with each choice *k*, and predict the choice an individual is expected to make under the new earnings settings. This allows us to evaluate the potential effect of changes in earnings policies on labour supply behaviour.

4. Data and Descriptive Statistics

We use data from the Medicine in Australia Balancing Life and Employment (MABEL) study, an annual panel survey of Australian doctors. The survey covers a broad range of topics around doctor's work arrangements, qualifications, job characteristics, attitudes and

[4] The number of weeks worked per year, non-work household income and partner's gross income are thus implicitly treated as exogenous. Weeks worked per year include absences for holidays and absences because of illness, as those are usually paid and thus contribute to the doctor's income. Absences for parental leave, maternity leave or other reasons are assumed to be unpaid and not included in the number of working weeks per year.

[5] Calculation of the after-tax income takes into account: income tax including rebates for low-income households and dependent spouses, family tax benefits, Medicare levy, and Medicare levy surcharge.

family circumstances. We use the first wave of MABEL which was collected in 2008, and restrict our analysis to GPs. We exclude individuals who do not report whether they supply any AHC, for whom no information on working hours is available, as well as those for whom missing information does not allow the prediction of income at different hours of work. We also exclude doctors whose reported weekly workload excluding AHC exceeds 80 hours per week, and those who report that they work less than one hour per week as these are outliers and are more likely to be measurement errors. This leaves a sample of 724 women and 996 men for the analysis.[6]

Table 1 shows key socio-economic characteristics that enter the preference parameters of the utility function, namely own age, self-employment status (yes/no), own health, presence of children by age of the youngest child, as well as presence and employment status of a partner.

Male doctors in the sample are on average about 53 years old, six years older than the female doctors; this reflects the higher proportion of female doctors in younger cohorts versus older cohorts. One in three women is self-employed, half the proportion for self-employed men. A clear majority (67.3%) of doctors of either gender report to be in excellent or very good health.

Matching female doctors' lower age, they are more likely to live with dependent children (aged 0 to 15) in a household than men are, and the youngest child in the household is likely to be younger. While male and female doctors are similarly likely to have a partner, female doctors' partners are usually full-time employed, while two out of three male GPs live with a partner who works part-time or not at all.

The individuals' labour supply is reported in Table 2, which shows doctors' chosen weekly working hours and whether they supply any AHC. Women are less likely to supply AHC and more likely to work less than 35 hours per week than men are.

The first step in preparing the data for the estimation of the structural labour supply model is to predict an income for each hours-band the doctors could have chosen. The MABEL survey asks for the total doctor's income from clinical practice and for total household income, but it does not separate income from AHC from the income from regular working hours. Therefore, we estimate total weekly salary as a function of regular working hours per week and the number of hours of AHC per week, which allows us to derive hourly earnings for both types

[6] Appendix A reports detailed information on the number of observations that were lost for different reasons. It also presents a comparison of personal key characteristics of doctors in the final sample and the original sample, which shows that both samples have similarly distributed key characteristics.

of working hours from the coefficients of the model. The number of working hours in daytime weekday practice and in AHC is interacted with a number of personal characteristics as well as job characteristics, in order to allow hourly earnings to vary across individuals.[7] Table 3 shows the results for the earnings equation. The hourly earnings for supplying AHC varies with the proportion of time spent in direct patient care, whether the doctor is self-employed, the practice size, and whether the doctor is located in a rural area. Hourly earnings are derived from the coefficients.[8] Practice size and time spent providing direct patient care are the main drivers of hourly earnings for AHC. The most important determinants of regular hourly earnings are a doctor's gender, qualifications, experience, self-employment status and the size of the practice they work in. Unpredictable work hours also play an important role, as does the complexity of patients' problems.

Once hourly earnings in the regular setting as well as in the after-hours setting are estimated for each doctor given his or her characteristics, we calculate a weekly salary before tax for each possible combination of regular hours and AHC. For this, an imputed number of hours of AHC (equal to the average) is used for those who choose an option including AHC. Multiplication by the number of weeks the doctor worked in the given year yields the estimated annual pre-tax salary. We then apply the tax regulations that were in place at the time to estimate the net income associated with each of the choices.

5. Estimation Results

Once we obtain an estimated net income associated with each combination of regular working hours and AHC, we estimate a conditional logit model based on equations (1) and (2) (see Appendix C for coefficients). Table 4 shows the marginal effects of weekly working hours and annual net income on the latent utility associated with a combination of regular-hours and AHC, based on three different specifications, each with income and hours as arguments in the utility function. The first specification does not include any additional socio-economic characteristics in the utility function, implying that the utility function is fixed across characteristics. The second specification includes doctor age and age of the youngest child; the third includes a full set of socio-economic characteristics, allowing the utility

[7] Descriptive statistics for the included job and personal characteristics are reported in Appendix B.

[8] For example, since the model predicts that increasing AHC by 1 hour increases the weekly earnings by \$5.40+\$30.57+\$4.41 for self-employed doctors in a metropolitan area with no other doctors working in the same practice, who spend 100 per cent of their time in after-hours care providing direct patient care, their hourly earnings for AHC is computed as \$40.83.

function to vary with doctor age, age of the youngest child, health status, self-employment status, and presence and employment status of a partner.

For all three specifications, the model yields a utility function that implies that the doctors' utility increases in income and decreases in working hours, one criterion for a 'well-behaved' utility function. We also test whether the indifference curves are concave in income and leisure, another criterion for a 'well-behaved' utility function. These criteria are not violated for any observation in the simplest model, and for only seven individuals in the most extensive specification. We assess the quality of predictions produced by the model by comparing the average predicted probability of choosing a regular-hour and AHC combination with the observed frequency of that choice in the sample. All specifications perform well and reproduce the observed distribution closely. Since all specifications meet standard quality criteria, we test the three specifications against each other, and find that the most extensive specification is preferred.[9] The remainder of this paper is based on the third specification. A comparison of predicted probabilities with observed frequencies is shown in Appendix D.

5.1. The impact of socio-economic characteristics on labour supply decisions

After choosing a specification, we first assess the impact of socioeconomic characteristics on labour supply decisions by changing each characteristic by one unit, in turn thereby changing an individual's utility. We then calculate expected total hours of work and the probability of providing any AHC before and after the change, using the estimated utility function and assuming that the net salary associated with each labour supply choice remained unchanged. Comparing the outcomes with just one characteristic changed, after averaging across all individuals, yields the effect of a one-unit change in characteristics on labour supply choices. Table 5 shows the results.

The effect of age on working hours varies strongly across gender. For women we see a small, constant decrease of weekly working hours with age that amounts to roughly 0.2 weekly working hours per year; that is, ceteris paribus we would expect a female doctor in her 60s to

[9] Parameter tests on the joint significance of the coefficients added to specification (2) compared to specification (1) show that these additional variables are statistically significant at the 0.1%-level for both men and women. Likewise, the variables added to specification (3) increase the model's explanatory power compared to specification (2); this is again significant at the 0.1%-level for both men and women. We also tested a specification where the effect of income and working hours on leisure depends not only on doctor age and age of the youngest child, but also on the interaction between them. However, parameter tests show that the additional coefficients add no explanatory power to the model, and they do not change the marginal effect of income or leisure. We thus reject this further extension of the model.

work 6 hours less per week than a female doctor in her 30s. For men, on the other hand, the relationship between working hours and age is that of an inverse U-shaped curve, with the turning point around age 40. The effect is strong and significant for younger and older doctors, and amounts to an increase in 0.3 weekly working hours per year for 30 year-olds, and a decrease of 0.8 weekly working hours per year for 60 year-olds.

Whereas men change their labour supply over the life-cycle with age and women do this to a much lesser extent, the opposite is true for the effect of having children. Female doctors whose youngest child is of preschool age work an average of 10 hours less than their childless counterparts do. As the child grows older, her labour supply increases again. The effects are highly significant. Male doctors' labour supply, on the other hand, hardly responds to the presence of children of any age.

If we interpret age as capturing a broad range of social and economic circumstances and preferences that impact on labour supply and change over the life course, it appears that the main change in a female doctor's life cycle affecting her labour supply is childbirth, and there are not many *other* relevant changes over the life-cycle to create an additional effect of age on labour supply. Male doctors' labour supply on the other hand, responds to a range of unmeasured circumstances and preferences that change over a typical life cycle – such as a mortgage that is to be paid off or expected returns on investments in the form of future career prospects – but having young children hardly affects them. The results suggest that even among doctors, a relatively homogenous group of men and women who made large investments in their education, there is a traditional division of labour in the home. This is further underlined by the effect of partners' labour force status on one's own labour supply: male doctors with a partner work four to five additional hours per week compared to their single counterparts, independent of whether their partner is fulltime employed or out of the labour force. This pattern is consistent with being a breadwinner and provider for the family. A female doctor, on the other hand, works nearly seven hours per week less than a single woman does if she has a fulltime employed partner, and five hours per week more if she has a partner who does not work. This pattern is consistent with the concept of a secondary earner.

Beyond the effects of family circumstances, men and women alike have lower labour supply when they are employed rather than self-employed: six hours less per week for women and 7 hours less per week for men.

When we assess the relationship between the same characteristics and the probability of providing AHC, the main point to note is that the effects are very small (see Table 6). Only very few of the characteristics change a doctor's probability of supplying AHC by as much as one percentage point, with the exception of having children for female doctors, and having a part-time employed partner rather than no partner for male and female doctors. The former decreases female doctors' after-hours supply by 1.5 percentage points if the child is 0 to 4 years old, and by 1 percentage point if the child is older than ten year. Having a part-time employed partner decreases women's probability of supplying AHC by about 1 percentage point as well, while the same situation increases men's probability by about 1 percentage point. This might reflect that women's partners, who are usually men, are more likely to work part-time only if they are relatively old or in poor health, which is not usually the case for men's partners. This would imply that women's probability of working after-hours may be reduced by care responsibilities, while men's after-hours supply usually is not.

5.2. The impact of earnings on labour supply decisions

We simulate the labour supply response to a change in the before-tax salary of 1%. We assess the impact of a change in earnings for regular working hours and AHC separately. We first simulate GPs' behavioural responses for the whole sample, and then for subgroups of GPs of specific policy interest across different practice sizes and practice areas (urban versus rural areas).

Table 7 shows the change in regular-hours labour supply in response to changes in hourly earnings, including a 1% increase in regular-hours earnings only, a 1% increase in after-hours earnings only, and a 1% increase in both regular-hours and after-hours earnings. Female doctors' total working hours increase by about 0.2%, if the pre-tax earnings for regular working hours increase by 1%. The effect is significant at the 5%-level.[10] No effect is found if the earnings for AHC increase by the same amount. This reflects that salary earned for AHC is a much smaller proportion of total earnings than the payments for regular working hours are. When we examine the responses to these earnings changes across subgroups, it turns out that they are mostly driven by childless women's labour supply. For women with

[10] This result is slightly different from the labour supply response to an increase in earnings found in Kalb et al. (2015), who estimate a similar model of labour supply, also using the first wave of MABEL data. They find a similarly small, but *negative* wage elasticity for both men and women; i.e. male and female doctors very slightly reduce their working hours when their wage is increased. We get the same result when we drop the choice of whether to provide AHC or not from the model and do not account for provision of AHC in the estimation of wages (keeping all else constant, including the doctors included in the sample). However, the main finding - that doctors' labour supply is largely unresponsive to changes in earnings – remains the same.

children, the effects are no longer significant. For women with young children, this is caused by a large reduction in the effect itself, whereas for women with school-aged children and older, the earnings elasticity cannot be estimated precisely, but might potentially be of a similar magnitude as for childless women with the confidence intervals for the estimated effects overlapping (see Figure 1). For female doctors who work in metropolitan areas versus those who work outside of metropolitan areas, there is virtually no variation in the labour supply response to an increase in one or both components of earnings. The same is true for doctors who work in a group practice with 3 or more doctors versus who work alone or with one other doctor in a practice.

Some of the patterns found for women are very similar for men. Overall, their earnings elasticity is similar: male doctors increase their regular working hours by 0.194% on average, if their pre-tax earnings for regular working hours increase by 1%. They also do not change their working hours if the earnings for AHC are increased. The total earnings elasticity if both salary components are increased simultaneously is 0.185. As for female doctors, there is little variation across rural and urban practices, little variation by practice size, and male doctors without children behave very similar to the overall population of male doctors. However, a different pattern is observed for male doctors comparing the elasticity across subgroups of male doctors by age of the youngest child. While we did find some reduction in female doctors' responsiveness to wages if they have a very young child, this is not the case for male doctors. Overall the responsiveness to financial incentives does not seem to vary much for men across different family circumstances or work settings, even less than is the case for women.

Table 8 presents the change in probability of providing AHC in response to changes in hourly earnings. The middle panel of Table 8 shows that an increase in AHC hourly earnings increases the probability of providing AHC for both male and female doctors. However, the magnitudes of the simulated responses are very small: increasing hourly earnings for AHC by 1% increases the probability of providing AHC by 0.097% for women and 0.144% for men. Based on the MABEL sample, 32.46% of all female doctors and 55.12% of male doctors provide some AHC. Taking female doctors as an example, the proposed change in after-hours earnings would increase AHC by about 0.032 percentage points – that is, only an additional number of 32 out of 100,000 female doctors would provide AHC in response to a 1% increase in AHC earnings (a 10% increase in AHC hourly earnings would only increase the number of total GPs in Australia providing AHC by 37 female and 134 male GPs). Neither

men nor women appear to change their responsiveness to financial incentives much in the presence of children, or when they work in practices of a different size. However, for both female and male doctors, the responsiveness does vary across subgroups of GPs by age of the youngest child doctors, and by their geographic location: GPs with very young children tend to be more responsive than GPs with older children, and the strongest positive response to an increase in AHC earnings is found among rural doctors. However, even among rural doctors, the behavioural response is still small: a 1%-increase in AHC earnings leads to an increase in the probability of providing AHC by 0.5% (or 0.16 percentage points) for women and 0.4% (or 0.2 percentage points) for men. Interestingly, increasing hourly earnings for AHC has a statistically significant, small negative impact on the provision of AHC in urban areas for both male and female doctors. The left panel of Table 8 demonstrate the cross-effect of an increase in regular-hours earnings on the provision of AHC. For both female and male doctors the effect of an increase in regular-hours earnings is negative for the whole sample and for all sub-groups[11]; the negative effects are statistically significant for the population of male doctors. That is, if doctors' ability to earn money outside of AHC increases, they are less likely to provide AHC. Since increasing regular earnings significantly decreases doctors' probability of providing AHC, the effect of an overall earnings increase is negative to zero for most sub-groups. If anything, a policy trying to use financial incentives to encourage provision of AHC needs to ensure that earnings bonuses are properly targeted.

6. Conclusion

In this paper we employ a structural discrete choice labour supply model to study GPs' choices of working hours within and outside of normal office hours. Using this framework, we were able to identify the type of GPs who are providing AHC, and more importantly, to estimate the extent to which the provision of AHC will increase in response to higher earnings across different types of GPs. We explicitly model GPs' decisions on regular working hours and AHC simultaneously as in reality GPs make joint but separate decisions

[11] The model uses average AHC hours by discrete labour supply point and gender. These average hours of AHC increase with regular labour supply (based on the observed relationship). So if an increase in regular hourly earnings increases labour supply, then the imputed hours of AHC increases as well, increasing the additional income when providing AHC, thus making the option with AHC more attractive. We cannot include the additional costs of providing more hours of AHC in the utility function, because we have no information on usual hours of AHC. If we had data that would allow us to identify the effect of AHC intensity instead of only whether any is provided, all cross-elasticities of providing AHC with respect to regular earnings would be even more negative than our estimates suggest.

on these two types of working hours. Moreover, using a structural model rather than a reduced-form model enables us to predict GP's behavioural responses to any hypothetical changes to earnings that may be introduced in the future. Therefore, our study provides the first evidence on this important issue which has received increasing attention in the policy arena in many countries.

Our results show a different life-course profile of working hours for male and female doctors, especially with regard to regular working hours. Male GPs' supply of regular working hours follows an inverted U-shaped curve, with the turning point being around age 40. Female GPs, on the other hand, do not show such a strong age profile, except for a significant decrease of regular working hours around child-rearing ages. There is a gender difference in working hours that depends on partner's employment status, depicting a picture where male GPs work as a breadwinner and female GPs work as a secondary earner in the household. Demographics and family circumstances play a much smaller role in the choice to provide AHC than in the choice for regular working hours. Few predictors are found for AHC − the only exception is that female GPs' probability of providing AHC is reduced by childcare responsibilities while there is no such effect on male GPs.

Our simulation results show that a one percent increase in regular hourly earnings will increase the supply of regular working hours by about 0.2% for both female and male GPs. This is consistent with the finding in this literature that physicians are not particularly responsive to earnings changes. For female GPs this small significant positive effect is not seen in women with young children, while for male GPs this effect is fairly similar across different family circumstances. With regard to AHC, our results indicate that a one percent increase in hourly earnings for AHC increases the probability of providing after-hour services by 0.14% for male GPs; for female GPs the magnitude is about 0.1% and the effect is not confined to women without any children. In general, the responsiveness to AHC financial incentives is positive, but very small for doctors of both genders, albeit ever so slightly larger for men than for women across all subgroups. A somewhat stronger response among both male and female doctors is found if they work in rural areas, but the response is still small. In addition, an increase in earnings for regular working hours decreases GPs' probability of providing AHC, especially for men. It is worth noting that our simulated behaviour responses on AHC are limited to the probability of providing AHC rather than the change in the number of AHC hours. This is due to data limitations: as there is no information on GPs' usual on-call and AHC hours in the data and since the number of on-call and AHC hours is likely to

vary over time, we cannot provide an estimate of the change in the number of on-call and AHC hours in response to a wage increase.

Several important policy implications can be drawn from this study. First, while a policy that increases the hourly earnings for AHC is likely to increase participation in AHC, the effect will be relatively small. We can quantify the simulated response in the provision of AHC in the Australian context: since there are in total about 11,000 female GPs and 15,900 male GPs in Australia, and about 32.46% of female doctors and 55.12% of male doctors currently provide some AHC, our estimated elasticity indicate that a 10% increase in AHC hourly earnings would increase the number of GPs providing AHC by 37 female GPs and 134 male GPs. This provides a cautionary note for any future policy reform that purely relies on higher hourly earnings for AHC as the cost of such a reform will be quite high. Second, given that an increase in earnings for regular working hours actually decreases the probability of AHC provision, if the policy goal is to improve the provision of AHC, it is important to specifically target financial incentives to AHC services while holding the earnings from regular working hours constant. If regular hourly earnings and after-hours earnings are increased at the same time, it is important to maintain the relativity between them to keep the current level of GP participation in after-hours care. Lastly, to the extent that the earnings elasticities for AHC vary across gender, family circumstances, and practice size and locations, financial incentives are unlikely to be equally effective across GPs with different family circumstances and GPs working in different locations.

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Table 1 Socio-economic characteristics

	Women		Men	
	Mean	Std. Dev.	Mean	Std. Dev.
Age	46.89	8.90	52.66	10.48
Is self-employed	0.343	0.475	0.613	0.487
Self-rated health status: excellent/very good	0.724	0.447	0.673	0.469
Has no children/children over 15 years only	0.483	0.500	0.626	0.484
Youngest child 0-4 years	0.144	0.351	0.121	0.326
Youngest child 5-9 years	0.149	0.357	0.097	0.297
Youngest child 10-15 years	0.224	0.417	0.162	0.369
Has no partner	0.162	0.367	0.105	0.307
Has partner who works full time	0.615	0.487	0.215	0.411
Has partner who works part time	0.128	0.335	0.390	0.488
Has partner who is out of the labour force	0.095	0.294	0.284	0.451
# of observations	724		996	

Notes: GPs with non-missing information in working hours, supply of after-hours care, income and relevant income determinants, and standard work hours between >0 and<=80 hours/week.

Table 2 Doctors' labour supply by gender

	Women		Men	
Daytime, weekday working hours per week:	No after-hours care	After-hours care	No after-hours care	After-hours care
>0 to18	0.120	0.015	0.040	0.006
>18 to 25	0.141	0.032	0.036	0.005
>25 to 35	0.191	0.079	0.077	0.040
>35 to 42.5	0.130	0.072	0.092	0.087
>42 to 47.5	0.043	0.041	0.072	0.089
>47.5 to 52.5	0.032	0.030	0.073	0.129
>52.5 to 57.5	0.012	0.019	0.028	0.075
>57.5 to 62.5	0.003	0.017	0.020	0.064
>62.5 to 67.5	0.003	0.011	0.006	0.027
>67.5 to 80	0.001	0.008	0.003	0.028
Total by AHC-provision	0.676	0.324	0.449	0.551
Total	1.0		1.0	

Notes: see Table 1.

Table 3 Estimated earnings across job characteristics and doctors' characteristics

Dependent variable: Total weekly earnings	Coeff.	Std. Err.
Weekly Working Hours	46.46***	11.72
Weekly working hours interacted with:		
Female	-14.09***	2.45
Has Australian Medical Qualification	-1.03	2.87
Is fellow of medical college	0.66	2.25
Number of medical qualifications	-0.86	1.43
Has Temporary Visa only?	-11.79	7.24
log(experience)	10.87***	2.08
Does any hospital work	0.59	2.62
Is self-employed	14.61***	2.78
Number of doctors in practice (Reference: 1)		
2-3	15.41**	4.98
4-5	20.31***	4.98
6-9	16.62**	4.82
>10	23.11***	5.35
Patients' problems are complex	-6.87**	2.41
Work hours are unpredictable	-12.72***	2.37
Opportunities for social interactions at work are good	-0.69	3.42
Employment opportunities for spouse at place of work are good	-3.93	2.21
Rural Setting (Reference: metropolitan)		
inner regional	-5.17	3.58
Outer regional/remote/very remote	8.23	4.57
State		
New South Wales	-1.85	7.93
Northern Territory	-8.45	11.43
Queensland	0.69	8.06
South Australia	0.06	8.46
Tasmania	-12.24	9.79
Victoria	-2.38	7.95
Western Australia	4.46	8.30

Table continued on next page

Table 3 - Continued

Dependent variable: Total weekly earnings	Coeff.	Std. Err.
Weekly On-call and AHC Hours	5.40	6.78
Weekly on-call and AHC hours interacted with:		
Proportion of time spent in direct patient-care (0-1)	30.57**	11.60
Is self-employed	4.41	4.62
Number of doctors in practice (Reference: 1)		
2-3	-12.13*	5.82
4-5	-16.25**	6.05
6-9	-17.67*	7.20
>10	-7.85	8.30
Rural Setting (Reference: metropolitan)		
inner regional	15.83**	5.49
Outer regional/remote/very remote	0.20	5.38
Number of observations	1720	
R2	0.821	
F-Test: all coefficients are zero (p-value)	0.000	

Notes: ***, ** and * indicate significance at the 0.1%-level, 1% level and 5% level. Also see notes Table 1.

Table 4 Marginal effect of working hours and annual net income on the latent utility of a regular hours and AHC combination based on different model specifications

Specification of utility function: Utility of income and working hours...	Argument of utility function	Marg. Eff.	Std. Err.
Women			
(1) does not vary with personal characteristics	Annual net income (in $10,000)	0.120***	0.021
(2) varies with doctor's age and age of youngest child		0.111***	0.012
(3) varies with full set of characteristics		0.149***	0.013
(1) does not vary with personal characteristics	Weekly working hours (in 10)	-2.901***	0.261
(2) varies with doctor's age and age of youngest child		-2.691***	0.273
(3) varies with full set of characteristics		-3.516***	0.302
Men			
(1) does not vary with personal characteristics	Annual net income (in $10,000)	0.082***	0.007
(2) varies with doctor's age and age of youngest child		0.093***	0.007
(3) varies with full set of characteristics		0.094***	0.007
(1) does not vary with personal characteristics	Weekly working hours (in 10)	-2.323***	0.176
(2) varies with doctor's age and age of youngest child		-2.621***	0.190
(3) varies with full set of characteristics		-2.660***	0.201

Notes: ***, ** and * indicate significance at the 0.1%-level, 1%-level and 5%-level. Also see notes Table 1.

Table 5 Effect of socio-economic characteristics on expected hours of work

	Women		Men	
Variable	Marg. Eff.	Std. Err.	Marg. Eff.	Std... Err.
Increase in age by one year				
At age 30	-0.19	0.12	0.27 *	0.13
At age 35	-0.20 *	0.08	0.11	0.09
At age 40	-0.22 **	0.06	-0.05	0.07
At age 45	-0.24 **	0.07	-0.20 ***	0.05
At age 50	-0.26 **	0.10	-0.37 ***	0.06
At age 55	-0.27 *	0.13	-0.56 ***	0.08
At age 60	-0.27	0.15	-0.76 ***	0.10
Having children (ref: no children)				
… Youngest child 0-4 years	-10.21 ***	1.13	-0.97	1.48
… Youngest child 5-9ears	-7.23 ***	1.36	-0.19	1.34
… Youngest child 10-15 years	-3.90 **	1.31	-0.18	1.19
Being employed (ref: self-employed)	-6.11 ***	1.15	-6.63 ***	0.81
Having a partner (ref: having no partner)				
… who is fulltime employed	-6.65 ***	1.33	4.70 **	1.75
… who is part-time employed	-3.36	1.86	1.69	1.58
… who is out of the labour force	4.80 **	1.73	4.17 *	1.67
Being in poor, fair or good health (ref: very good or excellent)	4.67 ***	1.15	2.49 **	0.83

Notes: Predicted changes are based on the most flexible model estimates reported in Table 4. ***, ** and * indicate significance at the 0.1%-level, 1%-level and 5%-level. Standard errors used to determine significance levels are bootstrapped with 100 repetitions. The bootstrap procedure accounts for the random nature of the model estimation, but not for that of estimated wages. Also see notes Table 1.

Table 6 Effect of socio-economic characteristics on the probability of providing after-hours care (in percentage points 0-100)

Variable	Women		Men	
	Marg. Eff.	Std. Err.	Marg. Eff.	Std. Err.
Increase in age by one year				
At age 30	0.039	0.042	0.005	0.068
At age 35	0.012	0.027	-0.012	0.052
At age 40	-0.012	0.021	-0.030	0.040
At age 45	-0.035	0.028	-0.049	0.034
At age 50	-0.056	0.041	-0.068	0.039
At age 55	-0.073	0.050	-0.082	0.056
At age 60	-0.084	0.049	-0.088	0.081
Having children (ref: no children)				
… Youngest child 0-4 years	-1.515 *	0.626	-0.537	1.072
… Youngest child 5-9ears	-0.790	0.701	0.283	0.955
… Youngest child 10-15 years	-1.074 *	0.528	-0.360	0.689
Being employed (ref: self-employed)	-0.184	0.430	-0.002	0.629
Having a partner (ref: having no partner)				
… who is fulltime employed	-0.437	0.565	-0.123	0.972
… who is part-time employed	-1.262 *	0.606	1.095	0.893
… who is out of the labour force	-0.019	0.718	-0.811	1.061
Being in poor, fair or good health (ref: very good or excellent)	0.681	0.539	-0.647	0.557

Notes: Predicted changes are based on the most flexible model estimates reported in Table 4. ***, ** and * indicate significance at the 0.1%-level, 1%-level and 5%-level. Standard errors used to determine significance levels are bootstrapped with 100 repetitions. The bootstrap procedure accounts for the random nature of the model estimation, but not for that of estimated earnings. Also see notes Table 1.

Table 7 Percentage change in supplied regular working hours for given changes in hourly earnings

	Regular earnings +1%		After-hours earnings +1%		Both earnings +1%	
	Point estimate	Standard error	Point estimate	Standard error	Point estimate	Standard error
			Women			
All	0.192 *	0.083	0.005	0.003	0.197 *	0.086
Has no children	0.208 *	0.095	0.006	0.005	0.214 *	0.098
Youngest child						
0-4 years	-0.008	0.127	0.003	0.006	-0.003	0.129
5-9 years	0.371	0.239	0.008	0.010	0.379	0.245
10-15 years	0.165	0.140	0.003	0.005	0.168	0.142
Practice size						
1-2 doctors	0.199 *	0.090	0.007	0.007	0.205 *	0.093
3 or more doctors	0.190 *	0.088	0.005	0.003	0.195 *	0.090
Practice location						
Urban	0.190 *	0.088	0.004	0.003	0.194 *	0.090
Rural	0.196 *	0.086	0.008	0.007	0.205 *	0.089
			Men			
All	0.194 **	0.063	-0.006	0.005	0.185 **	0.066
Has no children	0.169 *	0.072	-0.009 *	0.004	0.159 *	0.075
Youngest child						
0-4 years	0.249 *	0.121	-0.007	0.019	0.230	0.124
5-9 years	0.320 *	0.136	0.015	0.022	0.319 *	0.138
10-15 years	0.181 *	0.091	-0.005	0.007	0.176	0.095
Practice size						
1-2 doctors	0.138 *	0.067	-0.011	0.008	0.122	0.070
3 or more doctors	0.220 ***	0.064	-0.004	0.005	0.213 **	0.067
Practice location						
Urban	0.203 **	0.068	-0.005	0.004	0.198 **	0.070
Rural	0.181 **	0.058	-0.009	0.009	0.165 **	0.062

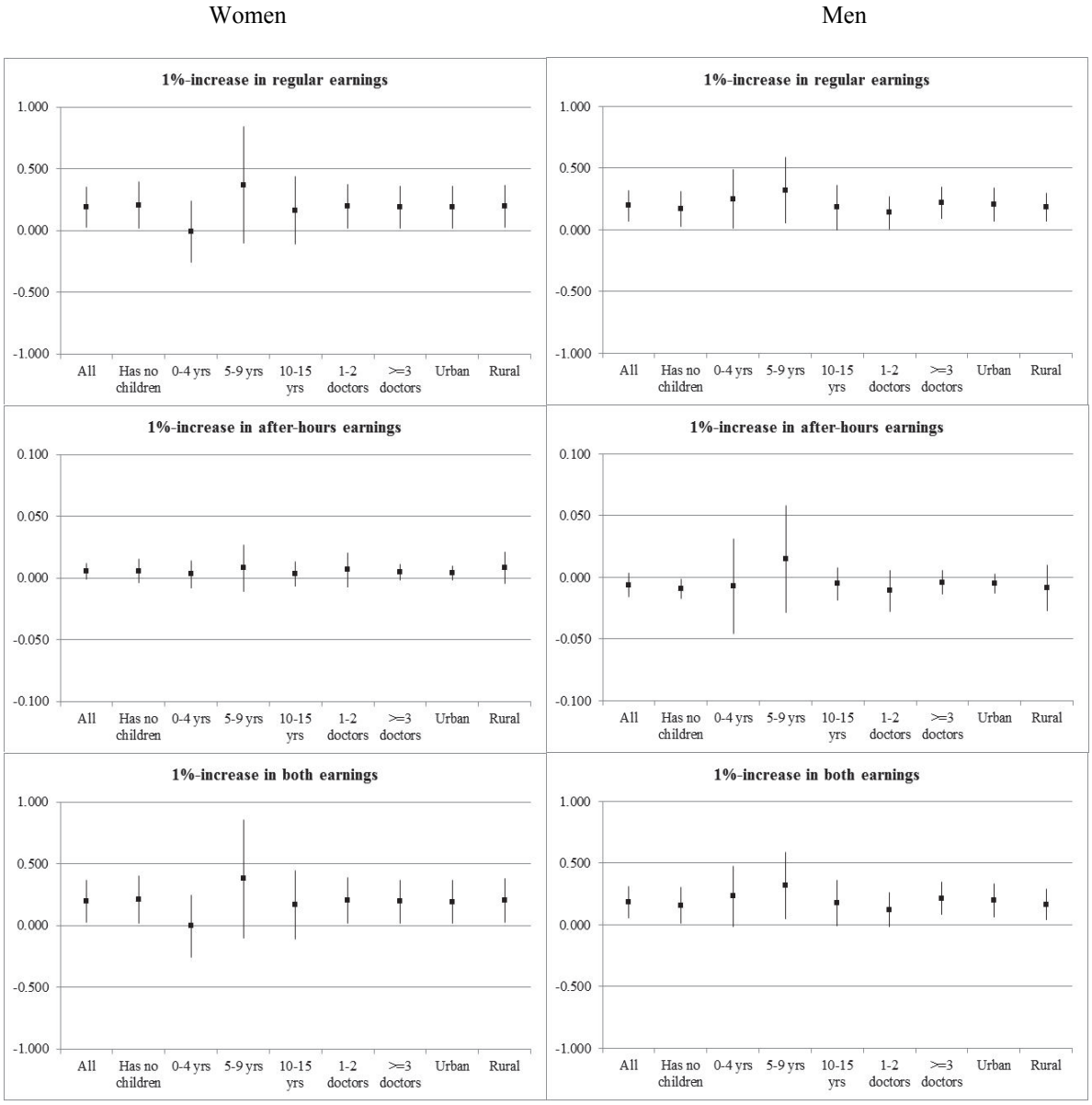
Notes: Changes in regular working hours are measured relative to working hours without the earnings increase; for example, a response of 1.000 in the above table implies that increasing an earnings component by 1% results in an increase of regular working hours by 1%. Predicted changes are based on the most flexible model estimates reported in Table 4. ***, ** and * indicate significance at the 0.1%-level, 1%-level and 5%-level. Standard errors used to determine significance levels are bootstrapped with 100 repetitions. The bootstrap procedure accounts for the random nature of the model estimation, but not for that of estimated earnings. Results are shown for different population groups: i) overall population of doctors; ii) doctors without children; iii)-v) doctors with children whose youngest child is 0-4 years old/5-9 years old/ 10-15 years old; vi)-vii) doctors who work in a practice with 1-2 doctors/ 3 or more doctors; viii)-ix) doctors who work in metropolitan areas/outside of metropolitan areas. Also see notes to Table 1.

Table 8 Percentage change in the probability of supplying after-hours care for given changes in hourly earnings

	Regular earnings +1%		After-hours earnings +1%		Both earnings +1%	
	Point estimate	Standard error	Point estimate	Standard error	Point estimate	Standard error
			Women			
All	-0.134	0.085	0.097 **	0.028	-0.039	0.085
Has no children	-0.179	0.103	0.103 *	0.048	-0.078	0.098
Youngest child						
0-4 years	0.056	0.241	0.159 **	0.057	0.217	0.257
5-9 years	-0.336	0.278	0.115	0.071	-0.224	0.271
10-15 years	-0.026	0.203	0.031	0.045	0.003	0.205
Practice size						
1-2 doctors	-0.017	0.175	0.094	0.070	0.075	0.164
3 or more doctors	-0.170	0.099	0.098 **	0.036	-0.074	0.094
Practice location						
Urban	-0.095	0.101	-0.078 ***	0.022	-0.174	0.101
Rural	-0.229	0.153	0.520 ***	0.082	0.286	0.156
			Men			
All	-0.151 ***	0.043	0.144 ***	0.027	0.008	0.035
Has no children	-0.111 ***	0.043	0.119 ***	0.025	0.010	0.035
Youngest child						
0-4 years	-0.337	0.200	0.279	0.189	0.021	0.188
5-9 years	-0.341 *	0.148	0.149	0.091	-0.146	0.107
10-15 years	-0.057	0.074	0.135 **	0.043	0.079	0.065
Practice size						
1-2 doctors	-0.052	0.098	0.122	0.073	0.100	0.086
3 or more doctors	-0.195 ***	0.043	0.154 ***	0.023	-0.033	0.037
Practice location						
Urban	-0.059	0.038	-0.048 **	0.017	-0.104 **	0.039
Rural	-0.291 **	0.103	0.436 ***	0.071	0.179 *	0.076

Notes: Changes in the probability of providing AHC are measured relative to the probability of providing AHC without the earnings increase; for example, a response of 1.000 in the above table implies that increasing an earnings component by 1% results in an increase in the probability of providing AHC by 1% (such as from 30.0% to 30.3%). Also see notes to Table 1 and Table 7.

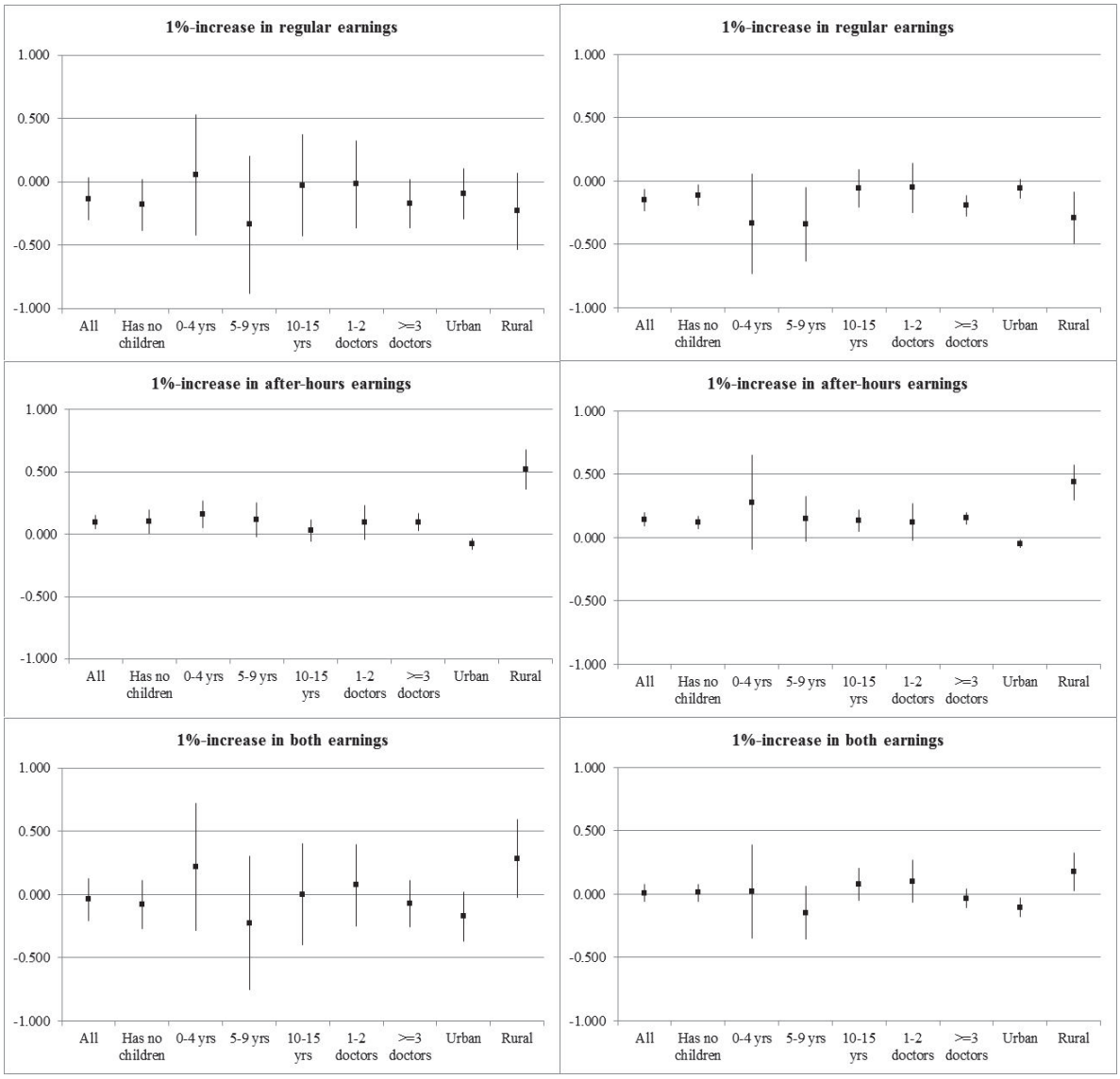
Figure 1 Percentage change in supplied regular working hours for different scenarios of an increase in earnings



Notes: The figure is an illustration of the results presented in Table 7. The black dots represent the point estimate of the behavioural response; the lines represent an interval estimate for a 95% confidence level. Note that the scale of the y-axis in the middle panel is different from the upper and lower panel, because the estimated response to an increase in after-hours earnings alone is very small.

Figure 2 Percentage change in in the probability of supplying after-hours care for different scenarios of an increase in earnings

Women Men



Notes: The figure is an illustration of the results presented in Table 8. The black dots represent the point estimate of the behavioural response; the lines represent an interval estimate for a 95% confidence level.

Appendix A

Table A.1 Sample selection

	Men	Women
Total observations in MABEL, Wave 1	1,996	1721
Dropped	1,000	997
Final sample	996	724
Reasons for dropping:		
Reports weekly working hours: zero	10	12
Missing information on provision of after-hours care	101	76
Reports usual weekly working hours: >80 hours/week	24	5
Missing income information	395	543
Missing information on characteristics that enter utility function	24	14
Missing information on characteristics that enter earning regression	390	305
Conflicting information on reported working hours	56	42
Total	1,000	997

Notes: see Table 1.

Table A.2 Summary statistics for full sample and final sample of analysis

	Men		Women	
Variable	Full Sample	Final Sample	Full Sample	Final Sample
Youngest child				
0-4 years	11.37%	12.05%	16.85%	14.36%
5-9ears	9.62%	9.24%	13.42%	14.92%
10-15 years	15.53%	16.16%	18.77%	22.38%
Age	26.59	26.77	20.17	20.89
Self-employed	58.91%	60.84%	33.35%	34.25%
Health status				
Fair/Poor	10.67%	11.24%	7.32%	7.60%
Good	21.04%	21.18%	18.48%	20.03%
Very Good	35.72%	37.95%	35.47%	35.91%
Excellent	27.45%	29.62%	33.88%	36.46%
Information is missing	5.11%	0%	4.59%	0%
Partner's employment status				
Not applicable – no partner	10.37%	10.54%	13.65%	16.16%
Full-time employed	20.34%	21.39%	58.86%	61.46%
Part-time employed	35.22%	39.46%	11.10%	12.85%
Not employed	26.80%	28.61%	9.01%	9.53%
Information is missing	7.26%	0%	7.38%	0%
# observations	1996	996	1721	724

Notes: see Table 1.

Appendix B

Table B.1 Summary statistics for characteristics included in the earnings equation

Variable	Mean	Std. Dev.	Min.	Max.
Weekly Earnings (Before Tax)	3609.29	2326.17	0.00	18523.68
Weekly Hours in AHC	12.76	23.77	0	134
Usual proportion of time spent in direct patient care during AHC hours (0-1)	0.17	0.33	0	1
Weekly Working Hours	39.89	14.20	1	80
Female	0.42	0.49	0	1
Has Australian Medical Qualification	0.81	0.39	0	1
Is fellow of medical college	0.57	0.50	0	1
Number of medical qualifications	0.56	0.76	0	4
Has Temporary Visa only?	0.02	0.14	0	1
log(experience)	24.62	10.61	0	63
Does any hospital work	0.29	0.45	0	1
Is self-employed	0.50	0.50	0	1
Number of doctors in practice (Ref.:1)				
2-3	0.20	0.40	0	1
4-5	0.23	0.42	0	1
6-9	0.34	0.47	0	1
>10	0.16	0.36	0	1
Patients' problems are complex	0.68	0.47	0	1
Work hours are unpredictable	0.28	0.45	0	1
Opportunities for social interactions at work are good	0.11	0.31	0	1
Employment opportunities for spouse at place of work are good	0.55	0.50	0	1
Rural Setting (Reference: metropolitan)				
inner regional	0.22	0.41	0	1
Outer regional/remote/very remote	0.14	0.34	0	1
State				
New South Wales	0.25	0.43	0	1
Northern Territory	0.02	0.13	0	1
Queensland	0.18	0.39	0	1
South Australia	0.09	0.29	0	1
Tasmania	0.04	0.19	0	1
Victoria	0.28	0.45	0	1
Western Australia	0.11	0.32	0	1
Number of observations		1720		

Notes: see Table 1.

Appendix C

Table C.1 Estimated Coefficients of the Utility Function

	Women		Men	
Variable	Coeff.	Std. Err.	Coeff.	Std. Err.
Income	0.292	0.046	0.142	0.034
Income·Income	0.000	0.000	0.000	0.000
Hours	-2.678	0.961	-0.853	0.807
Hours·Hours	0.237	0.096	0.184	0.094
Hours·Income	-0.024	0.008	-0.027	0.007
Income·Child(0-4)	-0.083	0.027	-0.011	0.022
Income·Child(5-9)	-0.037	0.030	0.006	0.023
Income·Child(10-15)	-0.054	0.024	-0.007	0.016
Income·Age (Age in 10 years)	0.047	0.034	0.010	0.021
Income·Age^2 (Age in 10 years)	0.013	0.008	0.004	0.004
Income·Selfemployed	0.007	0.019	0.005	0.014
Income·Excellent Health	-0.035	0.018	0.012	0.012
Income·Partner(FT)	-0.018	0.024	0.000	0.022
Income·Partner(PT)	-0.067	0.027	0.026	0.022
Income·Partner(OLF)	-0.005	0.032	-0.012	0.022
Hours·Child(0-4)	0.896	0.559	0.208	0.536
Hours·Child(5-9)	0.202	0.675	-0.172	0.597
Hours·Child(10-15)	0.849	0.533	0.175	0.419
Hours·Age	-0.114	0.075	0.022	0.053
Hours·Age2	0.003	0.002	0.000	0.001
Hours·Self-employed	0.353	0.425	0.415	0.360
Hours·Excellent Health	0.356	0.391	-0.511	0.310
Hours·Partner(FT)	-0.167	0.525	0.379	0.575
Hours·Partner(PT)	1.151	0.585	-0.530	0.571
Hours·Partner(OLF)	0.487	0.698	0.650	0.576
Provides after-Hours care	-0.815	0.085	-0.047	0.071
N	724		995	
log-likelihood	-1683.831		-2582.955	
F-test: Coefficients on all interaction terms of income/hours with personal characteristics are zero (p-value)	0.000		0.000	

Notes: The model corresponds to that presented in specification (3), Table 4. ***, ** and * indicate significance at the 0.1%-level, 1%-level and 5%-level. Also see notes Table 1.

Appendix D

Table D.1 Quality of model – observed and predicted labour supply choices (in %)

	Weekly hours of work	Women		Men	
		Observed proportion	Predicted probability	Observed proportion	Predicted probability
No after-hours care	>0 to18	12.0	9.7	4.0	1.6
	>18 to 25	14.1	13.1	3.6	2.5
	>25 to 35	19.1	16.0	7.7	5.5
	>35 to 42.5	13.0	11.6	9.2	8.1
	>42 to 47.5	4.3	8.0	7.2	8.1
	>47.5 to 52.5	3.2	4.7	7.3	7.1
	>52.5 to 57.5	1.2	2.5	2.8	5.4
	>57.5 to 62.5	0.3	1.2	2.0	3.5
	>62.5 to 67.5	0.3	0.5	0.6	2.0
	>67.5 to 80	0.1	0.2	0.3	0.9
After-hours care	>0 to18	1.5	4.2	0.6	1.6
	>18 to 25	3.2	5.8	0.5	3.4
	>25 to 35	7.9	7.4	4.0	6.3
	>35 to 42.5	7.2	6.0	8.7	9.3
	>42 to 47.5	4.1	3.7	8.9	10.2
	>47.5 to 52.5	3.0	2.7	12.9	8.6
	>52.5 to 57.5	1.9	1.4	7.5	6.8
	>57.5 to 62.5	1.7	0.8	6.4	4.8
	>62.5 to 67.5	1.1	0.4	2.7	2.8
	>67.5 to 80	0.8	0.1	2.8	1.3

Notes: Predictions are based on the most flexible model reported in Table 4. Also see notes Table 1.