Dual Practice of Health Workers: Evidence from Indonesia*

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Abstract

Dual practice among physicians is common all over the world. The policy of allowing public employees to work as private providers was intended to create an incentive for physicians to stay in their public posts. This paper assesses the causal impact of dual practice on health services provided by public health professionals. Using health-facility (known as puskesmas) level panel data from Indonesia, we exploit the exogenous variation in the initiation of private practice among puskesmas heads after a 1997 health regulation. This regulation requires health professionals to apply for a license for private practice at least three years after their graduation. Using a difference-in-differences regression discontinuity design, our estimates suggest that dual practice of health professionals (relative to those engaged only in public service provision) is associated with about 18 working hours less per week on average at public facilities. Dual practice is also associated with about 7 additional patients seen per week by health professionals in their public duties. We also find a higher likelihood of dual practitioners to refer public patients to private clinics. These findings are consistent with weak monitoring and low motivation of health workers in the presence of growing private practice opportunities and pose serious challenges for the human resource management of universal health care provisions.

JEL Classification: I10, I18, J2, J44, J45, O1

Keywords: Dual practice of health professionals; Indonesia, Ministry of health regulation 916; Weak monitoring; Difference-in-difference regression discontinuity design.

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Abstract

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1 Introduction

With a steep increase in health care spending across the globe as medical technology continues to evolve, achieving value for money is key to the success and sustainability of any public health system. Frequent absence of public health professionals and the poor delivery of public health services have often been a concern among policy makers in many emerging economies (Chaudhury et al., 2006). The presence of weak disciplining environment and growing opportunities for private practice (PP) among public health professionals (Ferrinho et al., 2004) can particularly challenge the public healthcare provision, especially when health workers are poorly motivated.

Dual practice among physicians is common all over the world. The policy of allowing public employees to work as private providers was intended to create an incentive for physicians to stay in their public posts. This could serve to reduce waiting times for treatment or lead to improvements in access to health services, especially for poor and rural inhabitants of developing countries (García-Prado and González, 2011). Data on health workforce practices in many countries confirm dual practice by doctors (Berman and Cuizon, 2004; Ferrinho et al., 2004; García-Prado and González, 2011; González, 2014), but there is little evidence on its impact. Theoretical studies mainly focus on analyzing physicians' incentives as dual providers (González, 2004; Barros and Olivella, 2005; González, 2005; Biglaiser and Ma, 2007; Brekke and Sørsgard, 2007), but results are rather ambiguous when it comes to identifying the ultimate impact of dual practice on the efficiency and quality of public health care provision.¹ More importantly, the related empirical literature is rather disperse and descriptive in nature, although it seems to suggest that health workers engaged in dual practice are often unproductive, inefficient and corrupt (Berman and Cuizon, 2004; Ferrinho et al. 1998, 2004).

This paper makes an innovative attempt to empirically identify the causal effect of dual practice on public health provision using the introduction of a 1997 Ministry of Health regulation in Indonesia (see below) and, as far as we are aware, it is the first paper to do so. Indonesia is an important case in point. The government of Indonesia is committed to the provision of quality health care and over the last decades has introduced a series of regulations (see Appendix 2) to ensure quality public health service provision to all Indonesians. Given the relative low pay of civil servants that

¹González (2004), Biglaiser and Ma (2007), Brekke and Sørsgard (2007) and González and Macho-Stadler (2013) also investigate on the optimality of allowing dual practice and explore different policy options to deal with this phenomenon.

includes government-employed physicians and other health professionals, allowing them to practise privately was considered to be essential to recruit and retain health professionals, especially in remote rural areas.² As such, PP by public health professionals remains common in Indonesia (Eggleston and Bir, 2006). Division of work hours between state and private practice is governed by general regulations for civil servants and specific local regulations. These generally require civil servants to spend 8 hours a day, five days per week, in their state employment and conduct private practice only after the close of the official public work day (Meliala, Hort and Trisnantoro, 2013).

Using four rounds of public health facility-level (locally known as puskesmas) Indonesian Family Life Survey (IFLS) data, we consider heads of puskesmas operating in rural and urban communities over 1993-2007. About three quarters of these heads are engaged in PP and are unlikely to be closely monitored because of their hiring/firing authority at the puskesmas. Undoubtedly, the decision to practise privately is a strategic choice by these heads and is, therefore, potentially endogenous to determining dual practitioner's provision of public health service measured by two outcomes, namely, the number of patients seen and the hours worked per week at the puskesmas.

To identify the causal effect of dual practice on the selected outcome variables, we exploit the exogenous variation in the initiation of PP of these puskesmas heads after the introduction of the 1997 Ministry of Health Regulation Act 916 in Indonesia. First, the timing of the regulation is randomly assigned and, in all likelihoods, it is orthogonal to the outcomes of interest. The regulation necessitated health professionals to get a license for PP, and they could apply for it only after completing at least 3 years of compulsory public service after graduation, which was not the case before 1997. Before 1997 health workers could practise privately anytime during the compulsory public service initiated after graduation. An immediate effect of the 1997 regulation in our sample has been a discrete jump in the likelihood of PP at experience level (defined as years since graduation and abbreviated as *exp*) 5 years, which used to be at experience level of 4 years in the pre-1997 years. This jump at $exp = 5$ in post-1997 years is the only discontinuity supported by the parametric analyses after controlling for all other factors too; the same does not hold for $exp = 2, 3, 4, 6$ years. Accordingly, we treat that the discrete jump in the PP likelihood at $exp = 5$ is an exogenous effect due to the 1997 regulation. In other words, for observations with *exp* close

²Income from government salary is a relatively small proportion of total income for specialists in Indonesia. In particular, 65.6% of income for surgeons and 81.2% of obstetricians are from the private sectors, as reported by Meliala, Hort and Trisnantoro (2013).

to the discontinuity around $exp = 5$ we essentially have a random pseudo-experiment, which we use to identify the causal effect of PP on our chosen outcome variables.

The observed discontinuity at $exp = 5$ in the post-1997 years allows us to distinguish sample health workers between eligible ($exp \geq 5$) and noneligible ($exp < 5$) workers. The joint considerations of pre- and post-1997 (i.e. before vs. after), together with $exp < 5$ and $exp \geq 5$ (i.e. eligible vs. non-eligible) allow us to formulate a difference-in-differences (d-in-d) framework for determining the likelihood of PP. Further, the fact that this effect on the likelihood of PP is only significant when using observations of health professionals with an experience level close to 5 years value, determines that we require weighting observations close to the ($exp = 5$) more than others. In turn, this means that we can only measure a local effect, that is only valid for health professionals with $exp = 5$. The weighted d-in-d estimator for PP (see further discussion in 2) thus corresponds to the first-stage in our analysis. This empirical framework is similar to a d-in-d regression discontinuity (RD) design. The RD weighting ensures that we focus on health workers who are rather comparable in terms of their experience and therefore efficiency and income. In a second-stage, we evaluate the effect of PP (instrumented by the d-in-d exogenous variation) on selected health provision outcomes: the number of patients seen and the hours worked per week at the puskesmas. We also study the link between the number of public patients seen by the dual practitioner in the puskesmas and the likelihood of referring a puskesmas patient to PP.

Our results suggest that dual practice of public health professionals is associated with significantly higher number of patients seen per week in the puskesmas, but a lower number of hours worked there per week in the full sample. Results are robust to use of alternative functional forms of our parametric regression function (linear, quadratic, cubic). Given that our analysis focuses on the immediate neighborhood of the experience cut-off $exp = 5$, we rule out the possibility that our results can be attributed to greater efficiency of dual practitioners. We also find that puskesmas with dual practitioner heads are more likely to refer public patients to private clinics. The results obtained are in line with the theoretical predictions recently found in González, Montes-Rojas and Pal (2020) where it is shown that allowing dual practice in weak discipline work environments could imply a reduction in the working time at public facilities together with an increase in the number of public patients seen when public physicians lack motivation (because, for instance, they are poorly paid in their public performance), or face large opportunity costs of working at public facilities

(because the private alternative is much more attractive). These two theoretical requirements, namely low motivation of dual practitioners and large opportunity cost of working at public health centers, seem to be compatible with the essential features of the Indonesian dual labour market characterized also by weak monitoring, as described in Section 2.³

As previously mentioned, the existing literature on dual practice is rather diverse encompassing the economics of dual job holding, governance of public service delivery as well as work place culture and social motivation of workers, especially in developing countries.⁴ There is also an emerging development literature that highlights the governance issues in the provision of public health services in developing countries: health workers are often absent from work (Chaudhury et al., 2006; Muralidharan et al., 2011). Doctors often spend just a few minutes with patients, providing lower quality care, and simultaneously over- and under-treating patients (see Das, Hammer and Leonard, 2008, and Das and Hammer, 2014, for reviews). Further Das et al. (2016) had studied the patient experience in public and private clinics in rural India and had reported that dual practitioners spent more time with private patients, completed more items on the checklist, and were also more likely to offer a correct treatment in their private practices, relative to their public practices. We complement these studies and link the dual practice of public health workers to their likely absence from public health services in weak monitoring environments. Our work also links to the literature on the role of social motivation on public service delivery. Workers in the public sector care about the usefulness of their job for society (Frank and Lewis 2004). Besley and Ghatak (2005) further argued that social motivation is an important driver of efficiency in organizational behaviour. But this may break down in weak monitoring environments.

Dual practice of health professionals undoubtedly poses a huge challenge to attain the efficiency of health care, especially at the primary healthcare level. Improving the efficiency of healthcare is a policy priority in most countries, as the share of healthcare costs out of GDP is increasing rapidly. These results from Indonesia therefore have important implications for an efficient management of public health provisions in other emerging economies characterized by weak monitoring and low

³Low motivation and weak monitoring can also be justified in light of the observations made by Chaudhury et al. (2006) for a group of developing countries including Indonesia. This study reports 40% absence rate among primary health care providers on an unannounced day. Similar observations are made by Das et al. (2016) who highlight that administrative accountability of public health care providers is weak in India.

⁴See Eggleston and Bir (2006), García-Prado and González (2011), Socha and Bech (2011) and González (2014) for reviews on dual practice.

motivation of health workers as well.

The paper is organized as follows. Section 2 describes the data and explains the empirical methodology. Section 3 presents and analyzes the results. Finally, Section 4 concludes.

2 Data and empirical strategy

2.1 Data

We use four rounds (1993, 1997, 2000 and 2007) of the Indonesian Family Life Survey (IFLS), available for over 300 communities in Indonesia located in 13 provinces, resulting in puskesmas-level panel data over 1993-2007. There are a total of 3907 puskesmas-level observations over four rounds; the number of puskesmas per round varies between 920 and 1095 in our sample so that it is an unbalanced panel. This data contain information on personal characteristics as well as service provision of the heads of the puskesmas (who could be a doctor or other type of health professional) and other administrative data for the service provision at the puskesmas. Since the personal information including their private practice (PP) is only available for the heads of puskesmas, our analysis focuses on them. Note that these health professionals had chosen to continue with the government medical service and may or may not practise privately.

2.2 The 1997 Health Regulation 916

Key to our identification strategy is the 1997 Ministry of Health regulation 916. The major change introduced by the 1997 regulation is that it necessitates doctors to get a license that enables them to practice privately and they can only apply for this licence after completing 3 years of compulsory service at public health centers. The licensing requirement for PP was absent before the introduction of the 1997 regulation, and health workers could practise privately anytime during the three years of compulsory service initiated after graduation.

Table 1 summarizes the descriptive statistics for the selected variables for the full sample and separately for pre- and post-1997 subsamples. About 75% of health professionals practice privately though the proportion declined little in the post-1997 years. On average, heads work 20 hours a week seeing about 84 patients and they spend about 15 minutes per patient. Note, however, that hours worked per week declined somewhat while number of patients seen increased in the post 1997

years. Second, average number of years since graduation (average experience) of health workers was about 9.6 years before 1997, but rose to an average of approximately 13 years after 1997, thus indicating greater tenure of heads after the 1997 regulation. Third, the average likelihood of referral of public patients from puskesmas to PP is reported to be around 32% in the full sample, and the likelihood has declined somewhat after 1997, which is possibly linked to the slight decline in private practice after 1997.

Figure 1 shows the distribution of experience for all heads (panels a and b), heads with less than or equal to 10 years of experience with dual practice (panels c and d) before (1993-1997) and after (2000-2007) the 1997 regulation. It is evident that there is a shift in the distribution of health workers' experience to the right in the post-1997 years, indicating that the pool of heads absorbed in the public puskesmas is more experienced in the post-1997 years. An overwhelming majority (95%) of puskesmas heads practising privately have more than three years of experience, especially after 1997. Also the percentage of dual practitioner heads with less than 3 years of experience had declined from 11% in the pre-1997 years to 5% in the post-1997 years; to a large extent, the cases of PP before completing three years of experience prevailed largely in rural areas in a bid to retain health care staff in these regions (Chomitz et al. 1997). These figures, thus, establish the transparency of the natural experimental design used for our identification strategy, using the assignment variable 'experience' (since graduation) measured in years in our sample (see further discussion below).

In the context of dual practice, it is also important to explore if the heads of the puskesmas face weak monitoring. By virtue of their position, puskesmas heads are in charge of the puskesmas and hence are unlikely to be directly monitored at their work place. Further, the 2000 and 2007 Indonesian Family Life Survey (IFLS) data provide information on whether the heads of puskesmas had authority to hire and fire staff (unfortunately this information is not available for the 1993 and 1997 rounds of the survey). We find that a significantly higher proportion of dual practitioner heads (33% as opposed to 29% of those without PP) have the authority to hire and fire subordinate staff at the puskesmas. The latter may make it easier for these heads to use their subordinate staff to cover their responsibility at the puskesmas during periods of absence on account of private practice. We can explore two possible ways a puskesmas head can facilitate their dual practice compared to any other subordinate staff. First, the average tenure (i.e., number of years spent in the current

puskesmas) of the head is higher in the post-1997 years, especially for the dual practitioners (see Table 1). Longer tenure in the same puskesmas may help the heads to establish their influence and authority over their subordinate staff. The second factor that may facilitate heads' dual practice is the availability of the support staff who can cover the head's responsibility during his/her absence from the facility. We find that the number of supporting doctors and nurses are significantly higher in puskesmas where the head is practicing privately (relative to those where the head is not doing so) and this holds both before and after 1997.

2.3 Identification strategy

We make use of the 1997 Ministry of Health regulation 916 for identifying the effect of dual practice. This allows us to exploit the exogenous variation in PP likelihood of puskesmas heads. The focus on years of experience since graduation (abbreviated by *exp*) is informative in this respect because it allows us to distinguish dual practitioners into 'eligible' and 'non-eligible' groups. How we do this is described below.

Following the practice in the regression-discontinuity (RD) design, we start with the graphical analysis because it provides both easy presentation and transparent validation of the design. We use the most common RD plot based on an evenly spaced binning of the data and choose IMSE-optimal evenly-spaced method using polynomial regression, to approximate the underlying variability of the raw data. Figure 2 shows the RD plot of the likelihood of PP among public puskesmas heads with a maximum of ten years of experience, for pre- (left panel) and post-1997 (right panel) years. We use a semi-parametric regression function fit with a polynomial of degree 3 in both cases. The left panel shows that the difference between the eligible and non-eligible workers was blurred in the pre-regulation years, i.e., health professionals practising privately were distributed continuously across this threshold of $exp = 5$ before the 1997 policy was implemented. Further, pre-1997 private practice likelihood was very low at ($exp = 2$) and then gradually peaked to about 0.83 at ($exp = 4$). In other words, even without the license requirement before 1997, it took four years (since the graduation) for private practice likelihood to peak in our sample, perhaps highlighting the importance of experience and reputation building in initiating PP.

The obvious impact of the 1997 regulation has been a pronounced drop of PP likelihood for those with $exp = 4$, followed by a discrete jump in the PP likelihood for those with $exp = 5$ (see

the right panel). In particular, the post-1997 PP likelihood drops to 0.64 at $exp = 4$ years and then jumps to around 0.80 at $exp = 5$.⁵ Further, the PP likelihood seems to have been stabilized for these health workers after 1997, which was clearly not the case in pre-regulation years. In other words, the observed discontinuity in PP likelihood around the $exp = 5$ in the post-1997 leads to a discrete jump in the PP likelihood at $exp = 5$, which we take as good as random.⁶

The graphical inference from Figure 2 is also compatible with the mean comparisons of selected variables for the chosen cut-off point of 5 years, as summarized in Table 2. Distinguishing between pre- and post-1997 years, the mean difference in the likelihood of PP is significant at the cut-off point of 5 years. Second, for the post-1997 period, the unconditional likelihood of having a PP is significantly higher for professionals with experience $exp \geq 5$ years: 78% as opposed to 71% for those with $exp < 5$ years. On average, the number of patients seen is significantly higher for professionals with more than five years of experience, while the hours worked per week appear significantly lower, on average, for heads with experience greater than or equal to five years after 1997. Importantly, note that this trend is opposite to that in the pre-regulation years. Third, the likelihood of referring public patients to private clinics is little less among more experienced workers and this trend is similar both in pre- and post-1997 years. We, however, do not have information on the health outcomes of patients treated by these dual and other health practitioners.

2.4 Econometric model

The basic empirical model of healthcare provision that we want to estimate is as follows:

$$y_{it} = \alpha_0 + \alpha_1 pp_{it} + f(exp5_{it}, exp_{it}) + \alpha_2 X_{it} + C_i + T_t + u_{it}, \quad (1)$$

where y refers to selected outcome variables, namely, hours worked per week (*hours_wk*) and number of patients seen per week (*n_patient_wk*) in the puskesmas. We also consider a third outcome variable indicating the propensity of a puskesmas with dual practitioner head to refer

⁵We find that the significant drop in PP likelihood among those with $exp = 4$ after 1997 arises because many heads left the puskesmas. We find that this happened more in rural puskesmas though IFLS data does not provide any information as to why these puskesmas heads had left. One possibility is that the license after 1997 offers these health workers a legitimacy to practise privately on their own, which was not possible for comparable workers in the pre-1997 years.

⁶Our parametric analyses further confirm that this observed discontinuity at $exp = 5$ in private practice likelihood after 1997 derived from a semi-parametric analysis holds. More importantly similar discontinuity does not hold at $exp = 2, 3, 4, 6$ years (see 3)

public patients to private clinics (*referral*). *pp* is a dummy variable indicating if a public health professional, i.e., the head of the puskesmas i holds a PP in year t . Our key explanatory variable is therefore *pp* that measures the dual practice of the puskesmas head and is likely to be endogenous. In view of our identification strategy explained above, we exploit the discontinuity at $exp = 5$ after 1997, and argue that the resultant treatment on PP likelihood is as good as random (see further discussion and eq. 2 below).

The set of variables X contains other covariates including individual characteristics of the health worker that may also influence y . The set of control variables X includes a dummy variable for urban puskesmas (*urban*), and a dummy variable (*llang*) that takes a value of 1 if the doctor's knows the local language and 0 otherwise. There are pronounced rural-urban differences in the placement of health professionals and also their private practice. As such, the urban dummy *urban* would account for the differential effect of urban (relative to rural) regions on the outcome variables, if any. Second, there are about 500 different dialects spoken in Indonesia's multicultural society and, as such, the knowledge of local language is an essential quality of a doctor to be able to converse with his/her patients, which is an essential prerequisite for practicing privately in the community. Inclusion of this binary variable *llang* would thus allow us to account for the differential effect of the knowledge of local language, if any, on public healthcare provision. We also include a binary variable *headdoc* to indicate if the head is a doctor and we do this to account for the differential behaviour, if any, of doctors from other health professionals who may also head a puskesmas.

We consider health professionals with at most ten years of experience,⁷ focusing on those with around 5 years of experience (as per our identification strategy summarised in Figure 2) after the 1997 regulation, using the binary variable $exp5_{it} \times post97_{it}$: $exp5 = 1$ if $exp \geq 5$ years and 0 otherwise, and $post1997 = 1$ if $year > 1997$ and 0 otherwise. As such, we assume that these puskesmas heads have comparable experience and are also on a relatively comparable payscale for the public job; hence, we do not control for their income, which is also potentially endogenous to their PP. We also include a polynomial (linear, quadratic or cubic) $f(exp5, exp)$ on experience, separately for $exp < 5$ and $exp \geq 5$. Finally, C_i refers to district (Kabupaten) fixed-effects and T_t to survey year fixed-effects to account for unobserved district and year-specific factors that may also influence the likelihood of PP. It is important to control for the district dummies as the district

⁷Note that it makes no difference for us to choose anything other than ten years of experience, because the weights make the other observations insignificant (Fajnzylber et al. (2011); also see discussion below).

governments are in charge of puskesmas and, hence, the district dummies would account for the unobserved variation in local governance within districts. As such, we compare the public health professionals' health care provision behaviour in puskesmas within districts. Inclusion of the year dummies accounts for the important changes, if any, during the sample period, including the 1997 financial crisis and the introduction of the fiscal decentralisation in 2000, both of which could have affected the public health care provision by sample health workers within districts.

Given the potential endogeneity of PP in eq. (1) above, and in the light of our identification strategy vis-a-vis Figure 2, we use $exp5_{it} \times post97_{it}$ as an instrumental variable (IV) for PP. The latter allows us to determine the PP likelihood of puskesmas heads before and after the introduction of the regulation in 1997 within a difference-in-differences (d-in-d) framework for determining the private practice likelihood:

$$pp_{it} = \beta_0 + \beta_1 exp5_{it} + \beta_2 post97_{it} + \beta_3 (exp5_{it} \times post97_{it}) + \beta_4 X_{it} + g(exp5_{it}, exp_{it}) + C_i + T_t + v_{it}, \quad (2)$$

where $post97$ is a binary variable that identifies pre- and post-1997 reform observations, and it takes values 0 for years 1993 and 1997, and 1 for 2000 and 2007. As before, we also control for common district-level and year-level unobserved shocks that may also affect pp , as captured by district (C_i) and year (T_t) dummies as in eq. (1). Note that in practice $post97$ is collinear with T , and it is thus redundant. Inclusion of district dummies means that we account for district-level unobserved factors including local governance of puskesmas that may influence our estimates. We also include a flexible polynomial (linear, quadratic or cubic) $g(exp5, exp)$ on experience, separately for $exp < 5$ and $exp \geq 5$.

The validity of the IV depends on comparing observations close to the $exp = 5$ cut-off, so that the distribution of health workers are comparable around the cut-off. Thus, we adopt a weighted two-stages least-squares (W2SLS) design following Fajnzylber et al. (2011), where larger weights are attached to observations with $|exp - 5|$ being small. This estimator uses analytical weights given by a Gaussian kernel with a given bandwidth where observations close to the observed threshold of $exp = 5$ are given a greater weight. The bandwidth is the standard deviation of the Gaussian kernel of 1, measured in $(exp - 5)$ units. Fajnzylber et al. (2011) is a d-in-d regression discontinuity (RD) estimator. Our model can also be interpreted as a d-in-d regression discontinuity when we have a

discontinuity in exp at $exp = 5$, and the weighting scheme corresponds to an RD design. The RD weighting, thus, ensures that we focus on health workers who are rather comparable in terms of their experience and therefore efficiency and income, i.e., both observables and unobservables.

An important challenge in this exercise is to identify the correct functional form of the relationship between the variable experience and the outcome measure. To the extent that the specified functional form is correct, the estimator implied by the IV as per Figure 2 will be an unbiased estimator of the mean program impact at the threshold $exp = 5$. If the functional form is incorrectly specified, treatment effects will be estimated with bias, because the identification could be solely based on misspecifying the functional form. For example, if the true functional form is highly nonlinear, a simple linear model can produce misleading results. There are two theoretical reasons for a nonlinear relationship between outcomes and ratings. One is that the relationship between mean counterfactual outcomes and ratings is nonlinear, perhaps because of a ceiling effect or a floor effect; the other is that treatment effects vary systematically with ratings. Consequently, we experiment with a variety of functional forms in $f(\cdot)$ and $g(\cdot)$ —including linear, quadratic models, and cubic models to make sure the functional form that is specified is as close as possible to the correct functional form (see Lee and Lemieux, 2010).

3 Results

In this section we shall present and analyze the results of both eqs. (1) and (2). Before we proceed to analyse the estimates, we need to ensure that the common trend assumption is satisfied for the heads with/without private practice in the pre-reform years 1993 and 1997. Mean comparisons of the two outcome variables (see Table A0 in the Appendix) suggest that there were no significant differences in the selected outcome variables, i.e., hours worked per week and number of patients seen per week in the pre-reform years 1993 and 1997. In other words, puskesmas heads with and without private practice behaved similarly with respect to the outcome variables in the pre-reform years. Thus, any differential effect in the outcome variables after 1997 can be attributed to the 1997 regulation, after controlling for all other factors that may also influence the outcomes. Also note that all our estimates focus on health professionals with at most ten years of experience. This is the reason why the number of observations in the estimation sample is less than those in the full

sample.

3.1 First-stage estimates: Effect of the 1997 administrative rules on private practice likelihood

We implement the weighted least squares estimation procedure described above. Table 3 reports the weighted least-squares first-stage estimates of the likelihood of private practice for a selected bandwidth of $\sigma = 1$ for eq. (2) using linear (column 1), quadratic (column 2) and cubic (column 3) polynomials for $exp5$ interacted with $post97$, $exp5$, $post97$, X as well as district level fixed-effects as additional covariates. Note that the year fixed effects are subsumed in $post97$ dummy.

Before proceeding to analysing the results, we need to test for the presence of pre-trends in determining the private practice likelihood within a d-in-d framework. Following Borusyak and Jaravel (2017) we perform an F test for identifying the pre-trends, treating the 1997 regulation as an event. With four rounds of data for 1993, 1997, 2000 and 2007 and given that the regulation was introduced in 1997, we take 1993 and 1997 as the pre-event years; similarly 2000 and 2007 are the post-event years. Accordingly, we compare the fully dynamic specification (including both pre and post-event terms) with the restricted model where we drop the two terms pertaining to 1993 and 1997. The resultant F-statistic turns out to be 13.88, which is statistically significant at 0% level. We can therefore reject the null hypotheses in favour of the alternative that there are no pre-trends in our sample, thus validating our estimates.

The results indicate that $exp5$ and $post97$ are not individually statistically significant for determining the likelihood of private practice. However, the interaction ($exp5 \times post97$) turns out to be positive and significant and the coefficient estimates is quite stable as we compare the estimates using linear, quadratic and cubic polynomial in columns (1)-(3) of the table. In particular, the private practice likelihood has been about 0.21 points higher among those with $exp \geq 5$ years (relative to those with $exp < 5$ years) in the post-1997 years in our sample. Columns (4)-(6) show the corresponding estimates for heads who are doctors. While the nature of the estimates are very similar, the private practice likelihood is higher for doctors (between 0.26 to 0.27 points) than other non-doctor heads with $exp \geq 5$ years (relative to those with $exp < 5$ years) in the post-1997 years.

We also implement further tests about the validity of the IV ($exp5 \times post97$) at any other

possible cut-off values of experience between 2 – 6 years. These results are shown in Table A1 in the Appendix. A comparison of results confirms that $exp\ k \times post97$ remains statistically insignificant when $k = 2, 3, 4$ or 6 years are used. In other words, $exp5$ in the post 1997 years is the only threshold level where we identify a statistically significant effect of the regulation on the likelihood of private practice; this is compatible with Figure 2 that we discussed above.

In Figure 3, panel a, we implement the above model for different bandwidth choices, using a cubic polynomial in exp with interactions with $exp5$. Moreover, we show the point estimates together with the 95% confidence interval using White-heteroskedasticity-robust standard errors. We consider bandwidth values in $\{1, 1.1, \dots, 2\}$ (for $\sigma < 1$ standard errors increase considerably and all specifications deliver statistically insignificant results). The figures show that the local effect is the largest for $\sigma = 1$, and its magnitude decreases monotonically as the bandwidth increases. Overall these suggest that only a local effect with $\sigma = 1$ delivers a statistically significant effect.

Validity of these results are contingent on the balancing of the covariates around the experience threshold. We follow Lee and Lemieux (2010) to formally test the covariates balancing. These results are summarized in Table 4 where we regress each of the covariates, namely, *llang* (i.e., the head speaks the local language), *headdoc* (i.e., head is a doctor), *urban* (the puskesmas is located in an urban region) on $exp5$, $post97$, and $exp5 \times post97$, including linear polynomials and the district dummies. Insignificance of the estimated coefficient of $(exp5 \times post97)$ confirm that the covariates are balanced around the cut-off in the post-1997 years.

3.2 Second-stage estimates: Effect of Dual Practice on Selected Public Health Provision Measures

At the second-stage, we evaluate the effect of dual practice on outcomes of public health provision, namely, hours worked per week (*hours_wk*) and number of patients seen in a week (*n_patients_wk*) by the puskesmas head. We also study the link between the number of public patients seen by the dual practitioner in the puskesmas and the likelihood of referring a puskesmas patient to private practice. To this end, we use the first-stage procedure above to instrument private practice (*pp*) by $(exp5 \times post97)$. Ordinary least squares (OLS) regression results (see Table A2 in the Appendix) indicate that private practice does not exert any statistically significant effect either on hours worked or patients seen per week by the heads of puskesmas in our sample, irrespective of the

choice of the polynomial. We argue that this lack of significance is attributed to the simultaneity bias between the likelihood of private practice and the resultant public health provision indices by the dual practitioner.

3.3 Hours worked per week

Table 5 shows the second-stage IV estimates for eq. (1), where the outcome of interest is *hours_wk*, i.e., hours worked per week. Columns (1)-(3) show the estimates for all health professionals, while columns (4)-(6) show those only for the doctors subsample. Controlling for all other factors, we find that dual practice is associated with significantly less hours worked per week irrespective of the type of health professionals (doctors or others). Clearly, the effect is independent of the choice of the polynomials, i.e. linear, quadratic and cubic, especially for all health professionals. Note that the effect is still negative for doctors for quadratic and cubic polynomials, while it turns out to be insignificant (though still negative) for linear polynomial (see column 4). Further, the size of the effect is the largest for linear polynomial, and then falls as we move from linear to quadratic and then to cubic polynomials. We see similar pattern for any health professional. Overall, these estimates suggest that dual practice of health professionals (relative to those engaged only in public service provision) is associated with about 18 working hours less per week on average. Figure 3, panel b, presents the point estimates of *pp* on hours worked per week together with the 95% confidence interval using White-heteroskedasticity-robust standard errors for different values of bandwidths in $\{1, 1.1, \dots, 2\}$, which emphasizes that the effect is only significant on a local interval around the *exp* = 5 cut-off. Evidently, the figure shows that the effect of *pp* is decreasing in the bandwidth and it becomes insignificant for a bandwidth value > 1 . The fact that the confidence interval increases means that it only works close to the cut-off *exp*5.

3.4 Patients seen per week

Second, Table 6 summarizes the second-stage estimates of number of patients seen per week (*n_patients_wk*) by the heads of puskesmas. Columns (1)-(3) show the estimates for all health professionals, while columns (4)-(6) show those for doctors only. Note that the effect of dual practice on number of patients seen per week remains insignificant for linear polynomial among doctors, but turns out to be statistically significant for quadratic and cubic polynomials, and this holds both

for any health professionals and also doctors in our sample. *Ceteris paribus*, dual practice is associated with about 7 additional patients seen per week by health professionals; the number is higher (about 12-13 patients per week) for doctors. As before, the size of the effect is the highest for the linear polynomial and then decreases gradually as we move from quadratic to cubic polynomial in our sample. Figure 3, panel c, presents the coefficient estimates of pp for determining the number of patients seen per week together with the 95% confidence interval using White-heteroskedasticity-robust standard errors for different values of bandwidths in $\{1, 1.1, \dots, 2\}$. It follows that the effect of pp is increasing in the bandwidth, but becomes statistically insignificant for a bandwidth value above 1.5. As we increase the bandwidth, the natural experimental design becomes weaker. The fact that the confidence interval increases means that it only works close to the cut-off *exp5*.

3.5 Referral of public patients to private clinics

Finally, we consider the link between number of public patients seen by the dual practitioner and the likelihood of referring public patients to private practice from the puskesmas. IFLS data ask heads of puskesmas if they refer public patients to (a) other puskesmas; (b) hospitals; (c) private practice. We use this information to calculate the likelihood of referring a puskesmas patient to private practice (as opposed to public hospitals for example). In order to explore the link between private referral of public patients and dual practice of health workers, we regress the likelihood of referring public patients to private clinics on the likelihood of dual practice (using the first stage estimates), after controlling for other factors that may also influence this. Results summarized in Table 7 suggest that the estimated coefficient of private referral is 0.10 with a standard error of 0.03 without any other controls (see column 1), and about 0.0320 with a standard error of 0.0127 with other controls (see column 2) that may also affect private referral. In other words, there is evidence from our sample that puskesmas with dual practitioner heads are more likely to refer public patients to private clinics.

3.6 Discussion

Taken together, results from Table 5 and Table 6 show a negative causal effect of private practice on hours worked per week in the puskesmas, and positive on number of patients seen per week. Moreover, we also find a higher likelihood of dual practitioners to refer public patients to private

clinics.

Our result that dual physicians work fewer hours in the public sector than contracted is not surprising. There are several papers in the literature that have warned that many public doctors work fewer hours than contracted in order to attend their private offices. Ensor and Duran-Moreno (2002) show that U.K. consultants spend time in private clinics that they should be devoting to their public duties. Mossialos, Allin, and Davaki (2005) suggest that the majority of doctors working at primary care centers run by IKA (one of Greece’s largest social security organizations, covering the majority of the working population) work fewer than their contracted hours. Absenteeism in public facilities is even more common in developing countries (Chaudhury et al. 2006). However, as far as we know, none of these works have identified the causal impact of dual practice as we do.

The finding of a higher likelihood of dual practitioners to refer public patients to private clinics lend support to the theoretical predictions that show that dual providers can be more motivated to use their public jobs to facilitate their private (rather than public) practice (González, 2004; Barros and Olivella, 2005; González, 2005; Biglaiser and Ma, 2007; Brekke and Sorgard, 2007).

Moreover, we relate the positive causal effect of private practice on number of patients seen per week, with the dual practitioners’ referral strategy mentioned above. If one agrees that physicians might use their public performance to refer some public patients to their private practice, as our data shows, then they may be interested in giving consultation to a large number of patients to deviate them and raise the amount of patients that end up treated privately. This mechanism is present in the theoretical papers by González (2004), where physicians have an incentive to provide excessive effort in the public sector to raise their prestige and create additional demand, and by González, Montes-Rojas and Pal (2020), where physician’s private income is positively related to the number of patients that he has treated in the public sector.

Finally, it is important to highlight that our results are not driven by higher efficiency of dual practitioners since our weighting design focuses on health workers with close to five years of experience and hence are of comparable efficiency.

The main limitation of our study is that it relies on assuming that the change in the regulation is the only cause of the change in the distribution of private practice likelihood on a close interval around the threshold level of experience $exp = 5$. We, however, minimise this bias by controlling for a set of observed and unobserved (time-invariant and time-varying) characteristics. There may

still remain some bias related to the unobserved characteristics of the puskesmas heads that we could not address because of data shortcomings. Finally, as with most regression discontinuity analysis, the results obtained this way are only valid in a local sense for observations with values of experience close to the observed cut-off where the identification is valid.

4 Conclusion

The present paper examines the effects of dual practice on public healthcare provisions in a weak monitoring environment, using the hours worked per week and the number of patients seen per week by heads of puskesmas in Indonesia as proxies for health services provision by public professionals. We also consider the likelihood of public health workers referring public patients to private clinics.

Our results support that dual practice is likely to be associated with a significant reduction in the number of hours of work per week in the public facility; but dual practitioners might end up seeing more patients during the week. *Ceteris paribus*, our estimates suggest that dual practice of health professionals (relative to those engaged only in public service provision) is associated with about 18 working hours less per week on average at public facilities. Moreover, dual practice is associated with about 7 additional patients seen per week by health professionals in their public duties. Finally, puskesmas with dual practitioner heads are about 10 percentage points more likely to refer public patients to private clinics. These results are robust to the choice of polynomials.

These findings are consistent with the theoretical predictions in González, Montes-Rojas and Pal (2020), where it is shown that allowing dual practice in weak discipline work environments imply a reduction in the working time at public facilities, together with an increase in the number of public patients seen, provided public physicians lack motivation or face large opportunity costs of working at public sector. These requisites reflect, in fact, the essential characteristics of the Indonesian health labour market, namely, weak monitoring environment and lower motivation of health workers with higher opportunity costs of working in the public sector as private facilities flourish.

Over the last years, universal health coverage (UHC) has become an agreed goal of global health policy and planning initiatives.⁸ While the importance of human resources in UHC has been recognized, this cannot be done objectively without a good understanding of the extent and impact

⁸<https://www.who.int/bulletin/volumes/94/2/14-151894/en/>

of health workers' dual practice that remains largely unexplored in the literature. Especially in low- and middle-income countries, the achievement of UHC may be hampered by unregulated dual practice as the private sector grows rapidly and costs of UHC grows rapidly. Failure to understand why, how, and to what extent public health workers engage in dual practice may compromise attempts to regulate it and undermine progress towards UHC. As far as we are aware, ours is the first study to identify the causal impact of dual practice on public health provisions in Indonesia using a novel identification strategy. While this is a study of Indonesia, we believe our results have important implications for management of public health provisions in other emerging economies characterized by weak monitoring and low motivation of health workers (Choudhary et al. 2006). Certainly, in order to evaluate the performance of countries in regard to dual practice and be able to make informed country-specific recommendations, further empirical work is needed. Still, we believe that this study can enrich the discussion on human resource management of dual practice and thereby contribute to the development of UHC.

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Tables

Table 1. Descriptive statistics at the Puskesmas level 1993-2007

Variable	Obs	ALL Mean	Std. Dev.	Obs	1993-1997 (pre-1997) Mean	Std. Dev.	Obs	2000-2007 (post-1997) Mean	Std. Dev.
If practice privately	3411	0.75	0.43	1520	0.78	0.42	1891	0.73	0.45
PP in the puskesmas	3896	0.19	0.39	2005	0.19	0.39	1891	0.18	0.38
Head is a doctor	3893	0.59	0.49	2002	0.55	0.49	1891	0.64	0.48
Hours worked/wk	3234	20.46	19.05	1364	29.30	12.46	1870	14.00	20.39
Patients seen/wk	3038	84.22	92.10	1318	79.25	77.74	1720	88.03	101.60
Referral to private pra	3909	0.32	0.15	2015	0.36	0.13	1894	0.29	0.15
Experience (in years)	2849	11.84	7.26	1380	9.96	6.67	1469	13.60	7.35
Tenure (in years)	3219	7.68	8.84	1333	6.53	11.09	1886	8.50	6.69
Speaks local language	3293	0.95	0.22	1402	0.95	0.22	1891	0.95	0.22
Support health staff	3815	2.81	3.53	1951	2.54	3.33	1864	2.68	3.73
Support staff if pp=1	2456	3.16	3.64	1097	3.57	3.51	1359	2.82	3.71
Urban region	3896	0.59	0.49	2005	0.58	0.49	1891	0.62	0.49

Source: Four rounds of IFLS 1993, 1997, 2000 and 2007. This table is based on information on all heads of puskesmas in our sample

Table 2: Mean comparisons of selected variables below/above 5 years of experience

Post-97 comparison	Experience$\geq$5yrs	Experience<5yrs	t-stat
If holds a private practice, all	0.78	0.71	2.0119**
If holds a private practice, urban	0.71	0.62	1.7818*
If holds a private practice, rural	0.75	0.80	1.0444
Hours worked/wk	14	16	-1.7656*
Patients seen/wk	88	85	1.4083
Refers patients to private clinic	0.28	0.36	-7.3123***
Holds private practice in the public hospital	0.17	0.30	-4.5080***
Pre-97 comparison	Experience$\geq$5yrs	Experience<5yrs	T-stat
If holds a private practice, all	0.78	0.75	1.1553
If holds a private practice, urban	0.76	0.68	2.0865*
If holds a private practice, rural	0.83	0.82	0.2590
Hours worked/wk	30	27	2.1978**
Patients seen/wk	81	65	2.3501**
Refers patients to private clinic	0.35	0.38	-2.9508***
Holds private practice in the public hospital	0.16	0.32	-6.6978***

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

Table 3. Linear probit estimates of the likelihood of private practice (pp) 1993-07

VARIABLES	(1) All <i>pp</i>	(2) All <i>pp</i>	(3) All <i>pp</i>	(4) Doctors <i>pp</i>	(5) Doctors <i>pp</i>	(6) Doctors <i>pp</i>
<i>exp5</i>	-0.118 (0.125)	0.0108 (0.171)	0.280 (0.241)	-0.1358 (0.146)	0.0793 (0.198)	0.5198 (0.281)
<i>post97</i>	-0.0653 (0.0753)	-0.0681 (0.0757)	-0.0685 (0.0758)	-0.1083 (0.0752)	-0.1092 (0.0758)	-0.1093 (0.0759)
<i>exp5*post97</i>	0.206** (0.104)	0.212** (0.105)	0.214** (0.105)	0.2579** (0.1228)	0.266** (0.1231)	0.269** (0.1234)
<i>Constant</i>	0.873*** (0.127)	0.798*** (0.155)	0.697*** (0.197)	0.7874*** 0.161	0.6482*** 0.194	0.495** 0.243
Polynomial	Linear	Quadratic	Cubic	Linear	Quadratic	Cubic
Weights	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	923	923	923	677	677	677
F-statistic (<i>exp5*post97=0</i>)	3.93**	4.12**	4.18**	4.41**	4.65**	4.73**
R-squared	0.136	0.139	0.140	0.22	0.23	0.23

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

The dependent variable is the private practice dummy *pp*. *exp5* is a binary variable indicating if the head has at least 5 years of experience since graduation. *post97* is a binary variable indicating post 1997 IFLS rounds, i.e., those conducted in 2000 and 2007. *exp5*post97* is the interaction between *exp5* and *post97*.

Table 4. Test of Covariates Balance

VARIABLES	(1) Speaks local language	(2) Head is a doctor	(3) Urban
<i>exp5</i>	0.0180 (0.0558)	-0.0343 (0.0734)	0.0849 (0.0698)
<i>post97</i>	-0.0220 (0.0367)	0.118*** (0.0435)	0.0487 (0.0443)
<i>exp5*post97</i>	0.00944 (0.0424)	-0.0714 (0.0580)	-0.101 (0.0660)
Constant	0.702*** (0.0803)	0.629*** (0.0901)	0.262*** (0.0911)
District dummies	Yes	Yes	Yes
Polynomials	Linear	Linear	Linear
Observations	923	923	923
R-squared	0.097	0.112	0.412

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

The table provides a test of balanced covariates for the key explanatory variables: head speaks the local language (llang), head is a doctor (headdoc) and the puskesmas is in urban community.

Table 5. 2SLS IV estimates of hours worked per week 1993-07

VARIABLES	(1) All	(2) All	(3) All	(4) Doctors	(5) Doctors	(6) Doctors
<i>pp</i>	-17.92* (10.84)	-18.16* (10.46)	-18.00* (10.30)	-17.57 (11.15)	-17.65* (10.48)	-17.42* (10.19)
<i>exp5</i>	-2.360 (1.731)	-3.396 (3.358)	-2.043 (10.00)	-3.797** (1.852)	-4.145 (4.114)	-0.490 (11.43)
<i>Speaks local lang</i>	-0.610 (2.470)	-0.485 (2.393)	-0.503 (2.365)	2.126 (4.199)	2.206 (3.951)	2.153 (3.866)
<i>Urban region</i>	-1.031 (1.221)	-1.042 (1.231)	-1.033 (1.229)	-2.827 (1.749)	-2.853* (1.706)	-2.838* (1.686)
<i>Head is a doctor</i>	-3.422*** (1.193)	-3.406*** (1.204)	-3.403*** (1.200)			
Constant	32.02*** (8.597)	33.36*** (8.077)	34.67*** (10.10)	26.15*** (8.478)	26.93*** (7.357)	27.88*** (8.960)
District/year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Weights	Yes	Yes	Yes	Yes	Yes	Yes
Polynomial	Linear	Quadratic	Cubic	Linear	Quadratic	Cubic
No of observations	889	889	889	656	656	656
R-squared	0.124	0.116	0.122	0.301	0.299	0.306

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

The private practice dummy *pp* is instrumented by the interaction term *exp5*post97*.

Table 6. 2SLS IV estimates of patients seen per week 1993-07

VARIABLES	(1) All	(2) All	(3) All	(4) Doctors	(5) Doctors	(6) Doctors
<i>pp</i>	7.079** (3.462)	6.786** (3.337)	6.710** (3.293)	13.89 (13.92)	12.98* (6.747)	12.69* (6.530)
<i>exp5</i>	-1.519 (7.777)	-20.59 (13.48)	-46.70 (41.09)	-9.398 (22.34)	-41.89* (23.39)	-94.94 (70.51)
<i>Speaks local lang</i>	5.785 (8.865)	7.385 (8.580)	7.632 (8.498)	-26.90 (42.68)	-22.66 (22.16)	-21.62 (21.48)
<i>Urban region</i>	7.732 (5.961)	7.634 (5.867)	7.627 (5.846)	0.396 (14.57)	0.200 (9.294)	0.241 (9.171)
<i>Head is a doctor</i>	23.62*** (4.635)	24.09*** (4.580)	24.10*** (4.563)			
Constant	1.827 (26.87)	18.63 (25.99)	34.97 (37.97)	3.543 (94.62)	30.33 (42.72)	50.64 (58.68)
Polynomial	Linear	Quadratic	Cubic	Linear	Quadratic	Cubic
Weights	Yes	Yes	Yes	Yes	Yes	Yes
District/Year dum	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	822	822	822	585	585	585
R-square	0.2143	0.2132	0.2147	0.2253	0.2245	0.2300

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

The private practice dummy *pp* is instrumented by the *exp5*post97*.

Table 7. 2SLS IV estimates of referral to private clinics 1993-07

VARIABLES	(1) Referral	(2) Referral
<i>pp</i>	0.100** (0.0494)	0.0320** (0.0127)
<i>exp5</i>		0.0172*** (0.00436)
<i>Speaks local lang</i>		-0.0143*** (0.00531)
<i>Urban region</i>		0.000899 (0.00328)
<i>Head is a doctor</i>		-0.00269 (0.00300)
Constant	0.384*** (0.0453)	0.447*** (0.0192)
District dummies	Yes	Yes
Year dummies	Yes	Yes
Polynomial	Quadratic	Quadratic
Weights	Yes	Yes
Observations	923	923
R-squared	0.356	0.746

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

Figures

Figure 1. Frequency distribution (histogram) of experience in years before/after the regulation

Figure 2. Likelihood of private practice - regression discontinuity in experience before and after the regulation (full sample)

Figure 3. Confidence interval estimates

Panel a. Effect of experience on likelihood of private practice – RD Confidence interval

b. Effect of private practice (proxied by experience threshold) on hours worked/week

c. Effect of private practice (proxied by experience threshold) on patients seen/week

Appendix

Table A0. Comparisons of outcome variables for heads with and without private practice before the introduction of the 1997 regulation

	With private practice	Without private practice	T-statistics
Years≤1997	All		
Hours per week	28.46	29.38	1.0142
Patients per week	77.45	82.86	0.8508
	Urban		
Hours per week	28.65	29.76	1.0232
Patients per week	91.79	101.8	1.0889
	Rural		
Hours per week	28.2	28.7	0.2910
Patients per week	57.76	47.96	1.4752

Table A1. Likelihood of private practice: Placebo test at different threshold levels of experience since graduation

VARIABLES	(1) Exp=2	(2) Exp=3	(3) Exp=4	(4) Exp=6
Post 1997	0.0734 (0.331)	0.0184 (0.0737)	0.0139 (0.0602)	0.0711 (0.0802)
Experience = 2	0.179 (0.329)			
(Exp=2)*Post 1997	-0.104 (0.337)			
Experience=3		0.172 (0.177)		
(Exp=3)*Post 1997		-0.0484 (0.102)		
Experience=4			-0.110 (0.164)	
(Exp=4)*Post 1997			-0.0439 (0.103)	
Experience=6				-0.0855 (0.231)
(Exp=6)*Post 1997				-0.000398 (0.111)
Constant	0.685* (0.350)	0.835*** (0.162)	1.000*** (0.0928)	0.777*** (0.161)
District dummies	Yes	Yes	Yes	Yes
Polynomial	Quadratic	Quadratic	Quadratic	Quadratic
Weights	Yes	Yes	Yes	Yes
F-stat (P-value)[1]	0.21 (0.89)	0.33 (0.80)	0.34 (0.79)	0.58 (0.63)
Observations	923	923	923	923
R-squared	0.216	0.196	0.148	0.116

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Exp is the experience level of the head. [1] The reported F-statistic tests the relevance of the instrument using the following joint hypothesis: $(Exp_k=0)$ $(post97=0)$ $(Exp_k*Post97=0)$ where k=2,3,4,6.

Table A2. OLS non-IV estimates of public doctor's services full sample

VARIABLES	(1) Hours per week	(2) patients per week	(3) Hours per week	(4) patients per week
<i>Holds PP</i>	1.803 (2.573)	-3.026 (7.032)	1.724 (2.584)	-3.288 (7.168)
<i>Speaks local lang</i>	-2.657 (3.057)	13.84 (14.81)	-2.656 (3.059)	14.18 (14.52)
<i>Urban</i>	-5.120 (4.897)	23.02** (11.02)	-5.113 (4.849)	22.88** (10.93)
<i>Head is a doctor</i>	-10.53 (8.380)	38.77*** (13.03)	-10.56 (8.442)	38.76*** (12.90)
<i>Constant</i>	22.82*** (7.561)	59.35** (23.15)	25.33** (9.327)	67.32** (27.00)
Polynomial	Linear	Linear	Quadratic	Quadratic
Weights	Yes	Yes	Yes	Yes
District & Year dummies	Yes	Yes	Yes	Yes
Observations	892	886	892	886
R-squared	0.185	0.251	0.188	0.253

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

PP is a binary variable indicating if the head of the puskesmas holds private practice.