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Does the Provision of Physician Services Respond to Competition?

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Does the Provision of Physician Services Respond to Competition? [§]

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Abstract

We assess the extent to which specialist physicians respond to local competition when deciding how much services to provide under a fee-for-service payment system. We use an exhaustive administrative panel data set of French physicians, and account for the dual nature of the regulatory environment, with part of the physicians being subject to price regulation. The activity of fee-regulated physicians depends only on their individual preferences, and is not affected by changes in their demand or competitive environment. By contrast, the prices charged by free-billing physicians decrease and their activity increases with physician density. Reaction functions are upward-slopping, with the quantities of services provided being strategic complements. Our findings are consistent with a static oligopoly model where the consumption-leisure preferences of doctors exhibit strong income effects.

Keywords: Fee-for-service payment, physician labor supply, income effects, spatial competition. *JEL*: I11, L13

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1 Introduction

In France, the patients' choice of health care providers is unrestricted. Physician services in the ambulatory sector are paid on a fee-for-service basis. Some, but not all, physicians are allowed to set their price freely. In the free-billing sector, prices exhibit substantial dispersion across physicians, with average levels being approximately twice as high as in the fee-regulated sector. Such high prices may decrease the activity of physicians if their labor supply is subject to income effects. An important policy question is whether market mechanisms discipline prices and give sufficient incentives to work, and what are the pros and cons of price regulation in these dimensions.

To shed light on the debate, we examine how the activity and price of physicians depend on their competitive environment and on individual characteristics such as non-professional income and family composition. Our first contribution is to theoretically model the behavior of utility-maximizing physicians accounting for imperfect competition and a dual regulatory environment –with and without price regulation. Our second contribution is to test empirically the predictions of the model about the functioning of competition while controlling for physician unobserved heterogeneity and location choice.

We find that fee-regulated physicians determine their activity on the sole basis of their individual preferences: in particular, they work less if they receive higher non-professional income, and they disregard changes in demand characteristics (e.g. local population wealth) or in the number of competitors. By contrast, for free-billing physicians, activity increases and prices decrease with physician density, reflecting that market forces are at work in the industry. Free-billing physicians respond to change in local competition: if their competitors increase their activity by one percent, they increase their their own activity by .27 percent. Similarly, they reduce their activity if the population gets richer in their local area.

We show that these findings are consistent with a static oligopoly model where physicians choose their labor supply by maximizing a utility function that depends on consumption and leisure. Upward-sloping reaction functions (physicians working more in response to an increase in the activity of their competitors) are possible in equilibrium if the income effects are sufficiently strong. We find empirical support for the following underlying mechanism: the provision of more services by the competitors depresses the residual demand addressed to a physician, meaning that she has to charge lower prices to attract the same number of patients. Her optimal response to such a negative income shock is to work more if the income effects on labor supply are strong enough. We also show that the presence of fee-regulated physicians tends to soften competition between free-billing physicians.

Our identification strategy takes advantage of the panel dimension of our data set. We model the unobserved quality of a physician by an individual fixed effect, which cancels out by time-first differentiation. The effect of competition is thus identified by changes in local medical densities over time. Those changes, however, may be related to changes in local demand because physicians are more likely to settle in attractive areas, where unobserved increase of demand may simultaneously lead already settled physicians to adapt their prices and outputs. Hence a possible endogeneity issue for the changes in medical density. To address this, we observe that the vast majority of physicians above 60 have been installed for many years at their current location, and therefore the lagged density of older physicians has no reason to be correlated with contemporaneous demand shocks. We therefore use the lagged density of old physicians to instrument the temporal changes in the total medical density.

This article is primarily related to the literature on competition in markets for physician services, see Gaynor and Town (2012). Dunn and Shapiro (2014) study the consolidation of the physician market in the United States. Using patient data, they find that greater physician concentration as measured by Herfindahl-Hirschman indices leads to higher service prices charged by physicians. In contrast, we use physician data and are able to control for the unobserved quality of the physicians thanks to the panel dimension of our data set, allowing for physician individual fixed effects. Moreover, like the majority of existing papers (e.g., Newhouse, Williams, Bennett, and Schwartz (1982), Brown (1993), Dionne, Langlois, and Lemire (1987)), we use medical densities, *i.e.*, numbers of physicians per capita, rather than HHI indices as competition indicator. Kann, Biorn, and Luras (2010) show that a local higher number of physicians per capita leads to more prescriptions. For France, Delattre and Dormont (2003) use a sample of GPs and specialists over the period 1979-1993. Due to data limitations, they compute densities at the administrative *départements* level, pooling all specialties together. In contrast, we work on exhaustive data over the years 2005-2014 for three common specialties, and we are able to compute densities for each specialty separately at a finer geographic level (postal code, accounting for nearby postal codes with a decreasing function of distance). Delattre and Dormont (2003) find that fee-regulated specialists did at that time respond to more competition by increasing the intensity of care they provided. We find this is no longer the case in recent years. The change can be explained by the dramatic fall in the densities of fee-regulated physicians in the last two decades. While those physicians may have suffered from insufficient demand twenty years ago, our results suggest that the current market is more likely to be characterized by excess demand at regulated prices.

In a vein similar to that of this article, Gravelle, Scott, Sivey, and Yong (2016) study the price and quality of GPs in Australia. They construct a Vickrey-Salop model, in which physicians compete locally in price and quality. They find that physicians with more distant competitors have slightly shorter consultations, charge higher average prices, and charge out-of-pocket expenses to a smaller share of their patients. We differ from this study in several important dimensions. First, we do not model price discrimination across patients and do not observe in our data the share of patients who are charged out-of-pocket fees. Second, while Gravelle, Scott, Sivey, and Yong (2016) rely on a cross-sectional survey and use large area fixed effects to control for GPs location choices, our identification strategy crucially exploits the panel dimension of the data set. Third, contrary to these authors, we assume that physicians maximize utility rather than profit, with income effects playing a critical role in our setting.[1]

This study is also related to the literature on physician labor supply, which generally does not address the role of imperfect competition. Rizzo and Blumenthal (1994) present evidence of income effects for male physicians in the United States, those effects being dominated by the pure substitution effect (the uncompensated elasticity of labor supply with respect to price is positive). Thornton and Eakin (1997) estimate a model of the

[1] A couple of studies adopt a more direct approach to evaluate the role of competition. They estimate the cost or production functions of physicians, and assess market power by comparing marginal cost and marginal revenue. Based on this approach, Gunning and Sickles (2013) reject perfect competition and do not reject a Cournot oligopoly. Wong (1996) tests whether higher prices in places where the number of physicians per capita is high, is explained by the fact that a high number of physicians per capita increases the search costs for patients. He rejects this "informational confusion" hypothesis in favor of classic monopolistic competition.

utility-maximizing physician, allowing for both price-taking and price-setting behavior. In the latter case, they assume that the physician faces a constant elasticity of demand for her services, but do not model the effect of the competitors' activity on the physician's residual demand, a crucial point in the present work. Working on a sample of French GPs, Clerc, L'Haridon, Paraponaris, Protopopescu, and Ventelou (2012) show that the length of patient consultations is connected to the physician's work/leisure trade-off in the fee-regulated sector while it is not in the free-pricing sector. Andreassen, Di Tommaso, and Strom (2013) estimate on Norwegian data a structural labor supply model that allows for choices between types of jobs. They find that an overall increase in wage or a more progressive rate tax modestly lead physicians to work more full-time and in private practice. Because they allow for habit persistence, the overall impact on labor supply among Norwegian medical doctors of changes in economic incentives is rather modest. Broadway, Kalb, Li, and Scott (2017) estimate decisions on the number of daytime-weekday working hours and the probability of providing after-hours care on a large sample of Australian General Practitioners (GPs), finding a modest positive effect on hourly earnings for both decisions. Here, we do not have information on hours of work and therefore do not model a production function. Nassiri and Rochaix (2006) highlight changes in the composition of physician activity induced by regulatory changes in Quebec. To protect their income, primary care providers are willing to increase their aggregate volume of prescriptions, and this is particularly marked for more technical procedures. We find here similar effects following changes in competition (rather than in regulation) for free-billing physicians.

The paper is organized as follows. Section 2 provides institutional details on the French environment, presents our data and explains the construction of indicators for price, output and local competition. Section 3 sets up a theoretical model of physician labor supply under imperfect competition, distinguishing the two regulatory regimes. Section 4 presents our empirical strategy. Section 5 shows how prices and outputs depend on local competition and demand conditions. Section 6 estimates demand and reaction functions. Section 7 concludes.

2 Data and industry background

In France, general practitioners and specialist physicians who provide ambulatory care in their private practice are usually self-employed and paid on a fee-for-service basis. There exist two types of contractual arrangements between physicians and the National Health Insurance, known as "sector 1" (fee-regulated) and "sector 2" (free-billing). For each medical procedure, a reference price is set after a bargaining between the Public Health insurance system and the physicians' unions. During our period, the reference price for a simple visit is €28 for specialists.[2] Sector 1 physicians are not allowed to charge extra-billings above this reference price whereas sector 2 physicians can do so.[3]

For sector 2 specialists, extra-billings represent on average 35% of the regulated billings they receive.[4] Even though extra-billings do not fall in the Social Security accounts, they question the organization of the French Health system.

A physician chooses her sector once for all when beginning her practice. Since 1990, the access to sector 2 is restricted to physicians who demonstrated an additional qualifying hospital practice (such as ex- Head of Clinic).

Patients choose their physicians freely. In particular, for a limited number of specialties, they do not need to be addressed by their regular GP when visiting one physician of those specialties to be reimbursed by Public Health insurance. We focus hereafter on those most common "direct access" specialties, namely gynecology, pediatrics, and ophthalmology.

Irrespective of the physician sector, the National Health Insurance reimburses to patients about 70% of the reference price, with the remaining 30% being generally covered by a supplementary insurance.[5] By contrast, extra-billings charged by sector-2 physicians are not reimbursed by Public Health insurance. While they are covered to a various extent

[2]The reference price is €23 for any doctor including GPs, with a technical lump-sum payment of €5 for specialists.

[3]To compensate for not over-billing, Public Health insurance subsidizes part of sector 1 physicians social contributions and pension savings, whereas it does not for sector 2 physicians. 9.70% of net fees for their Health insurance contributions, 5% of net fees for their familial contributions and 2760 euros annually for pension savings.

[4]The amounts of sector 2 physicians' extra billings have more than doubled in the last 20 years, going from b€.9 in 1990 to b€2.4 in 2014 (CNAM (2014)).

[5]In 2012, 96% of the French population is covered by a supplementary insurance contract (see Garnero and Le Palud (2013)).

by supplementary insurance contracts, the patient usually incurs positive out-of-pocket expenses when she decides to visit a physician operating in the sector 2 regime.[6]

In 2014, 31% of pediatricians and 54% of gynecologists or ophthalmologists can bill freely, i.e., operate under the sector 2 regime, see Table 1. These shares greatly increased since 2005 and will continue to grow. Around 85% of the new gynecologists and ophthalmologists who began their practice between 2011 and 2014 are sector 2, 53% of pediatricians. With this generalization of the free-billing sector, learning about the behaviors of sector 2 physicians matters for policy makers.

2.1 Data

We exploit a comprehensive administrative data file that gathers individual information on the activity and fees of self-employed physicians in 2005, 2008, 2011 and 2014.[7] This source is matched by the French national statistical institute (INSEE) with the income tax returns of the concerned physicians for the same four years ("*Appariement Revenus et Activité des médecins, INSEE-DGFiP-CNAM*"). For each physician we observe the number of medical procedures performed each year as well as annual fees, extra-billings, sex, age, year of practice beginning, specialty, sector, and location at the postal code level. The tax returns provide us with information on physicians' household earnings and characteristics such as non-practice income, per type of income, type of household, number and age of children.

Our sample of study is composed of all self-employed gynecologists, pediatricians, and ophthalmologists operating in metropolitan France. Full-time wage-earners (e.g. Centre de santé or hospital employees) are excluded even though they also have a side self-employed activity. Physicians older than 65, and the very few ones who do not have a contract with the Public Health insurance are also discarded. Our final database contains 20,151 (physician $\times$ year) observations in sector 1 and 19,504 (physician $\times$ year) observations in sector 2.

[6] Garnero and Le Palud (2013) document that for €45 of sector 2 specialist consultation not covered by the National Health insurance individual supplementary contracts typically cover €12 and collective ones €30, which translates into respectively €33 and €15 out-of-pocket expenses.

[7] The data is provided by Public Health insurance Scheme (SNIIR-AM, CNAM).

2.2 From fees to output and prices

Table 1 reports physicians' fees composition per specialty and per sector in 2014. Although the average levels of sector 2 physicians' fees greatly differ between specialties, extra-billings in any case represent a large share of these physicians' total fees, around 40%. By contrast, extra-billings are, as expected, negligible for sector 1 physicians. Sector-2 physicians earn between 35% and 70% more than their counterparts in sector 1, depending on specialty.

	Gynecologists		Pediatricians		Ophthalmologists	
Nb of physicians	2968		1577		3084	
% Free-billing physicians	54		31		54	
	mean	(std)	mean	(std)	mean	(std)
Free-billing physicians (sector 2)						
Annual Fees in k€	274	(154)	189	(94)	435	(298)
at reference prices	159	(100)	99	(106)	274	(209)
extra-billings (EB)	115	(85)	73	(57)	161	(125)
% of EB in Fees	43	(15)	37	(15)	38	(14)
Composite Output	5683	(3569)	3789	(1825)	9784	(7466)
Fee-regulated physicians (sector 1)						
Annual Fees in k€	165	(105)	139	(71)	257	(160)
at reference prices	160	(99)	126	(66)	251	(152)
extra-billings (EB)	6	(17)	2	(7)	6	(21)
% of EB in Fees	3	(6)	1	(4)	2	(4)
Composite output	5699	(3538)	4501	(2344)	8980	(5443)

Source: *Appariement Revenus et Activité des médecins, INSEE-DGFiP-CNAM.* Self-employed Pediatricians, Gynecologists and Ophthalmologists under 65 in 2014, who began their practice before 2011.

Table 1: Fees and Output in 2014

Physicians perform different types of medical procedures (e.g., office visits, home visits, technical procedures) with various intensity of care. Simply counting all medical procedures would not reflect well the output level, as it will neglect differences in the intensity of the care the physician provides. However, the annual fees excluding extra-billings (annual fees at the reference prices) does reflects these care intensity differentials through the use of the reference prices of each type of procedures. Indeed, more intensive procedures (such as technical acts) have higher reference prices that simpler ones (simple visits). So, dividing the annual fees at the reference prices by the reference price of a simple office visit (€28 for a gynecologist, a pediatrician or an ophthalmologist) provides a simple composite output indicator (see Delattre and Dormont, 2003). The composite output of physician i in year t, q_{it} is then defined as

$$q_{it} = \frac{\sum_j \bar{p}_{jt} n_{ijt}}{\bar{p}_{0t}}, \tag{1}$$

with $\bar{p}_{jt}$ the reference price at time t of procedure j, n_{ijt} the number of procedures, and $\bar{p}_{0t}$ the reference price of a simple visit.

In 2014, for ophthalmologists, composite outputs are higher in the free-billing sector (S2) than for in the fee-regulated sector (S1). The reverse occurs for pediatricians. And outputs are quite similar among gynecologists.

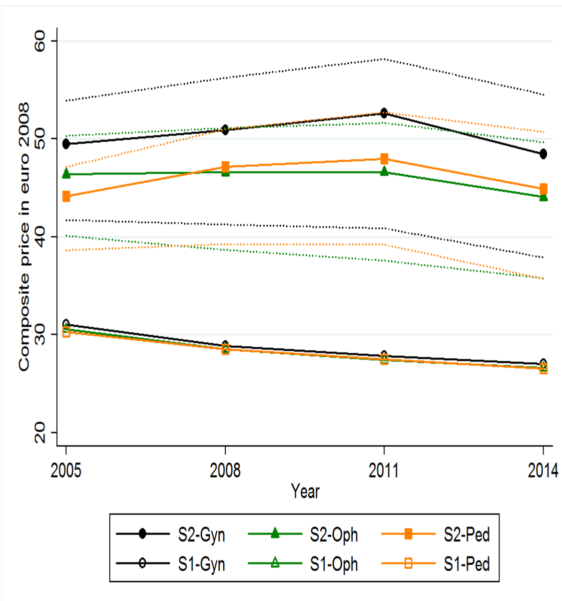
We define a composite indicator for the price set by a physician i corrected for structural effects related to differences in care intensity between different types of medical procedures:

$$p_{it} = \frac{\sum_j p_{ijt} n_{ijt}}{q_{jt}} = \bar{p}_{0t} \frac{\sum_j p_{ijt} n_{ijt}}{\sum_j \bar{p}_{jt} n_{ijt}} = \bar{p}_{0t} \left(1 + \frac{\sum_j \delta_{ijt} \bar{p}_{jt} n_{ijt}}{\sum_j \bar{p}_{jt} n_{ijt}} \right) \tag{2}$$

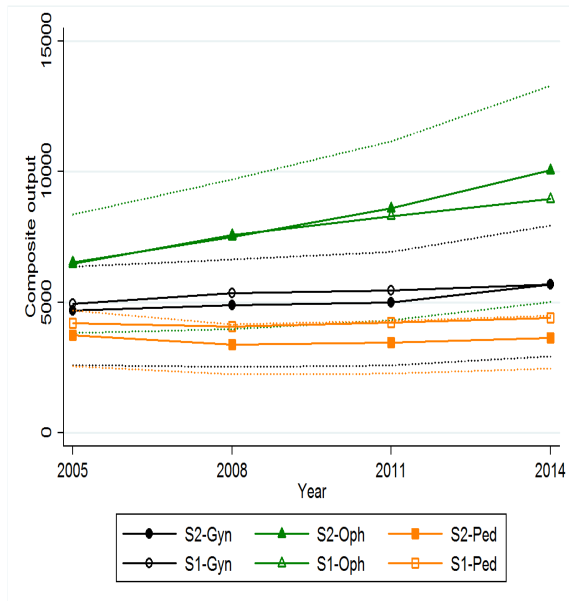
where $\delta_{ijt} = (p_{ijt} - \bar{p}_{jt})/\bar{p}_{jt}$ is the extra-billings rate of physician i at year t for medical procedure j. We do not observe p_{ijt} nor n_{ijt} for each type of medical procedure, but we do observe the numerators, and the denominators of equations (1) and (2), and are then able to compute both composite indicators. The ratio at the right-hand side of (2) is the weighted average of extra-billings rates, our main variable of interest for the price analysis.[8]

Descriptive statistics about composite prices and outputs and their changes are reported in Table 2 and Figure 1. They document the main trends at stake in the industry since 2005, the large dispersion between individual behaviors, and show individual price and output changes. We pay a particular attention that free-billing physicians' price and output show enough individual variation in time to ensure a time differential analysis.

[8] The ratio drives the variations of $\ln p_{jt}$ once we include year dummies to control for the evolution of $\bar{p}_{0t}$.



(a) Composite price (€2008)



(b) Composite output

Note: first (Q1) and third (Q3) quartiles are reported in dashed lines.
Source: *Appariement Revenus et Activité des médecins, INSEE-DGFiP-CNAM*.
Self-employed Pediatricians, Gynecologists and Ophthalmologists under 65.

Figure 1: Evolutions of price and output

Table 2: Composite price and Output: individual variations

		Free-billing physicians			Fee-regulated physicians		
		Level in 2014 (€)	ΔLog 2014-2011	ΔLog 2011-2008	Level in 2014 (€)	ΔLog 2014-2011	ΔLog 2011-2008
Composite Price							
Gynecologists	mean	52.66	-0.043	0.040	28.95	-0.032	-0.038
	median	48.72	-0.032	0.032	28.10	-0.033	-0.037
	sd	16.32	0.089	0.081	2.25	0.041	0.037
Pediatricians	mean	49.29	-0.043	0.027	28.44	-0.035	-0.037
	median	46.31	-0.033	0.027	28.02	-0.033	-0.037
	sd	14.32	0.096	0.060	1.57	0.029	0.029
Ophthalmologists	mean	47.83	-0.037	0.006	28.55	-0.031	-0.041
	median	44.92	-0.028	0.007	28.02	-0.033	-0.037
	sd	13.03	0.097	0.090	1.68	0.028	0.049
Composite output							
Gynecologists	mean	5683	0.044	-0.059	5698	0.005	-0.018
	median	4871	0.044	-0.047	4771	0.021	0.001
	sd	3568	0.355	0.271	3537	0.296	0.361
Pediatricians	mean	3788	0.061	0.024	4500	0.030	0.027
	median	3470	0.048	0.000	4090	0.017	0.034
	sd	1824	0.326	0.594	2344	0.410	0.357
Ophthalmologists	mean	9783	0.080	0.066	8980	0.026	0.054
	median	8118	0.076	0.049	7567	0.028	0.051
	sd	7466	0.378	0.311	5443	0.176	0.279

Source: *Appariement Revenus et Activité des médecins, INSEE-DGFiP-CNAM*. Self-employed Pediatricians, Gynecologists and Ophthalmologists under 65.

In real terms, sector 1 prices steadily decreased between 2005 and 2014. There is little dispersion in individual price levels and variations over time. Output increases very slowly over the period with large dispersion both in individual levels and individual variations. For gynecologists for instance, the individual output variation between 2011 and 2014 is .5% on average, with a standard variation of 30% (Table 2).

Sector 2 specialists show large dispersion in both the levels and variations of prices and outputs within each specialty. For instance, accounting for composition effects in terms of medical procedures, sector 2 gynecologists charged on average €53 in 2014, with a standard deviation of €16. Between 2008 and 2011, the individual price variation at the physician level is 4% on average, with a standard deviation of 8%. Between 2011 and 2014, these figures are -4%, and 8% respectively. The break may be related to the introduction of a new policy in December 2012. Since then, a new contract has been offered to Sector 2 physicians whereby the Health insurance offers better conditions in return for keeping overcharges below 100% of the reference price and for not increasing the overcharge rate for three years. At the same time, the Health insurance introduced policy measures (monitoring, sanctions) to deter "excessive overcharge". In January 2014, about 20% of the S2 physicians has enrolled into the new contractual arrangement.[9] In terms of individual levels and variations in output, there is no striking difference with sector 1s, the important feature being a large dispersion across physicians. Finally, individual price and output changes are likely to provide enough variation to conduct time differential analysis.

2.3 Local competition

Descriptive statistics about competition environment in 2014 and their 2011-2014 changes are reported in Table 3. Sector 2 physicians have on average 45 S2 competitors and 14 Sector 1 competitors. These figures are (exponentially-)distance-weighted to account for proximity differentials: a competitor at the same zipcode counts for one, whereas he will counts for .5 if located in a zipcode distant by ten minutes, and for 0 if distant of more than 45 minutes. The median number of S2 competitors (20 competitors) is well below the

[9]The policy change only affects the end of our period of study. In the empirical part, we check that our results hold true when considering only the years before the change.

mean number and the interquartile range (7;55) is large, suggesting that those physicians are spatially concentrated. The average number of competitors fell between 2011 and 2014, but 25% of physicians experienced a rise in their S2 competitors. More generally, virtually all S2 physicians experience a change in their competitive environment: 71% (27%) face a reduction (a rise) in the number of competitors.

Sector 1 physicians have much less Sector 2 competitors than their Sector 2 counterparts, 15 instead of 45 on average. To a smaller degree, they also have less S1 competitors (9 instead of 14). We find again a large dispersion in the number of S2 competitors, with an interquartile range (1;15). Sector 1 physicians face a reduction in the number of S1 competitors (minus one competitors). Half of them face a rise in S2 competitors and the other half a fall. More generally, virtually all S1 physicians experience a change in their competitive environment: 63% (32%) face a reduction (a rise) in the number of competitors.

In the empirical part, we will consider as local competition measure a local medical density indicator which relates the number of physicians at a particular location to the potential demand addressed to them in their influential zones. This indicator is computed at the zipcode level following the two-step floating catchment area method used to measure spatial accessibility ("Accessibilité Potentielle Localisée") (Barlet, Coldfy, and Collin, 2012; Radke and Mu, 2000; Luo and Qi, 2009). Hence, the medical density at zipcode z is obtained as the number of physicians located at z, m_z, or in neighbor zipcodes j, m_j, divided by the population at j, pop_j, and in neighbor zipcodes i, pop_i:

$$d_z = \sum_j w(t_{zj}) \frac{m_j}{\sum_i \text{pop}_i \; w(t_{ij})} \tag{3}$$

where the weights $w(t_{zj}) = e^{-\alpha t_{zj}}$ decrease exponentially with travel time. The rate α is chosen so that zipcodes at 10 minutes count for .5. The weight is negligible after 45 minutes of travel and is approximated to zero. This choice is guided by survey results on time transportation of patients.

We compute local medical densities for sector 1s and sector 2s, for physicians older than 60. The latter will probably soon retire and then impact the level of the local

Free-billing physicians (sector 2): 3774 observations					
	mean	p50	p25	p75	sd
# free-billing competitors	45.45	20.07	7.06	55.50	57.98
# fee-regulated competitors	13.92	11.19	5.05	20.65	10.75
2011-2014 change in # free-billing competitors	-1.04	0.00	-1.74	0.83	3.64
2011-2014 change in # fee-regulated competitors	-1.21	-0.83	-2.08	0.00	1.66
% wo competitor changes	0.01	0.00	0.00	0.00	0.09
% with same # competitors	0.02	0.00	0.00	0.00	0.15
% with fewer competitors	0.71	1.00	0.00	1.00	0.45
% with more competitors	0.27	0.00	0.00	1.00	0.44
Free-billing medical density (per 100,000 inhabitants)	8.80	8.16	5.11	12.28	4.37
2011-2014 change in log medical density	-0.00	-0.01	-0.04	0.03	0.10
Fee-regulated medical density (per 100,000 inhabitants)	3.78	3.10	2.22	4.92	2.32
2011-2014 change in fee-regulated log medical density	-0.06	-0.05	-0.11	-0.01	0.12

Fee-regulated physicians (sector 1): 3855 observations					
	mean	p50	p25	p75	sd
# free-billing competitors	15.01	5.00	1.20	14.98	27.98
# fee-regulated competitors	9.38	6.89	3.00	12.79	8.82
2011-2014 change in # free-billing competitors	-0.07	0.00	-0.34	0.47	1.89
2011-2014 change in # fee-regulated competitors	-0.78	-0.37	-1.22	0.00	1.34
% wo competitor changes	0.02	0.00	0.00	0.00	0.13
% with same # competitors	0.05	0.00	0.00	0.00	0.22
% with fewer competitors	0.63	1.00	0.00	1.00	0.48
% with more competitors	0.32	0.00	0.00	1.00	0.46
Free-billing medical density (per 100,000 inhabitants)	4.44	3.59	1.36	6.44	3.85
2011-2014 change in free-billing log medical density	0.03	0.00	-0.04	0.07	0.19
Fee-regulated medical density (per 100,000 inhabitants)	5.52	4.92	3.30	7.29	2.83
2011-2014 change in fee-regulated log medical density	-0.07	-0.05	-0.12	-0.00	0.13

Source: *Appariement Revenus et Activité des médecins, INSEE-DGFiP-CNAM*. Self-employed Pediatricians, Gynecologists and Ophthalmologists under 65

Table 3: Competition environment in 2014

medical density. We will use it as instruments for the medical density in our regressions (sector 1s and sector 2s are computed).

The average S2 physician in our sample faces a local medical density of about 8.8 S2 physicians, and 3.8 S1 physicians for 100,000 inhabitants, with a high dispersion around these means. Between 2011 and 2014, the average density is fairly stable on average, with 25% of S2 physician facing a rise of at least 3% and 25% facing a decline of at least 4% of the S2 density. The average S1-physician faces a different environment: 4.4 S2 physicians and 5.5 S1 physicians for 100,000 inhabitants. All physicians face a decline of the S1 density, with an average of -6%; consistently with all new doctors operating under the S2 regime.

Overall, these descriptive statistics show there are enough individual time variations of the competition environment to assess the sensitivity of labor supply to competition. In the next section we set up an analytic framework to address this issue.

3 Physician behavior under imperfect competition

3.1 General setting

The labor supply behavior of a physician (indexed by i) is represented by a utility function $U_i(c_i, q_i)$, where c_i denotes her consumption and q_i her output. The function U_i increases with c_i, decreases with q_i, and is quasi-concave. The marginal rate of substitution between consumption and output is

$$\text{MRS}_i(c_i, q_i) = -\frac{\partial U_i/\partial q_i}{\partial U_i/\partial c_i}.$$

We denote by $R_i(q_i; q_{-i})$ physician i's revenue when her output is q_i and that of her competitors is given by the vector q_{-i}. The physician's budget constraint is

$$c_i = N_i + R_i(q_i; q_{-i}),$$

where N_i represents non-professional income. She chooses her activity q_i to solve

$$\max_{q_i} U_i(N_i + R_i(q_i; q_{-i})\,,\, q_i).$$

The first-order condition of the problem is

$$\frac{\partial U_i}{\partial c_i}\,\frac{\partial R_i(q_i; q_{-i})}{\partial q_i} + \frac{\partial U_i}{\partial q_i} = 0.$$

Dividing by $\partial U_i/\partial c_i > 0$, we find that the physician equalizes her marginal revenue and her marginal rate of substitution between consumption and activity:

$$\frac{\partial R_i(q_i; q_{-i})}{\partial q_i} - \mathrm{MRS}_i(c_i, q_i) = 0. \tag{4}$$

Each of the above first-order conditions defines a physician reaction function. For any pair of physicians (i, j), we denote by ρ_{ij} the slope (log-derivative) of physician i's reaction function with respect to physician j's output, $\rho_{ij} = \partial \ln q_i / \partial \ln q_j$. The set of first-order conditions for all physicians defines the equilibrium.

Example In what follows, we consider the following utility function

$$U(c, q) = [\,\alpha\,(c - \underline{c})^\gamma + (1-\alpha)\;(\bar{q} - q)^\gamma\,]^{1/\gamma}\,, \tag{5}$$

where $\underline{c} \geq 0$, $\bar{q} > 0$, $\alpha \in (0,1)$ and $\gamma < 1$ and $\gamma \neq 0$. The utility is quasi-concave on $[\underline{c}, \infty) \times [0, \bar{q}]$. The parameters $\underline{c}$ and $\bar{q}$ can be thought of as a subsistence level and a physical capacity constraint. Together with α, γ, they vary across physicians but for clarity we omit the index i when this does not create confusion.

The utility function reflects a constant elasticity of substitution between $c - \underline{c}$ and $\bar{q} - q$. We denote the elasticity of substitution $\sigma = 1/(1-\gamma) > 0$. For all $\gamma < 1$, the marginal rate of substitution is given by

$$\mathrm{MRS}(c, q) = \frac{1-\alpha}{\alpha}\;\left(\frac{c - \underline{c}}{\bar{q} - q}\right)^{1-\gamma}. \tag{6}$$

As γ comes close to zero and σ tends to one, the above utility tends to the Cobb-Douglas form:

$$U(c,q) = (c - \underline{c})^{\alpha} \; (\bar{q} - q)^{1-\alpha}.$$

When γ and σ go respectively to $-\infty$ and zero, the utility function tends to the Leontief function $U(c,q) = \min\,(c - \underline{c}\,,\, \bar{q} - q)$. Below, we are mostly interested in the cases that lie between Leontief ($\gamma = -\infty$, $\sigma = 0$) and Cobb-Douglas ($\gamma = 0$, $\sigma = 1$).

3.2 Fee-regulated physicians

Fee-regulated physicians are paid on the basis of reference prices set nationally. We assume that they have full control over quantities they produce. They can choose their output with no consequence on the price they earn, so their revenue function is simply

$$R_i(q_i; q_{-i}) = p^r\, q_i, \tag{7}$$

where p^r is the reference price. This assumption is consistent with a disequilibrium situation where there is excess demand at the regulated price. Patients would like to consume more services at this price than they actually do because out-of-pocket expenses for those services amount to only €1 per visit, which is most likely lower than their marginal utility.[10] The marginal revenue of fee-regulated physicians is p^r, and the first-order condition (4) boils down to

$$\mathrm{MRS}_i(N_i + p^r q_i, q_i) = p^r, \tag{8}$$

a condition that does not involve the physician's competitive environment or the patients' willingness to pay.

In the case of the CES utility (5), the labor supply of a fee-regulated physician is given by

$$q_i = \frac{\alpha^{\sigma}\bar{q} - (1-\alpha)^{\sigma}(p^r)^{-\sigma}(N_i - \underline{c})}{\alpha^{\sigma} + (1-\alpha)^{\sigma}(p^r)^{1-\sigma}}, \tag{9}$$

where $\sigma = 1/(1-\gamma)$ and all the parameters α, γ, and $\bar{q}$ are physician specific (we omit the index i for clarity).

Labor supply exhibits an income effect: for any finite value of the elasticity σ, output

[10] It might also be the case that physicians are able to manipulate demand. We do not try to disentangle demand rationing from supplier-induced demand.

q_i decreases with non-professional income N_i. Whether labor supply increases with price is ambiguous when $\sigma < 1$ and $\underline{c} < N_i$, as both the numerator and the denominator of equation (9) increase with p^r. In the Cobb-Douglas case ($\sigma = 1$), the denominator does not depend on price, so output increases with price, i.e., the substitution effect dominates. By contrast, in the Leontief case ($\sigma = 0$), the numerator does not depend on price, so output *decreases* with price, i.e., the income effect dominates. The above findings are summarized in the next lemma.

Lemma 1. *Suppose that the demand for physician services is rationed at the regulated price. Then fee-regulated physicians do not respond to demand conditions or to their competitive environment. In particular, the slopes of their reaction functions are zero:* $\rho_{ij} = 0$ *for all* $i \in \mathcal{R}$.

3.3 Free-billing physicians

For free-billing physicians, price and output are linked though patient demand. We denote by $\eta_{ij} = -\partial \ln p_i / \partial \ln q_j$ the elasticity of physician i's price with respect to the quantity produced by physician j. We expect $\eta_{ii} \geq 0$. Moreover, if two physicians $i \neq j$ are substitutes from the patients' perspective, then when physician j increases output, the price that physician i can charge should fall, hence $\eta_{ij} \geq 0$ for $j \neq i$. In what follows, we neglect the variations of η_{ij} with quantities, i.e., we consider the following log-linear approximation of the inverse demand function of free-billing physicians:

$$\ln p_i = a_i - \sum_j \eta_{ij} \ln q_j. \tag{10}$$

In other words, we locally approximate the inverse demand function by

$$p_i(q_i; q_{-i}) = e^{a_i} \prod_j q_j^{-\eta_{ij}}, \tag{11}$$

which yields the following expression for the activity revenues of free-billing physicians:

$$R_i(q_i; q_{-i}) = q_i \, p_i(q_i, q_{-i}) = e^{a_i} \, q_i^{1-\eta_{ii}} \prod_{j \neq i} q_j^{-\eta_{ij}}. \tag{12}$$

If $0 \leq \eta_{ii} < 1$, the revenue function $R_i(q_i; q_{-i})$ is increasing and weakly concave in q_i. Under this circumstance, the program of a free-billing physician

$$\max_{q_i} U_i \left[q_i \, p_i(q_i; q_{-i}) + N_i \, , \, q_i \right],$$

is concave and admits a unique solution, as represented on Figure 2.

An important difference between the revenue functions of fee-regulated and free-billing physicians, given respectively by (7) and (12), is the presence of the output produced by competitors in the latter. The maximization problem of free-billing physicians depends on the activity of the physician's competitors through the price $p_i(q_i; q_{-i})$. Changes in the competitors' output q_{-i} affect the price the physician can charge, and accordingly her response to such changes depends on how her labor supply reacts to price changes.

Proposition 1. *Consider a free-billing physician $i \in \mathcal{U}$ and another physician j. Then the slope of the reaction function ρ_{ij} is positive if and only if*

$$\eta_{ij} \left[1 - \eta_{ii} - q_i \frac{\partial \; MRS_i}{\partial c_i} \right] < 0, \tag{13}$$

with q_i being given by (4). In the case of the CES utility function, the above condition is equivalent to

$$\eta_{ij} \left[N_i - \underline{c} + \gamma R_i(q_i; q_{-i}) \right] < 0. \tag{14}$$

Proof. See appendix. □

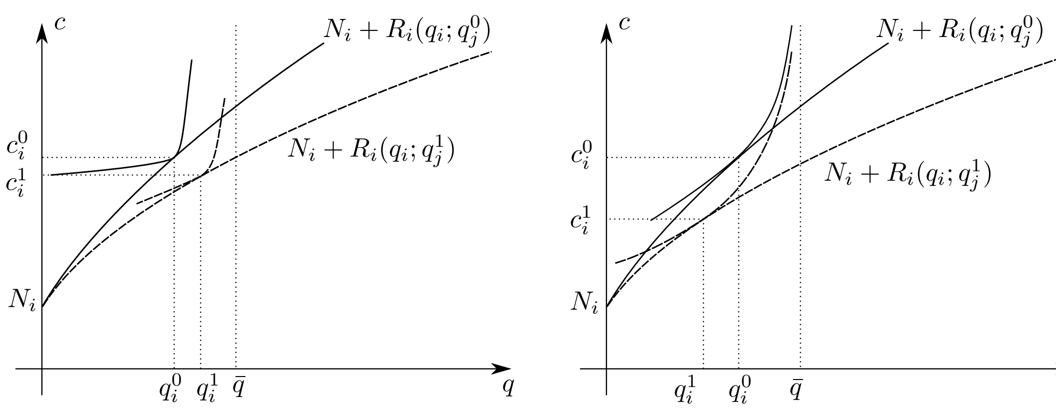
Proposition 1 states that when physicians are substitutes ($\eta_{ij} > 0$) and income effects are strong enough (the disutility of work increases strongly with consumption), then a physician responds to an increase in the labor supply of her competitors by working more. Figure 2 shows the cases where the necessary and sufficient condition (14) holds (panel (a): strategic complementarity) and does not hold (panel (b): strategic substitutability). The condition holds when γ is negative and very large in absolute value. In the extreme case of the Leontief utility ($\gamma = -\infty$), it is guaranteed that the slope of the reaction function ρ_{ij} is positive. The condition does not hold in the Cobb-Douglas case ($\gamma = 0$), for which $\rho_{ij} < 0$ as in the standard Cournot model.

We now turn to the analysis of responses to changes in demand conditions, which follows the same logic as above.

Lemma 2. *The labor supply of a free-billing physician $i \in \mathcal{U}$ decreases with the demand parameter a_i appearing in equation (11) if and only if condition (13) holds and, in the CES case, if and only if (14) holds.*

Proof. See appendix. □

From Proposition 1 and Lemma 2, we conclude that the responses of free-billing physicians to increases in competitors' output and to rises in demand go in opposite directions. This is because the two responses operate through the same channel, namely the income effect. If the income effect dominates the substitution effect for the determination of labor supply, then a physician should increase her output when competitors work more and reduce it when demand rises. This is what our econometric results show. By contrast, we know from Lemma 1 that fee-regulated physicians do not change their labor supply in such events, which again is confirmed by our empirical analysis.



(a) Strategic complementarity (b) Strategic substitutability

Figure 2: Physician i's response to competitor j increasing output from q_j^0 to $q_j^1 > q_j^0$

Example (Continued) We specialize to the extreme case of the Leontief utility, for which we already know that the reaction functions are upward-sloping. We adopt the slightly more general specification: $U_i(c_i, q_i) = \min(c_i - \underline{c}\,, \beta(\bar{q} - q_i))$, with $\beta > 0$. The optimal allocation is located along the straight line $c_i = \underline{c} + \beta(\bar{q} - q_i)$. If β is small, the physician essentially insists on maintaining her consumption close to $\underline{c}$.

We show in the appendix that the effect of the demand parameter a_i on the output produced is given by:

$$\frac{\partial \ln q_i}{\partial a_i} = \frac{-1}{1 - \eta_{ii} + \beta/p_i}. \tag{15}$$

Similarly, the impact of an increase in non-practice income on the output produced is given by

$$\frac{\partial \ln q_i}{\partial \ln N_i} = \frac{-N_i/R_i}{1 - \eta_{ii} + \beta/p_i}. \tag{16}$$

The above two elasticities increase with the price p_i and therefore should be higher when there are no or few fee-regulated competitors in the neighborhood as prices are higher under this circumstance.[11] For fee-regulated physicians, the counterpart of (16) is

$$\frac{\partial \ln q_i}{\partial \ln N_i} = \frac{-N_i/R_i}{1 + \beta/p^r}. \tag{17}$$

Comparing the above income elasticities for fee-regulated and free-billing physicians, we identify two opposite forces: on the one hand, the ratio N_i/R_i is lower for free-billing physicians (because they earn higher fees and have comparable non-professional incomes),[12] so the elasticity should be weaker in absolute value for those physicians. On the other hand, the denominator is lower for them (in particular because the price is higher), which plays in the opposite direction.

Finally, we show in the appendix that the slope of the reaction is given by:

$$\rho_{ij} = \frac{\partial \ln q_i}{\partial \ln q_j} = \frac{\eta_{ij}}{1 - \eta_{ii} + \beta/p_i}. \tag{18}$$

In the limiting case $\beta \to 0$, equation (18) expresses that the physician increases her output to maintain her fees R_i and consumption c_i constant. As the slope ρ_{ij} increases with the price p_i, the response of free-billing physicians to output changes by their free-billing

[11] This is true for all years and specialties. For instance, the mean composite price of gynecologists is €60 in areas with below the median S1 density and €45 in areas with above the median S1 density. The corresponding figures are €50 and €40 for ophthalmologists.

[12] The median ratios N_i/R_i of non-professional incomes over fees are 6% and 3.4% for fee-regulated and free-billing gynecologists respectively. The corresponding figures are 4.2% and 3.7% for pediatricians, and 4.7% and 2.9% for ophthalmologists.

competitors, for the same reason as above, should be stronger when there are no or few fee-regulated competitors in the neighborhood.

4 Empirical strategy

We derive reduced-form equations for equilibrium, which relate outputs and prices to the model primitives, *i.e.* physician characteristics, competitors characteristics and environmental characteristics, the link between prices and output levels (demand), and reaction functions (choice of a physician as a function of her competitors' choices).

We then test model predictions in our empirical application. To do this, we rely on the econometric specification and the empirical strategy presented below.

4.1 General strategy followed

Here, we take the example of the equilibrium output equation to explain our empirical strategy. The output of a physician i located, year t, in zipcode $z(i,t)$ is function of several factors: (i), her perceived quality/attractiveness/reputation, whose effect is modeled as a constant term α_i^q and $Q(Exp_{it})$ that varies with time and is observed such as her experience; (ii), her preferences (parameters of her utility function presented in the previous section) and her non-professional revenue, $\alpha_i^\Phi + \Phi(X_{it})$ that depends on her household characteristics X_{it}, such as spouse income, children, etc. (iii), the characteristics of her (free-billing and regulated) neighbors, such as their perceived quality/reputation, which we denote by $v_{G_t(i)}$, where $G_t(i)$ stands for the set and location of physician i's competitors at year t.

Lemma 1 predicts that fee-regulated physician output does not depend on demand conditions nor on competitive environment. To test this empirically, we add in the reduced-form equation, the local medical density $d_{z(i)t}$ per sector, and characteristics of the local demand, that is, the population average wealth in the area, the population density, age structure in the area, local GPs density whose effects are $f(Y_{z(i)t})$, and shall test that corresponding parameter estimates are null. This leads to

$$\ln q_{it} = \alpha_i^q + Q(Exp_{it}) + v_{G_t(i)} + \alpha_i^\Phi + \Phi(X_{it}) + a^{S2} d_{z(i)t}^{S2} + a^{S1} d_{z(i)t}^{S1} + f(Y_{z(i)t}) + s_t + u_{it}, \quad (19)$$

where we also add a common time trend, and an error term.

Our empirical strategy relies on two steps: taking time-first differences to get rid of individual fixed effects, then instrumenting changes in medical densities by exogenous characteristics of the environment. Only physicians located at the same postal code two years in a row (stayers) are included in the regressions.

First-differentiating equation (19) leads to

$$\begin{aligned} \Delta \ln q_{it} &= \Delta Q(Exp_{it}) + \Delta\Phi(X_{it}) + a^{S2} \Delta d_{z(i)t}^{S2} + a^{S1} \Delta d_{z(i)t}^{S1} \\ &\quad + \Delta(f(Y_{z(i)t})) + \Delta s_t + (v_{G_{t_1}(i)} - v_{G_{t_0}(i)}) + \Delta u_{it} \end{aligned} \quad (20)$$

Two potential biases may affect the estimation of the effects of the medical densities. First, new physicians are likely to settle in more attractive areas, where the unobserved demand increases. The medical density is then endogenous. However, while this is true for arriving physicians, the number of old physicians present at a given year should not be not related to changes in demand conditions that may occur in following years. If this is true, the local densities of physicians older than 60 at t_0 provide valid instruments explaining variations (especially decreases) in medical density between t_0 and t_1.

Second, the mobility of physicians (arrival, moving, retirement) may create local changes in the quality of competitors. Unobserved quality changes $v_{G_{t_1}(i)} - v_{G_{t_0}(i)}$, which do not cancel out by first-differences, affect negatively the demand addressed to the physician. Whether this omitted variable biases the density estimates depends on how it correlates to changes in density. For example, if newly arrived physicians provide care of greater quality than incumbent ones, then there is a positive correlation with a rise in the medical density, and a negative correlation with the output provided by the physician, creating a downward bias of the effect of medical density on output. However it is just as likely that already settled physicians, due to their experience, provide better care than new ones. The direction of the bias, if any, is therefore unclear.

Our instrumental strategy controls for the first bias, but not for the second potential channel. In practice, our model includes two endogenous variables, namely the medical densities in each of the two regulatory sectors. As shown by Sanderson and Windmeijer (2016), the inspection of the individual first-stage F-statistics is not sufficient to evaluate the strength of the instruments. Accordingly, we use the test proposed by these authors to check that the two corresponding instruments (the density of S1- and S2-physicians older than 60) provide enough power to identify the two effects separately.

4.2 Reduced-form equations

We apply the above identification strategy (first time-differentiation and instrumentation of variations in densities or output) to each of the reduced-form equations derived from the theoretical model.

Equilibrium equations for fees, output and price of free-billing physicians All equilibrium equations have the same structure as (19), namely

$$\ln y_{it} = \alpha_i^q + Q(Exp_{it}) + \alpha_i^\Phi + \Phi(X_{it}) + v_{G_t(i)} + a^{S2} d_{z(i)t}^{S2} + a^{S1} d_{z(i)t}^{S1} + f(Y_{z(i)t}) + s_t + u_{it},$$

where the variable y represent alternatively total fee, composite price, composite output, number of patients seen each year, number and price of simple visits, number and price of technical acts. As the seemingly unrelated regressions (SUR) involve exactly the same explanatory variables and instruments, efficient estimates are obtained by equation per equation 2SLS estimation.[13]

Output responses We define the following empirical counterpart for the slopes of the reaction functions, $\rho_{ij} = \partial \ln q_i / \partial \ln q_j$. Using the same weights as in (3), we compute the distance-weighted average of the output produced by physician i's S1 and S2 competitors, $q_{G_t(i)}^{S1}$ and $q_{G_t(i)}^{S2}$. We then estimate the reduced-form output response equation:

$$\ln q_{it} = a^{S1} \ln q_{G_t(i)}^{S1} + a^{S2} \ln q_{G_t(i)}^{S2} + \alpha_i^q + Q(Exp_{it}) + \alpha_{G_t(i)}^q + \alpha_i^\Phi + \Phi(X_{it}) + f(Y_{z(i)t}) + s_t + u_{it},$$

[13]The proof follows directly the one for the equivalence of OLS and GLS estimation of SUR regressions with identical explanatory variables, see Amemiya (1985).

The main parameters of interest, a^{S1} and a^{S2}, represent the elasticities of physician i's output with respect to the output of her S1 and S2 competitors. The equation contains the physician's characteristics that may influence her preferences for work as well as characteristics of the area, but not the competitors' characteristics.

Inverse demand We estimate the empirical counterpart of equation (10), a reduced-form equation for the inverse demand that relates a free-billing physician price to her own and -either free-billing and fee-regulated- competitors outputs:

$$\ln p_{it} = \alpha_i^d + Q_d^i(Exp_{it}) + f(Y_{z(i)t}) - a \ln q_{it} - b^{S1} \ln q_{G_t(i)}^{S1} - b^{S2} \ln q_{G_t(i)}^{S2} + u_{it}^d,$$

The direct elasticity $a = \eta_{ii}$ is assumed to be constant across physicians. The parameters b^{S1} and b^{S1} are empirical counterparts of $\eta_{ij}, j \neq i$ that represent the elasticity of the price charged by physician i to the quantity produced by her S1 and S2 competitors. No medical density appears in the demand equation. The labor supply preferences of the physician and of her competitors are absent, too. Only the experience of the physician and the characteristics of the patients in the area (wealth, age structure) enter the demand.

The identification strategy followed here uses first-differentiation and lagged densities of older physicians, variations in non-practice income and physician household characteristics as instruments for the variations of individual and competitors' output.

4.3 Construction of variables

In the empirical part, we use the local medical density indicators such as defined in section 2. We also follow a similar weighted approach (with the same weights) to compute local indicators for population wealth (population median income per zipcode weighted by the size of the population in the zipcode) and local age structure.

As physician characteristics, we consider her experience which is related to her quality/reputation. It is defined as the difference between the current year and the year of practice beginning.

As physician's household characteristics, potentially related to physician's preferences for leisure, we use the size of the household (with a fiscal meaning) and a dummy indicating whether there is at least one child under three in the household.

As non-practice income variable, we consider the non-professional income of the household, which includes real estate income, agricultural income, capital income, and pensions, supports and rents perceived by a member of the household; the non physician income, which covers previous sources plus labor income of other members of household (except the physician); and last, child and ex-spouse support, that is, the financial support the household may give for a child or an ex-spouse after a separation. This decreases the available household income. For this last variable, we use a dummy indicating if yes or no there is a child support. The two other variables of income are reported to the number of persons in the household.

5 Equilibrium results

We present here the estimation results for the equilibrium equations relative to price, output and fees. We start with a cross-sectional analysis and proceed to the time-difference analysis.

5.1 Cross-sectional analysis

In contrast *a priori* with competition mechanisms, a cross-sectional analysis shows a positive correlation between medical density and physician prices: the higher sector 2 medical density, the higher local prices are (see Table 4, first column). These naive regressions do not account for that physician location choices are closely related to the attractiveness of the area so as local unobserved demand factors. Hence, estimates are biased. Moreover, there may be a positive correlation between the medical density of sector 2 physicians and the unobserved quality/reputation of physicians who choose to locate in such areas. Sector 2 physicians have often additional education with respect to sector 1 physicians as since 1990 the sector 2 option has been only opened to physicians who have a qualifying university teaching and hospital practice (ex-clinic supervisors). Reputation/quality may depend on those qualifying practices and experiences. For instance, a previous practice in a particular hospital may be more reputed/valuated than a practice in an other one. So, S2 physicians who chose to locate in an area with high medical density may be those who have the better reputation who are likely (or expected) to provide care of higher quality. If so, the parameter in front of the S2 medical density is biased upward. The direction of this bias is confirmed when we add Zip codes and individual fixed effects that account for unobserved local/individual differentials in the effects of physician location choices. Notice that Sector 2 physicians set higher prices in richer areas.

Free-billing physicians						
		Price			Output	
Free-billing medical density (in log)	0.075***	0.002	-0.042***	0.022	-0.030	-0.018
	(0.007)	(0.009)	(0.011)	(0.021)	(0.033)	(0.040)
Fee-regulated medical density (in log)	-0.089***	-0.035***	-0.013	0.133***	-0.012	0.050
	(0.006)	(0.007)	(0.010)	(0.017)	(0.025)	(0.036)
Year effects	X	X	X	X	X	X
Zipcode effects		X			X	
Individual fixed effects			X			X
Observations	19504	19504	19504	19504	19504	19504
R^2	0.462	0.647	0.940	0.387	0.492	0.913
$R^2 adj$	0.461	0.627	0.903	0.386	0.463	0.860
Price and output correlation				-0.136	0.256	-0.118
Fee-regulated physicians						
					Output	
Free-billing medical density (in log)				-0.037***	-0.080***	0.001
				(0.012)	(0.019)	(0.016)
Fee-regulated medical density (in log)				0.070***	0.017	-0.018
				(0.019)	(0.029)	(0.031)
Year effects				X	X	X
Zipcode effects					X	
Individual fixed effects						X
Observations				20151	20151	20151
R^2				0.277	0.429	0.904
$R^2 adj$				0.277	0.387	0.856

Note: Pooled OLS regressions, with also controls (not reported) for local GP log density, physician's non professional income, non physician income, child/ex-spouse support, presence of a child under 3 interacted with physician's sex, household size, physician's experience and square, local population size and age structure, local median income, specialty, sex, years. Standard errors clustered by physician in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Price and Output: cross-sectional analysis

Density parameter estimates in regressions on output are not significantly different from zero neither for S1 and S2 physicians. This is consistent with theory for S1 physicians: their outputs do not depend on their local environment. However both for output and price equations, these cross-sectional results do not account for unobserved demand that may affect the location choices of new physicians and the local structure of the market. So, we turn to the time-difference analysis.

5.2 Analysis in time differences

Output of fee-regulated physicians. In line with the predictions of Lemma 1, we find in Table 5 that the labor supply of fee-regulated physicians does not respond to changes in demand or supply conditions: none of the variables related to medical density or population (size and wealth) has a statistically significant effect on the output of S1 physicians. This result is not driven by weak instrumentation: our instruments for the variations in the two medical densities are very strong according to individual F-statistics and to the Sanderson-Windmeijer tests.

We find fairly strong effects of income on labor supply: if the non-professional income and the non-physician income of a S1 physician increases by 1%, her activity decreases by respectively .7% and .3%. The presence of a young child is associated with a 10% decrease in activity for female S1 physicians. As expected for fee-regulated physicians, using output or fees as the dependent variable leads the same results.[14]

A decrease in the medical densities causes the number of distinct patients seen during a year to rise, but has no effect on the number of simple visits (see Table 6). This is compatible with patient rationing through longer waiting times. As regards the composition of the offered care services, the densities do not affect the number of technical acts performed.[15] These results contrast with the findings of Delattre and Dormont (2003) on the earlier period 1973-1994, a time when there were much more fee-regulated physicians and rationing was more likely to be on the physician side rather than on the patient side.[16]

Fees, price and output of free-billing physicians For all specialties, we have seen that the positive correlation between medical density and prices found in cross-section

[14]These qualitative results described above hold for gynecologists, pediatricians and ophthalmologists separately (see Tables 22, 23, and 24 in the supplementary material for online appendix for results by specialty), and if year 2014 is removed from the sample, see Table 26.

[15]This is true even if one restricts attention to technical specialties, obstetric gynecologists and ophthalmologists, results are available upon request.

[16]Between 1991 and 2013, the densities of fee-regulated physicians have fallen by respectively 30%, 18% and 10% for gynecology, ophthalmology, and pediatrics.

	Output		Fees	
	OLS	IV	OLS	IV
D.Log sector 2 medical density	-0.021*	-0.034	-0.019*	-0.113
	(0.012)	(0.080)	(0.011)	(0.084)
D.Log sector 1 medical density	-0.089***	-0.054	-0.126***	-0.156
	(0.024)	(0.125)	(0.023)	(0.127)
D.Log GP density	0.009	0.010	0.005	0.013
	(0.033)	(0.035)	(0.033)	(0.035)
D.Non professional Log income /100	-0.714***	-0.713***	-0.668***	-0.663***
	(0.177)	(0.177)	(0.179)	(0.179)
D.Non physician Log income /100	-0.311**	-0.314**	-0.315**	-0.313**
	(0.130)	(0.131)	(0.131)	(0.133)
D.Child/ex-spouse support (y/n)	0.003	0.003	0.003	0.003
	(0.008)	(0.008)	(0.008)	(0.008)
D.≤3 yo child (y/n) x Women	-0.108***	-0.108***	-0.111***	-0.112***
	(0.020)	(0.020)	(0.020)	(0.020)
D.≤3 yo child (y/n) x Men	-0.022	-0.022	-0.020	-0.019
	(0.035)	(0.035)	(0.035)	(0.035)
D.Log Nb persons in Household	0.003	0.003	0.004	0.003
	(0.014)	(0.014)	(0.014)	(0.014)
D.Log local population	-0.053	-0.035	0.002	-0.027
	(0.162)	(0.190)	(0.163)	(0.193)
D.Local log median income	-0.148	-0.138	-0.030	-0.024
	(0.238)	(0.236)	(0.240)	(0.238)
L.Experience in years/10	-0.013	-0.012	-0.016	-0.016
	(0.025)	(0.025)	(0.025)	(0.025)
L.Experience^2/100	-0.014**	-0.014**	-0.012*	-0.012*
	(0.007)	(0.007)	(0.007)	(0.007)
Constant	0.194***	0.194***	0.187***	0.189***
	(0.032)	(0.032)	(0.032)	(0.032)
Observations	12995	12995	12995	12995
R^2	0.035	-	0.033	-
$R^2 adj$	0.033	-	0.032	-
endogeneity test (pval)		0.868		0.425
Nb instruments		2.000		2.000
1st st. F for S1-medical density		359.480		359.480
1st st. F for S2-medical density		277.300		277.300
Sanderson-Windmeijer F-test for S1-med dens		452.570		452.570
Sanderson-Windmeijer F-test for S2-med dens		408.774		408.774
Stock-Wright S (joint 0) (pval)		0.892		0.359
Anderson-Rubin (joint 0) (pval)		0.892		0.358

Note: OLS and IV regressions are performed on physicians staying at the same location within a time period. D. denotes that controls are taken in first differences; L. stands for lagged value.
Controls also include years, specialties (pediatricians, ophthalmologists, gynecologists) and age composition of local population (not reported). In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60.
Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Output and Fees of fee-regulated physicians: First-difference analysis

	Visits		Patients		Tech Act	
	OLS	IV	OLS	IV	OLS	IV
D.Log sector 2 medical density	-0.034*	0.018	-0.030***	-0.144**	-0.065	0.153
	(0.020)	(0.119)	(0.009)	(0.065)	(0.043)	(0.227)
D.Log sector 1 medical density	-0.164***	-0.013	-0.128***	-0.220**	-0.130	0.239
	(0.038)	(0.179)	(0.016)	(0.096)	(0.095)	(0.401)
D.Log GP density	0.029	0.024	0.005	0.015	-0.005	-0.026
	(0.052)	(0.054)	(0.024)	(0.024)	(0.112)	(0.114)
D.Non professional Log income /100	-0.583**	-0.583**	-0.324***	-0.319**	-0.320	-0.327
	(0.232)	(0.232)	(0.124)	(0.125)	(0.438)	(0.440)
D.Non physician Log income /100	-0.163	-0.176	-0.202**	-0.193*	-0.160	-0.193
	(0.179)	(0.180)	(0.102)	(0.105)	(0.361)	(0.362)
D.Child/ex-spouse support (y/n)	-0.015	-0.015	0.005	0.005	0.037	0.037
	(0.012)	(0.012)	(0.006)	(0.006)	(0.024)	(0.024)
D.$\leq$3 yo child (y/n) x Women	-0.137***	-0.134***	-0.055***	-0.058***	0.032	0.041
	(0.025)	(0.025)	(0.017)	(0.017)	(0.112)	(0.113)
D.$\leq$3 yo child (y/n) x Men	-0.007	-0.007	-0.004	-0.003	0.057	0.056
	(0.046)	(0.046)	(0.034)	(0.034)	(0.078)	(0.078)
D.Log Nb persons in Household	0.011	0.011	0.006	0.006	-0.022	-0.021
	(0.019)	(0.019)	(0.010)	(0.010)	(0.037)	(0.037)
D.Log local population	-0.154	-0.059	-0.131	-0.199	0.916	1.158*
	(0.273)	(0.310)	(0.110)	(0.133)	(0.580)	(0.628)
D.Local log median income	0.796**	0.823**	-0.013	-0.019	-2.472***	-2.416***
	(0.405)	(0.403)	(0.178)	(0.178)	(0.861)	(0.863)
L.Experience in years/10	0.014	0.015	-0.048**	-0.049**	0.051	0.054
	(0.035)	(0.035)	(0.020)	(0.020)	(0.066)	(0.066)
L.Experience^2/100	-0.014	-0.014	-0.000	-0.000	-0.036**	-0.036**
	(0.009)	(0.009)	(0.005)	(0.005)	(0.018)	(0.018)
Constant	-0.130**	-0.130**	0.086***	0.086***	0.355***	0.355***
	(0.052)	(0.052)	(0.027)	(0.027)	(0.106)	(0.106)
Observations	12995	12995	12995	12995	12995	12995
R^2	0.031		0.157		0.016	
$R^2 adj$	0.029		0.156		0.015	
Breusch_Pagan_pvalue						
endogeneity test (pval)		0.694		0.195		0.573
Nb inst.		2.000		2.000		2.000
1st st. F for S1-medical density		359.480		359.480		359.480
1st st. F for S2-medical density		277.300		277.300		277.300
Sanderson-Windmeijer F-test for S1-med dens		452.570		452.570		452.570
Sanderson-Windmeijer F-test for S2-med dens		408.774		408.774		408.774
Stock-Wright S (joint 0) (pval)		0.965		0.046		0.780
Anderson-Rubin (joint 0) (pval)		0.965		0.046		0.780

Note: OLS and IV regressions are performed on physicians staying at the same location within a time period. D. denotes controls are taken in first differences. L. in lagged value.
Controls also include years, specialties (pediatricians, ophthalmologists, gynecologists) and age composition of local population (not reported). In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60.
Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Visits, Patients and Technical acts of Fee-regulated physicians: First-difference analysis

disappears when we use a first-difference approach. When we furthermore instrument the medical density, *i.e.* when we properly account for location choices, we find a significant negative effect of medical densities on the prices, consistent with a competition mechanism.

Specifically, Table 7 shows that the elasticity of price with respect to the S2 density is about -.71 and is much stronger (by a factor 20) than the OLS estimate, which confirms the direction of the bias we already discussed (physicians tend to locate in areas where local demand and hence prices are high). The elasticity of price with respect to the S1 density is about -.36 (again much higher in absolute value than the OLS estimate).[17] The difference between the two elasticities is statistically significant, showing that equilibrium price of S2 physicians respond more to the arrival or departure of competitors when they belong to the same regulatory sector.

[17]Sanderson-Windmeijer joint statistics and individual first-stage F-statistics are, again, very high, showing that the instruments are powerful.

	Price		Output		Fees	
	OLS	IV	OLS	IV	OLS	IV
D.Log sector 2 medical density	-0.035***	-0.710***	-0.083***	0.615***	-0.121***	-0.155
	(0.008)	(0.083)	(0.025)	(0.206)	(0.025)	(0.188)
D.Log sector 1 medical density S1	-0.008	-0.356***	-0.022	0.517***	-0.032*	0.114
	(0.007)	(0.072)	(0.020)	(0.183)	(0.018)	(0.171)
D.Local GP log density	-0.021*	0.031*	-0.039	-0.099**	-0.066*	-0.068*
	(0.013)	(0.018)	(0.039)	(0.044)	(0.037)	(0.040)
D.Non professional Log income /100	0.042	0.085*	-0.258	-0.313	-0.229	-0.236
	(0.039)	(0.048)	(0.190)	(0.191)	(0.194)	(0.193)
D.Non physician Log income /100	-0.020	-0.012	-0.257	-0.275*	-0.290*	-0.299*
	(0.030)	(0.037)	(0.160)	(0.164)	(0.163)	(0.164)
D.Child/ex-spouse support (y/n)	0.000	0.001	0.015*	0.014	0.015*	0.015*
	(0.002)	(0.003)	(0.008)	(0.009)	(0.008)	(0.008)
D.≤3 yo child (y/n) x Women	0.000	-0.004	-0.067**	-0.063**	-0.066**	-0.067***
	(0.006)	(0.008)	(0.028)	(0.028)	(0.026)	(0.026)
D.≤3 yo child (y/n) x Men	-0.009*	-0.012*	0.001	0.002	-0.007	-0.009
	(0.005)	(0.006)	(0.013)	(0.013)	(0.011)	(0.011)
D.Log Nb persons in Household	-0.001	-0.000	0.029**	0.028**	0.028**	0.028**
	(0.003)	(0.004)	(0.013)	(0.014)	(0.013)	(0.013)
D.Log local population	0.163**	-0.355***	-0.322	0.344	-0.183	-0.089
	(0.069)	(0.120)	(0.219)	(0.322)	(0.207)	(0.298)
D.Local log median income	0.751***	0.961***	-0.916***	-1.128***	-0.147	-0.131
	(0.091)	(0.127)	(0.300)	(0.332)	(0.289)	(0.305)
L.Experience in years/10	0.008*	-0.003	-0.147***	-0.136***	-0.139***	-0.140***
	(0.004)	(0.006)	(0.020)	(0.021)	(0.020)	(0.020)
L.Experience^2/100	-0.001	0.001	0.016***	0.014**	0.015**	0.015**
	(0.001)	(0.002)	(0.006)	(0.006)	(0.006)	(0.006)
Constant	-0.063***	-0.075***	0.277***	0.296***	0.276***	0.282***
	(0.010)	(0.014)	(0.033)	(0.036)	(0.032)	(0.034)
Observations	11640	11640	11640	11640	11640	11640
R^2	0.117		0.082		0.067	
$R^2 adj$	0.116		0.081		0.065	
Correlation between price and output residuals	-0.266					
Breusch_Pagan_pvalue	0.000					
endogeneity test (pval)		0.000		0.002		0.157
Nb instruments		2.000		2.000		2.000
1st st. F for S1-medical density		175.382				175.382
1st st. F for S2-medical density		189.606				189.606
Sanderson-Windmeijer F-test for S1-med dens		165.721				165.721
Sanderson-Windmeijer F-test for S2-med dens		170.382				170.382
Stock-Wright S (joint 0) (pval)		0.000		0.006		0.036
Anderson-Rubin (joint 0) (pval)		0.000		0.006		0.036

Note: OLS and IV regressions are performed on physicians staying at the same location within a time period.
D. denotes that controls are taken in first differences. L. stands for lagged value. Controls also include years, specialties (pediatricians, ophthalmologists, gynecologists) and age composition of local population (not reported). In IV regressions, variations of log medical densities are instrumented with lagged log density of physicians older than 60.
Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Price, Output and Fees of free-billing physicians: First difference analysis

Turning to labor supply, Table 7 also shows that the output produced by a free-billing physician depends *positively* on the local medical densities: when a S2 physician faces a decrease in the number of competitors, for instance because some of them retire and are not replaced, she responds by working *less*. The elasticities with respect to the S1 and S2 densities are positive and not significantly different from each other (.62 and .52 respectively), while the OLS estimates are negative or non significant.

	#Patients	#Visits	Visit Price	Tech. Acts	TA Price	Comp. Output	Comp. Price	Total Fees
All specialties								
D.Log sector 2 medical density	-0.353**	-0.828**	-0.088	1.608***	-0.595***	0.610***	-0.709***	-0.158
	(0.158)	(0.391)	(0.078)	(0.551)	(0.097)	(0.206)	(0.083)	(0.188)
D.Log sector 1 medical density	-0.132	-0.375	-0.001	1.750***	-0.342***	0.514***	-0.356***	0.112
	(0.139)	(0.370)	(0.064)	(0.491)	(0.081)	(0.183)	(0.072)	(0.171)
D.Log local median income	-0.167	0.786	0.017	-5.196***	1.314***	-1.130***	0.963***	-0.131
	(0.256)	(0.613)	(0.114)	(0.907)	(0.164)	(0.332)	(0.126)	(0.305)
Observations	11630	11630	11532	11628	10513	11630	11630	11630
Medical specialties: General gynecology and Pediatricians								
D.Log sector 2 medical density	-0.482*	-0.709**	-0.194**	0.903	-0.455**	0.508	-0.812***	-0.424
	(0.266)	(0.356)	(0.084)	(1.209)	(0.195)	(0.320)	(0.153)	(0.297)
D.Log sector 1 medical density	-0.095	-0.201	0.251***	-0.878	-0.030	0.091	-0.109	-0.097
	(0.293)	(0.388)	(0.096)	(1.266)	(0.182)	(0.362)	(0.150)	(0.345)
D.Log local median income	-1.293**	-0.961	0.442***	-7.717***	1.352***	-1.514**	0.543*	-1.142
	(0.634)	(0.757)	(0.149)	(2.378)	(0.394)	(0.749)	(0.279)	(0.736)
Observations	3085	3085	3084	3083	2087	3085	3085	3085
Technical specialties: Obstetric gynecology and Ophthalmologists								
D.Log sector 2 medical density	-0.376*	-0.972*	-0.058	1.623**	-0.606***	0.547**	-0.650***	-0.112
	(0.202)	(0.565)	(0.110)	(0.632)	(0.113)	(0.264)	(0.102)	(0.243)
D.Log sector 1 medical density	-0.192	-0.514	-0.059	2.016***	-0.373***	0.485**	-0.363***	0.123
	(0.172)	(0.516)	(0.088)	(0.551)	(0.093)	(0.228)	(0.088)	(0.213)
Local median income	0.213	1.423*	-0.111	-4.781***	1.325***	-0.989***	1.034***	0.083
	(0.271)	(0.794)	(0.150)	(0.988)	(0.181)	(0.363)	(0.145)	(0.330)
Observations	8545	8545	8448	8545	8426	8545	8545	8545

Note: Estimates extracted from IV regressions with log medical density changes instrumented with lagged log density of physicians older than 60, with the same specifications as in Table 7, $*p < .10$, $**p < .05$, $***p < .01$. Detailed results are available in the supplementary appendix.

Table 8: Quantities and prices of services provided by free-billing physicians: first difference analysis

To get a sense of the magnitudes involved, we consider the effect on the price and output of removing one competitor. According to Table 3, the median (distance-weighted) number of competitors is 20. Hence removing one competitor (located in the same postal code, hence at a zero minute distance) decreases that number, and hence the medical density at given population, by 5%, which translates into a 3.5% price rise and a 3% output fall.

Higher medical densities translate into less visits and fewer patients seen, which does not prevent free-billing physicians from maintaining or even increasing their total output, see Table 8. Technical physicians, obstetric gynecologists and ophthalmologists, face a decrease in the price of technical acts and respond to stronger competition by producing more of those acts, thus increasing their total output (recall equation 1). This, combined to the fact that S2 physicians generally overcharge less technical acts than visits (48% on average for technical acts vs 100% for clinical acts), results in a fall of the composite price even though the price of simple visits remains unchanged (recall price is measured as a weighted average of overcharge rates across types of acts, see equation (2)).

Non-technical specialists (medical gynecologists and pediatricians) who produce few technical acts (about 10% of their activity), face a stronger decrease in composite prices because both the price of their simple visits and the price of the few technical acts they provide fall.

Population wealth. We find a positive effect of local population wealth on prices (driven by prices of technical procedures and price of simple visits for medical specialists) and a negative effect on output (driven by technical procedures). This is consistent with Lemma 2, interpreting the population wealth as a shifter of the inverse demand equation: richer patients are likely to be ready to pay more for specialist care.

Income effects on labor supply. The model predicts that free-billing physicians should reduce their activity level and raise their prices in response to a non-practice income increase. Empirical results are consistent with such income effects on output for the three specialties pooled together. Physicians decrease their activity and increase their price in response to an increase in the non-professional income of the household. These effects are not statistically significant and smaller in magnitude than those observed for fee-regulated physicians. According to the comments below equations (16) and (17), this may be explained by the fact that the ratio of nonprofessional income over fees is lower for free-billing physicians. The presence of a child under 3 in the household causes female physicians to decrease their activity level. When scrutinizing specialty per specialty, we see that these results hold especially for Gynecologists.

Experience We find a concave effect of experience on output: changes in output decrease with the physician's level of experience.

Simulation exercise To give a concrete idea of the effects of changes in the medical density at the aggregate level, we simulate a 5% increase of the number of fee-for-service physicians of our three specialties in 2014.[18] This corresponds to the arrival of 446 supplementary physicians. We assign them either into the fee-regulated sector ("scenario S1") or into the free-billing sector ("scenario S2"), and use the estimates of Tables 5 and 7 to compute the impact of those two policies on prices and outputs. In the former scenario, the S1 medical density increases on average by 10.5%. In the latter, the S2 medical density increases of 9.6%.

Changes in	All fee-regulated (sector 1) (%)	All free-billing (sector 2) (%)
Fee-regulated medical density	10.5	
Free-billing Medical density		9.6
Composite Price in the free-billing sector (S2)	-3.7	-6.8
Care provided by one fee-regulated physician	-0.6	-0.3
Care provided by all fee-regulated physicians	9.9	-0.3
Care provided by one free-billing physician	5.4	5.9
Care provided by all free-billing physician	5.4	15.5
Total volume of care provided	7.4	8.7
Average price over the two sectors	-3.1	-3.1

Note: We use the estimates reported in tables 5 and 7 to simulate the effect of a 5% increase in the 2014 medical density of fee-for-service pediatricians, gynecologists and ophthalmologists. This corresponds to adding 446 physicians. We alternatively consider that all those new physicians enroll into the fee-regulated regime (sector 1/scenario 1) or into the free-billing one (sector 2/scenario 2).

Table 9: Simulating the entry of new physicians.

Both scenarios lead to a similar decrease in the average price (-3.1%), but through different channels. In scenario S1, free-billing physicians decrease moderately their prices (by 3.7%), and the proportion of fee-regulated physicians rises from 47.8% to 50.3%. In scenario S2, the price reaction of S2 physicians is much stronger (-6.8%), but balanced by a composition effect (share of S1 physicians falls to 45.6%). Total output increases more than proportionally to the number of physicians due to the positive effect of competition on labor supply. The increase is stronger in scenario S2 (+8.7% vs 7.4%). This comes from a strong increase in output of free-billing physicians (+15.5%) that largely overpasses the small output decrease of S1 physicians (-.3%). Reversely, the scenario S1 leads to a

[18]The Ministry of health aims to raise by 20% the number of physicians trained each year. A back of the envelope calculation assuming a stationary environment (in terms of retirement behavior and share of self-employed physicians) shows that a 5% increase of the number of physician would be achieved in 4 to 5 years after completion of the training of the new physicians.

strong increase in S1 physician output (+9.9%) but to a more modest increase in the S2 physician output (+5.4%).

The S2 scenario might be socially preferred as the increase in activity is larger for similar decreases in price. This is due to the fact that S2 physicians work in general more than S1s and do react to competition. This S2 scenario presents the additional advantage to reduce more S2 physician overcharges, and hence the price dispersion observed in the market. However, this simulation exercise shows only an average effect at the national level ignoring the potential effects on local inequalities.

Regulatory environment To further investigate the impact of regulatory environment, on physicians responses, we re-estimate equilibrium price and output equations for two groups of free-billing physicians depending on whether they are surrounded by more S1-physicians (than the median by specialty and year) or not. In line with the comments below equation (18), we find that price and output reactions to free-billing medical density changes are stronger in areas with fewer fee-regulated physicians (as the price of free-billing competitors is in these case generally higher). Reversely, income effects are smaller in such areas. Moreover, the impact of local median income is reduced. See the comments below equations (15) and (16).

Robustness analysis and extensions We check the results are robust to introducing in the equilibrium equations a number of variables relative to the competitors, see Tables 27 and 28 in the supplementary appendix.[19] We also check that the results remain true if the year 2014 is removed from the sample, see Table 25, so they are not driven by the contractual arrangement for S2-physicians introduced in 2012. The negative effect of the S2 densities on S2 prices holds for each of the three specialties separately while the positive effect on output holds only for gynecologists. See Tables 19, 20, and 21 for additional results by specialty. We performed separate estimations for male and female

[19]The competitors variables are the non-professional and non-physician incomes, the presence of a young child, and whether the physician pays child or ex-spouse support. All these variables are averaged using the distance-based weights presented above across all the competitors who are present at years t and $t + 1$.

	More fee-regulated competitors than median		Fewer fee-regulated competitors than median	
	Price	Output	Price	Output
D.Log local medical density S2	-0.297***	0.226	-1.684***	1.460**
	(0.048)	(0.151)	(0.402)	(0.638)
D.Log local medical density S1	-0.108**	0.137	-0.475***	0.281
	(0.048)	(0.149)	(0.151)	(0.248)
D.Local log median income	0.555***	-0.596	2.532***	-2.472**
	(0.119)	(0.367)	(0.460)	(0.882)
Observations	5868	5868	5767	5767
endogeneity test (pval)	0.000	0.171	0.000	0.007
# instruments	2.000	2.000	2.000	2.000
1st st. F excluded for S1-med dens	127.402	127.402	24.256	24.256
1st st. F excluded for S2-med dens	160.389	160.389	12.934	12.934
Sanderson-Windmeijer F-test for S1-med dens	240.121	240.121	85.844	85.844
Sanderson-Windmeijer F-test for S2-med dens	241.550	241.550	55.188	55.188
Stock-Wright S (joint 0) (pval)	0.000	0.319	0.000	0.019
Anderson-Rubin (joint 0) (pval)	0.000	0.318	0.000	0.018

Note: IV regressions are performed only on physicians staying at the same location within a time period. Changes in log medical densities are instrumented by lagged log density of physicians older than 60. Regressions include also controls for years, specialties (pediatricians, ophthalmologists, gynecologists), age composition of local population, GP medical density physician's non professional income, non physician income, child/ex-spouse support, child under 3 interacted with physician sex, physician household size, local population size, physician experience and its square. Standard errors clustered by physician are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Detailed results in table 17 in the supplementary appendix.

Table 10: Price and output of free-billing physicians depending on regulatory environment

physicians (see Tables 29-32), the only differences that show up are stronger labor supply responses of women, especially if they are fee-regulated, to changes in spouses' incomes.

6 Demand and reaction functions

In this section, we test the theoretical predictions of the model about the slope of reaction functions of fee-regulated and free-billing physicians. We also check that the prices charged by free-billing physicians are negatively affected by the activity of their competitors.

6.1 Reaction functions

According to Table 11, the reaction functions of free-billing physicians are upward sloping. A S2 physician increases her output by .27% when her S2 competitors increase theirs by 1%. The corresponding figure for S1 competitors, .48%, is not significantly different at the 5% confidence level. We therefore find a fairly strong effect of competition on labor supply. Our instruments for the time variations in S1 and S2 competitors' output for the two medical densities are very strong according to individual F-statistics and to the Sanderson-Windmeijer tests.[20]

The effects of individual characteristics (non-professional income, family) are almost the same as in the equilibrium specification of Table 7. The main difference concerns the role of the population wealth, which is significant in equilibrium specification, but not in the reaction function.

Turning to fee-regulated specialists, we find that their labor supply does not respond to change in the labor supply of their competitors, see Table 11 two last columns. We also find that the wealth of the local population plays no role in the determination of labor supply. These results are consistent with Lemma 1. The price channel that is at work for S2 physicians is shut down for S1s. Changes in their colleagues' activity or in patients' income cannot affect the price their earn per visit and as a result they choose labor supply based solely on their own characteristics ans preferences.

[20]The analysis is carried out by pooling all three specialties together. We lack instrumental power to estimate reactions functions for each specialty separately.

	Free billing		Fee-regulated	
	OLS	IV	OLS	IV
D.Free-billing Compet. Log Output	0.006	0.272***	0.001	-0.009
	(0.005)	(0.105)	(0.002)	(0.021)
D.Regulated Compet. Log Output	0.024***	0.477**	0.012	-0.030
	(0.008)	(0.216)	(0.011)	(0.068)
D.Local GP log density	-0.045	-0.058	0.006	0.009
	(0.039)	(0.046)	(0.033)	(0.035)
D.Non professional Log income /100	-0.264	-0.293	-0.714***	-0.714***
	(0.189)	(0.198)	(0.177)	(0.178)
D.Non physician Log income /100	-0.257	-0.275	-0.320**	-0.319**
	(0.160)	(0.167)	(0.130)	(0.131)
D.Child/ex-spouse support (y/n)	0.015*	0.015	0.003	0.003
	(0.008)	(0.009)	(0.008)	(0.008)
D.$\leq$3 yo child (y/n) x Women	-0.067**	-0.072**	-0.106***	-0.106***
	(0.028)	(0.028)	(0.020)	(0.020)
D.$\leq$3 yo child (y/n) x Men	0.001	0.003	-0.022	-0.023
	(0.013)	(0.014)	(0.035)	(0.035)
D.Log Nb persons in Household	0.029**	0.034**	0.004	0.003
	(0.013)	(0.014)	(0.014)	(0.014)
D.Log local population	-0.283	-0.550**	-0.007	0.029
	(0.217)	(0.264)	(0.159)	(0.161)
D.Local log median income	-0.921***	-0.294	-0.118	-0.161
	(0.301)	(0.554)	(0.236)	(0.233)
L.Experience in years/10	-0.146***	-0.140***	-0.012	-0.012
	(0.020)	(0.021)	(0.025)	(0.025)
L.Experience^2/100	0.016***	0.014**	-0.014**	-0.014**
	(0.006)	(0.006)	(0.007)	(0.007)
Constant	0.343***	0.140	0.188***	0.202***
	(0.035)	(0.103)	(0.031)	(0.040)
Observations	11640	11640	12995	12995
R^2	0.082		0.034	
$R^2 adj$	0.080		0.032	
endogeneity test (pval)		0.008		0.822
# instruments		2.000		2.000
1st st. F excluded for S1 compet. output		39.876		41.886
1st st. F excluded for S2 compet. output		25.908		149.105
Sanderson-Windmeijer F-test S1 compet. output		34.939		100.092
Sanderson-Windmeijer F-test for S2 compet. output		35.237		122.695
Stock-Wright S (joint 0) (pval)		0.006		0.892
Anderson-Rubin (joint 0) (pval)		0.006		0.892

Note: OLS and IV regressions include only gynecologists, pediatricians, ophthalmologists staying at the same location with the time period. D. denotes controls in first differences, L. indicates lagged value control. Controls include also years, specialties (gynecologists, pediatricians and ophthalmologists), and age composition of local population (not reported). In IV regressions, changes in log medical density are instrumented by lagged log density of physicians older than 60 by sector. Standard errors clustered by physicians are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Output response equation (reaction function)

Non-professional and non-physician incomes affect negatively the labor supply of S1 physicians, with elasticities of -.7 and -.3 very similar to those found in the equilibrium equation of Table 5. The presence of children less than 3 lowers the labor supply of women as in Table 5.[21]

	More fee-regulated competitors than median		Fewer fee-regulated competitors than median	
	OLS	IV	OLS	IV
D.Free-billing Compet. Log Output	0.009	0.089	-0.000	0.972
	(0.006)	(0.061)	(0.007)	(1.045)
D.Regulated Compet. Log Output	0.014	0.126	0.025**	0.690
	(0.015)	(0.152)	(0.010)	(0.919)
D.Local log median income	-0.693**	-0.459	-1.066**	0.213
	(0.353)	(0.449)	(0.492)	(1.862)
Observations	5868	5868	5767	5767
R^2	0.096		0.076	
$R^2 adj$	0.093		0.073	
endogeneity test (pval)		0.387		0.014
# instruments		2.000		2.000
1st st. F excluded for S1 compet. output		46.329		5.963
1st st. F excluded for S2 compet. output		24.455		6.124
Sanderson-Windmeijer F-test S1 compet. output		67.924		3.780
Sanderson-Windmeijer F-test for S2 compet. output		61.653		3.594
Stock-Wright S (joint 0) (pval)		0.319		0.019
Anderson-Rubin (joint 0) (pval)		0.318		0.018

Note: OLS and IV regressions include only gynecologists, pediatricians, ophthalmologists staying at the same location with the time period. D. denotes controls in first differences, L. indicates lagged value control. Controls include also years, specialties (gynecologists, pediatricians and ophthalmologists), age composition of local population, GP medical density, physician' non professional income, non physician income, child/spouse support, child under 3 interacted with physician sex, size of household, population size, physician experience and its square (not reported). In IV regressions, changes in log medical density are instrumented by lagged log density of physicians older than 60 by sector. Standard errors clustered by physicians are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Detailed results in Table 18 in the supplementary appendix.

Table 12: Output response of free-billing physicians depending on regulatory environment

Finally, Table 12 provides limited evidence that the reaction functions of free-billing specialists are steeper when there are fewer fee-regulated specialists in the neighborhood, in line with the comments below equation (18).[22]

[21] All the results remain if the year 2014 is removed from the sample, Tables 26 and 25.
[22] But instruments are weak in the regression with fewer fee-regulated physicians than the median.

6.2 Inverse demand for free-billing physicians

Table 13 documents the estimation results of the inverse demand equation (10) for free-billing physicians. Column (1) reports OLS results, columns (2) and (3) IV regression ones with different sets of instruments: physician's household and non-practice characteristics (column 2), physician's and competitors' ones (column 3). We claim that the prices charged by S2 physicians decrease with their competitors' activity. When S2 competitors increase their activity by 1%, the price charged by a S2 physician decreases by .25%. This is although true for fee-regulated competitors with a similar magnitude although the statistical significance is weaker (1% instead of 10%). These estimates should be interpreted with caution because of the lack of instrument power (see the first-stage F statistics). However, their sign is robust to weak instruments. Indeed, the robust-to-weak-identification Anderson-Rubin test indicates that the parameters of the endogenous variables (own and competitors' outputs) are different from zero. Given that the own-price elasticity is not significantly different from zero, we can infer that the elasticity of a physician's price with respect to her competitors' output must be significantly negative; in other words the coefficients η_{ij} in Section 3.3, taken on the whole set of competitors æ $\neq i$, are positive.

	Price (OLS)	Price (IV1)	Price (IV2)
D.Physician output	-0.072***	-0.112	-0.153***
	(0.009)	(0.071)	(0.058)
D.Free-billing compet output	-0.007***	-0.253***	-0.163***
	(0.002)	(0.057)	(0.029)
D.Fee-regulated compet output	-0.004	-0.227*	-0.044
	(0.003)	(0.119)	(0.033)
D.Local GP log density	-0.026**	-0.015	-0.020
	(0.012)	(0.022)	(0.016)
D.Log local population	0.166***	0.367***	0.259***
	(0.065)	(0.132)	(0.090)
D.Local log median income	0.661***	0.150	0.339**
	(0.086)	(0.301)	(0.159)
L.Experience in years/10	-0.003	-0.014	-0.019*
	(0.004)	(0.013)	(0.011)
L.Experience^2/100	0.000	0.002	0.002
	(0.001)	(0.002)	(0.002)
Constant	-0.051***	0.101*	0.040
	(0.010)	(0.055)	(0.030)
Observations	11943	11630	11517
R^2	0.181		
$R^2 adj$	0.180		
endogeneity test (pval)		0.000	0.000
# instruments		7.000	17.000
1st st. F excluded for output		3.347	2.299
1st st. F excluded for S1 compet. output		11.838	7.738
1st st. F excluded for S2 compet. output		9.605	8.398
Stock-Wright S (joint 0) (pval)		0.000	0.000
Anderson-Rubin (joint 0) (pval)		0.000	0.000

Note: OLS and IV regressions include only gynecologists, pediatricians, ophthalmologists staying at the same location within a time period. D. denotes controls in first differences, L. indicates lagged value control. Controls include also years, specialties (gynecologists, pediatricians and ophthalmologists), age composition of local population, population size, GP medical density. In the second column, the IV regression (IV1) uses as instruments for physician output and competitors outputs (3 variables instrumented), changes in density of physicians above 60 per sector, in physician' non professional income, in non physician income, in child/spouse support, in the presence of child under 3 for women, in size of household. In the third column, the IV regression (IV2) includes also changes in the same average characteristics both for free-billing and fee-regulated competitors. Standard errors clustered by physicians are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 13: Inverse demand for free-billing physicians.

We find that prices increase with the size of the population and a significant effect of the population wealth on prices, but only in the OLS and in the IVs regression with the larger set of instruments (column 3), which may suffer the most from weak identification issues.

7 Discussion

A unique institutional feature of the French ambulatory care system is the coexistence of two contractual arrangements for physicians, with and without price regulation ("Sector 1" and "Sector 2" respectively). We uncover very different determinants for the provision of services in the two sectors. The supply of services by fee-regulated physicians depend only on their individual characteristics. For instance, rises in non-professional incomes or (for female physicians) the arrivals of young children cause them to reduce their activity. These physicians do not adjust their labor supply as market conditions change. By contrast, free-billing physicians do respond to changes in medical densities or in the wealth of the population in their local area when deciding which services to provide and in what quantity. Following an increase in local competition, prices of technical services (and of simple visits for medical specialties) fall, and although sector 2 physicians see fewer patients and have less simple visits, they manage to maintain their fees roughly at the same level by providing more technical acts.

Our results suggest that the effect of competition on labor supply operates through the following channel: (i) physician services are substitutes for patients,[23] so a higher output of competitors forces a physician to charge a lower price to attract the same number of patients. More intense competition therefore entails a negative effect on the physicians' incomes. (ii) the physician responds to that negative shock by increasing the supply of care. In other words, reactions functions are upward-slopping: the outputs produced by physicians are strategic complements. We find some evidence that the reaction functions are steeper in areas with fewer fee-regulated physicians, that is, the presence of those physicians tends to soften competition between free-billing physicians. Our theoretical

[23] The cross-elasticities of the inverse demand function are positive: $\eta_{ij} > 0$ for $j \neq i$.

analysis provides conditions under which the income effect on labor supply is sufficiently strong to rationalize these results.

The above findings bring mixed news for the regulator. On the negative side, there is little hope that market forces can induce fee-regulated physicians to provide more services. The government cannot count on competition to increase the provision of physician services at regulated prices. On the positive side, there seems to be an unexploited reservoir of potential labor supply in the free-billing sector: these physicians may choose to work more if prices decrease.

Our analysis therefore calls for different policy interventions in the two regulatory sectors. As regards the fee-regulated sector, the regulator should implement reforms that directly encourage labor supply by reducing the opportunity cost of work: improving work conditions; encouraging group practices to allow flexibility in working hours; favoring better conciliation of work and family life; improving child care, etc. For free-billing physicians, stimulating competition has the double advantage to lower prices and increase labor supply. The current government policy of abrogating caps on the number of trained physicians is likely to entail such an intensification of competition in the medium-to-long run.[24] A simple simulation exercise suggests that a policy that would allocate an increase in the number of physicians into the free-billing sector has larger effects on the total quantity of care provided than an increase in the number of fee-regulated physicians because only free-billing physicians respond to the competition channel.

An important limitation of this study is the use of yearly outcomes (quantity of care, average prices) computed at the physician level. In particular, we have ignored the dispersion of prices across patients for a given physician. While average prices in the free-billing sector respond to competition, it is unclear whether the same holds at the level of individual patients. In particular, extra-billings may prevent low-income patients from acceding to care services for certain specialties.[25] A quantitative assessment of financial barriers to care requires detailed matched patient-physician data sets. Whether some form of regula-

[24] The newly trained physicians are more and more likely to choose the free-billing sector.

[25] In principle, physicians are required by the code of medical ethics to show "tact and moderation" in their pricing policy. In particular, they are not supposed to charge extra-billings to low-income patients.

tion is needed to guarantee care access for less privileged patients should be the attention of future research.

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APPENDIX

Proof of Proposition 1 To compute the slope ρ_{ij} of the reaction function of physician i with respect to physician j's output q_j, we denote by ϕ_i the left-hand side of (4) and use the implicit function theorem:

$$\frac{\partial q_i}{\partial q_j} = -\frac{\partial \phi_i / \partial q_j}{\partial \phi_i / \partial q_i}.$$

Because ϕ_i equals (up to a positive factor) the derivative of the physician objective and q_i achieves the maximum of that objective, ϕ_i is positive (negative) at the left (right) of q_i, implying that the derivative $\partial \phi_i / \partial q_i$ is negative. It follows that the sign of ρ_{ij} is the same as that of

$$\frac{\partial \phi_i}{\partial q_j} = \frac{\partial^2 R_i}{\partial q_i \partial q_j} - \frac{\partial}{\partial q_j} \text{ MRS}_i(c_i, q_i).$$

From the budget constraint $c_i = N_i + R_i(q_i; q_{-i})$ and the expression of the physician revenue, equation (12), we obtain

$$\frac{\partial c_i}{\partial q_j} = \frac{\partial R_i}{\partial q_j} = -\eta_{ij} \frac{p_i q_i}{q_j} \quad \text{and} \quad \frac{\partial^2 R_i}{\partial q_i \partial q_j} = -\eta_{ij}(1 - \eta_{ii}) \frac{p_i}{q_j}.$$

It follows that

$$\frac{\partial \phi_i}{\partial q_j} = -\eta_{ij} \frac{p_i}{q_j} \left[1 - \eta_{ii} - q_i \frac{\partial \text{ MRS}_i}{\partial c_i} \right],$$

which shows that $\rho_{ij} > 0$ if and only if (13) holds.

In the case of the CES utility function with $\gamma < 1$, we have, using first the expression of the marginal rate of substitution, equation (6), and then the first-order condition (4):

$$\frac{\partial \text{ MRS}_i}{\partial c_i} = (1 - \gamma) \frac{\text{MRS}_i}{c_i - \underline{c}} = \frac{1 - \gamma}{c_i - \underline{c}} \frac{\partial R_i}{\partial q_i} = \frac{1 - \gamma}{c_i - \underline{c}} (1 - \eta_{ii}) p_i.$$

It follows that

$$\frac{\partial \phi_i}{\partial q_j} = -\eta_{ij}(1 - \eta_{ii}) \frac{p_i}{q_j} \left[1 - (1 - \gamma) \frac{p_i q_i}{c_i - \underline{c}} \right] = -\eta_{ij}(1 - \eta_{ii}) \frac{p_i}{q_j (c_i - \underline{c})} \left[N_i - \underline{c} + \gamma p_i q_i \right],$$

which shows that $\rho_{ij} > 0$ if and only if (14) holds.

Proof of Lemma 2 By the same argument as above, the sign of $\partial q_i / \partial a_i$ is the same as the sign of

$$\frac{\partial \phi_i}{\partial a_i} = \frac{\partial^2 R_i}{\partial q_i \partial a_i} - \frac{\partial \text{ MRS}_i}{\partial a_i}.$$

From the revenue equation (12), we have

$$\frac{\partial^2 R_i}{\partial q_i \partial a_i} = \frac{\partial R_i}{\partial q_i} = (1 - \eta_{ii}) p_i.$$

By the same argument, we compute

$$\frac{\partial \, \mathrm{MRS}_i}{\partial a_i} = \frac{\partial R_i}{\partial a_i} \frac{\partial \, \mathrm{MRS}_i}{\partial c_i} = R_i \frac{\partial \, \mathrm{MRS}_i}{\partial c_i}.$$

It follows that

$$\frac{\partial \phi_i}{\partial a_i} = (1 - \eta_{ii}) p_i - R_i \frac{\partial \, \mathrm{MRS}_i}{\partial c_i},$$

which yields condition (13) after eliminating p_i.

Leontief utility The physician chooses her labor supply so that her allocation remains along the line $c_i = \underline{c} + \beta(\bar{q} - q_i)$, hence

$$N_i - \underline{c} + e^{a_i} q_i^{1-\eta_{ii}} \prod_j q_j^{-\eta_{ij}} = \beta(\bar{q} - q_i). \tag{A.1}$$

Differentiating (A.1) with respect to q_i and a_i leads to

$$[(1 - \eta_{ii}) p_i + \beta] \, \mathrm{d}q_i + R_i \, \mathrm{d}a_i = 0,$$

hence

$$\frac{\partial \ln q_i}{\partial a_i} = \frac{-p_i}{(1 - \eta_{ii}) p_i + \beta},$$

which yields (15). We obtain (16) by the same method. In the same way, differentiating with respect to q_i and q_j leads to

$$[(1 - \eta_{ii}) p_i + \beta] \, \mathrm{d}q_i - \eta_{ij} \frac{R_i}{q_j} \, \mathrm{d}q_j = 0,$$

which yields

$$\rho_{ij} = \frac{\partial \ln q_i}{\partial \ln q_j} = \frac{\eta_{ij}}{1 - \eta_{ii} + \beta q_i / R_i}$$

and finally (18), using $R_i = p_i q_i$.

Supplementary material for online appendix

Detailed results

	#Patients	#Visits	Visit Price	Tech. Acts	TA Price	Comp. Output	Comp. Price	Total Fees
D.Log sector 2 medical density	-0.353**	-0.828**	-0.088	1.608***	-0.595***	0.610***	-0.709***	-0.158
	(0.158)	(0.391)	(0.078)	(0.551)	(0.097)	(0.206)	(0.083)	(0.188)
D.Log sector 1 medical density	-0.132	-0.375	-0.001	1.750***	-0.342***	0.514***	-0.356***	0.112
	(0.139)	(0.370)	(0.064)	(0.491)	(0.081)	(0.183)	(0.072)	(0.171)
D.Log GP density	-0.036	-0.065	0.013	-0.510***	0.065***	-0.099**	0.032*	-0.068*
	(0.030)	(0.087)	(0.016)	(0.176)	(0.021)	(0.044)	(0.018)	(0.040)
D.Non professional Log income /100	0.030	0.216	0.004	-0.167	-0.019	-0.311	0.083*	-0.236
	(0.151)	(0.275)	(0.069)	(0.355)	(0.063)	(0.191)	(0.048)	(0.193)
D.Non physician Log income /100	-0.150	0.234	-0.063	-0.315	-0.055	-0.277*	-0.012	-0.300*
	(0.123)	(0.233)	(0.057)	(0.285)	(0.050)	(0.164)	(0.037)	(0.164)
D.Child/ex-spouse support (y/n)	0.011*	0.029**	-0.000	0.013	0.001	0.014	0.001	0.015*
	(0.006)	(0.014)	(0.002)	(0.023)	(0.003)	(0.009)	(0.003)	(0.008)
D.≤3 yo child (y/n) x Women	-0.026	0.007	0.009	-0.098	-0.017*	-0.066**	-0.002	-0.068***
	(0.024)	(0.052)	(0.009)	(0.066)	(0.010)	(0.028)	(0.008)	(0.026)
D.≤3 yo child (y/n) x Men	-0.005	-0.055*	-0.002	0.039	-0.011	0.002	-0.012*	-0.009
	(0.013)	(0.032)	(0.005)	(0.029)	(0.007)	(0.013)	(0.006)	(0.011)
D.Log Nb persons in Household	0.024**	0.069***	0.001	0.049	-0.000	0.028**	-0.000	0.028**
	(0.011)	(0.025)	(0.004)	(0.031)	(0.006)	(0.014)	(0.004)	(0.013)
D.Log local population	-0.021	-0.619	0.179	2.617***	-0.233*	0.341	-0.356***	-0.093
	(0.237)	(0.649)	(0.117)	(0.875)	(0.132)	(0.322)	(0.120)	(0.298)
D.Local log median income	-0.167	0.786	0.017	-5.196***	1.314***	-1.130***	0.963***	-0.131
	(0.256)	(0.613)	(0.114)	(0.907)	(0.164)	(0.332)	(0.126)	(0.305)
L.Experience in years/10	-0.112***	-0.094***	0.009	-0.021	-0.018***	-0.136***	-0.003	-0.140***
	(0.017)	(0.032)	(0.007)	(0.041)	(0.007)	(0.021)	(0.006)	(0.021)
L.Experience^2/100	0.013***	0.010	-0.003*	-0.011	0.002	0.014**	0.001	0.015**
	(0.005)	(0.009)	(0.002)	(0.012)	(0.002)	(0.006)	(0.002)	(0.006)
Constant	0.166***	0.005	0.057***	0.622***	-0.066***	0.297***	-0.075***	0.282***
	(0.029)	(0.068)	(0.012)	(0.096)	(0.016)	(0.036)	(0.014)	(0.034)
Observations	11630	11630	11532	11628	10513	11630	11630	11630
endogeneity test (pval)	0.183	0.107	0.145	0.000	0.000	0.002	0.000	0.156
Nb instruments	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
1st st. F excluded for S1-med dens	175.396	175.396	174.909	175.395	169.014	175.396	175.396	175.396
1st st. F excluded for S2-med dens	189.607	189.607	188.449	189.541	194.365	189.607	189.607	189.607
Sanderson-Windmeijer F-test for S1-med dens	165.488	165.488	165.488	165.488	165.488	165.488	165.488	165.488
Sanderson-Windmeijer F-test for S2-med dens	170.138	170.138	170.138	170.138	170.138	170.138	170.138	170.138
Stock-Wright S (joint 0) (pval)	0.023	0.023	0.109	0.001	0.000	0.007	0.000	0.035
Anderson-Rubin (joint 0) (pval)	0.023	0.023	0.109	0.001	0.000	0.007	0.000	0.036

Note: IV regressions are performed only on physicians staying at the same location within a time period. Changes in log medical densities are instrumented by lagged log density of physicians older than 60. Regressions include also controls for years, specialties (pediatricians, ophthalmologists, gynecologists), age composition of local population. Standard errors clustered by physician are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 14: Quantities and prices of services provided by free-billing specialists: first difference analysis

	#Patients	#Visits	Visit Price	Tech. Acts	TA Price	Comp. Output	Comp. Price	Total Fees
D.Log sector 2 medical density	-0.482*	-0.709**	-0.194**	0.903	-0.455**	0.508	-0.812***	-0.424
	(0.266)	(0.356)	(0.084)	(1.209)	(0.195)	(0.320)	(0.153)	(0.297)
D.Log sector 1 medical density	-0.095	-0.201	0.251***	-0.878	-0.030	0.091	-0.109	-0.097
	(0.293)	(0.388)	(0.096)	(1.266)	(0.182)	(0.362)	(0.150)	(0.345)
D.Log GP density	-0.039	-0.101	-0.026	-0.048	-0.017	-0.024	-0.043	-0.067
	(0.059)	(0.080)	(0.021)	(0.310)	(0.056)	(0.078)	(0.034)	(0.071)
D.Non professional Log income /100	0.097	-0.098	0.070	0.054	-0.005	-0.057	0.097	0.049
	(0.400)	(0.428)	(0.059)	(0.802)	(0.165)	(0.425)	(0.085)	(0.450)
D.Non physician Log income /100	-0.253	-0.145	-0.075*	0.871	-0.035	-0.259	-0.034	-0.295
	(0.338)	(0.422)	(0.041)	(0.628)	(0.125)	(0.422)	(0.062)	(0.440)
D.Child/ex-spouse support (y/n)	0.009	0.010	-0.005*	0.045	0.018**	0.017*	-0.007	0.010
	(0.008)	(0.011)	(0.003)	(0.042)	(0.009)	(0.009)	(0.005)	(0.008)
D.≤3 yo child (y/n) x Women	-0.102*	-0.142*	-0.013	-0.265	-0.067	-0.167**	0.002	-0.163**
	(0.054)	(0.085)	(0.013)	(0.188)	(0.044)	(0.082)	(0.019)	(0.081)
D.≤3 yo child (y/n) x Men	-0.054	-0.042	-0.033	0.121	0.024	-0.043	-0.014	-0.052
	(0.043)	(0.063)	(0.026)	(0.167)	(0.055)	(0.053)	(0.018)	(0.052)
D.Log Nb persons in Household	0.005	0.005	0.002	0.117*	0.011	0.015	-0.003	0.010
	(0.019)	(0.025)	(0.005)	(0.070)	(0.016)	(0.022)	(0.007)	(0.022)
D.Log local population	0.050	-0.341	-0.209	4.835**	-0.102	0.254	-0.524**	-0.365
	(0.407)	(0.617)	(0.170)	(2.181)	(0.275)	(0.545)	(0.234)	(0.504)
D.Local log median income	-1.293**	-0.961	0.442***	-7.717***	1.352***	-1.514**	0.543*	-1.142
	(0.634)	(0.757)	(0.149)	(2.378)	(0.394)	(0.749)	(0.279)	(0.736)
L.Experience in years/10	-0.170***	-0.182***	0.014	-0.005	-0.018	-0.184***	-0.010	-0.199***
	(0.046)	(0.057)	(0.009)	(0.129)	(0.026)	(0.053)	(0.014)	(0.054)
L.Experience^2/100	0.021*	0.025*	-0.004*	-0.024	0.004	0.021	0.003	0.027*
	(0.012)	(0.015)	(0.002)	(0.033)	(0.006)	(0.014)	(0.004)	(0.014)
Constant	0.352***	0.263***	0.017	0.776***	-0.070	0.362***	-0.011	0.445***
	(0.084)	(0.101)	(0.018)	(0.282)	(0.045)	(0.096)	(0.030)	(0.097)
Observations	3085	3085	3084	3083	2087	3085	3085	3085
endogeneity test (pval)	0.436	0.402	0.000	0.292	0.004	0.077	0.000	0.723
Nb instruments	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
1st st. F excluded for S1-med dens	27.331	27.331	27.310	27.327	22.188	27.331	27.331	27.331
1st st. F excluded for S2-med dens	35.796	35.796	35.800	35.757	44.577	35.796	35.796	35.796
Sanderson-Windmeijer F-test for S1-med dens	77.675	77.675	77.675	77.675	77.675	77.675	77.675	77.675
Sanderson-Windmeijer F-test for S2-med dens	82.746	82.746	82.746	82.746	82.746	82.746	82.746	82.746
Stock-Wright S (joint 0) (pval)	0.158	0.102	0.000	0.202	0.001	0.208	0.000	0.320
Anderson-Rubin (joint 0) (pval)	0.155	0.102	0.000	0.194	0.001	0.206	0.000	0.319

Note: IV regressions are performed only on physicians staying at the same location within a time period. Changes in log medical densities are instrumented by lagged log density of physicians older than 60. Regressions include also controls for years, specialties (pediatricians, ophthalmologists, gynecologists), age composition of local population. Standard errors clustered by physician are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 15: Quantities and prices of services provided by free-billing specialists: first difference analysis, medical specialties

	#Patients	#Visits	Visit Price	Tech. Acts	TA Price	Comp. Output	Comp. Price	Total Fees
D.Log sector 2 medical density	-0.376*	-0.972*	-0.058	1.623**	-0.606***	0.547**	-0.650***	-0.112
	(0.202)	(0.565)	(0.110)	(0.632)	(0.113)	(0.264)	(0.102)	(0.243)
D.Log sector 1 medical density	-0.192	-0.514	-0.059	2.016***	-0.373***	0.485**	-0.363***	0.123
	(0.172)	(0.516)	(0.088)	(0.551)	(0.093)	(0.228)	(0.088)	(0.213)
D.Log GP density	-0.028	-0.031	0.025	-0.608***	0.078***	-0.106**	0.051**	-0.061
	(0.035)	(0.116)	(0.021)	(0.207)	(0.023)	(0.053)	(0.021)	(0.049)
D.Non professional Log income /100	0.001	0.337	-0.031	-0.227	-0.025	-0.395*	0.069	-0.346*
	(0.144)	(0.343)	(0.091)	(0.385)	(0.068)	(0.206)	(0.057)	(0.204)
D.Non physician Log income /100	-0.119	0.354	-0.059	-0.623**	-0.060	-0.285*	-0.002	-0.296*
	(0.119)	(0.278)	(0.075)	(0.315)	(0.054)	(0.165)	(0.044)	(0.161)
D.Child/ex-spouse support (y/n)	0.012	0.039**	0.001	0.001	-0.004	0.013	0.003	0.017
	(0.008)	(0.019)	(0.003)	(0.027)	(0.004)	(0.011)	(0.003)	(0.011)
D.$\leq$3 yo child (y/n) x Women	-0.000	0.057	0.017	-0.035	-0.008	-0.030	-0.004	-0.034
	(0.027)	(0.063)	(0.011)	(0.060)	(0.009)	(0.025)	(0.008)	(0.021)
D.$\leq$3 yo child (y/n) x Men	-0.003	-0.062*	0.002	0.029	-0.012*	0.005	-0.011*	-0.006
	(0.013)	(0.035)	(0.005)	(0.028)	(0.006)	(0.014)	(0.006)	(0.011)
D.Log Nb persons in Household	0.030**	0.093***	0.001	0.028	-0.004	0.034**	0.000	0.034**
	(0.014)	(0.033)	(0.006)	(0.033)	(0.006)	(0.017)	(0.005)	(0.016)
D.Log local population	-0.132	-0.908	0.299*	1.802*	-0.235	0.229	-0.273*	-0.066
	(0.300)	(0.900)	(0.158)	(0.965)	(0.155)	(0.403)	(0.148)	(0.375)
D.Local log median income	0.213	1.423*	-0.111	-4.781***	1.325***	-0.989***	1.034***	0.083
	(0.271)	(0.794)	(0.150)	(0.988)	(0.181)	(0.363)	(0.145)	(0.330)
L.Experience in years/10	-0.104***	-0.075*	0.010	-0.053	-0.015**	-0.130***	0.001	-0.128***
	(0.018)	(0.039)	(0.008)	(0.040)	(0.007)	(0.022)	(0.006)	(0.022)
L.Experience^2/100	0.013**	0.007	-0.004	-0.008	0.002	0.013*	-0.001	0.012*
	(0.005)	(0.012)	(0.003)	(0.012)	(0.002)	(0.007)	(0.002)	(0.007)
Constant	0.119***	-0.070	0.067***	0.628***	-0.069***	0.289***	-0.091***	0.252***
	(0.031)	(0.087)	(0.015)	(0.103)	(0.018)	(0.040)	(0.016)	(0.036)
Observations	8545	8545	8448	8545	8426	8545	8545	8545
endogeneity test (pval)	0.306	0.160	0.847	0.000	0.000	0.054	0.000	0.198
Nb instruments	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
1st st. F excluded for S1-med dens	147.592	147.592	147.003	147.592	146.710	147.592	147.592	147.592
1st st. F excluded for S2-med dens	157.602	157.602	156.533	157.602	155.955	157.602	157.602	157.602
Sanderson-Windmeijer F-test for S1-med dens	91.384	91.384	91.384	91.384	91.384	91.384	91.384	91.384
Sanderson-Windmeijer F-test for S2-med dens	93.487	93.487	93.487	93.487	93.487	93.487	93.487	93.487
Stock-Wright S (joint 0) (pval)	0.085	0.072	0.791	0.000	0.000	0.082	0.000	0.082
Anderson-Rubin (joint 0) (pval)	0.085	0.072	0.790	0.000	0.000	0.081	0.000	0.083

Note: IV regressions are performed only on physicians staying at the same location within a time period. Changes in log medical densities are instrumented by lagged log density of physicians older than 60. Regressions include also controls for years, specialties (pediatricians, ophthalmologists, gynecologists), age composition of local population. Standard errors clustered by physician are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 16: Quantities and prices of services provided by free-billing specialists: first difference analysis, technical specialties

	More fee-regulated physicians than median		Fewer fee-regulated physicians than median	
	Price	Output	Price	Output
D.Log sector 2 medical density	-0.297***	0.226	-1.684***	1.460**
	(0.048)	(0.151)	(0.402)	(0.638)
D.Log sector 1 medical density	-0.108**	0.137	-0.475***	0.281
	(0.048)	(0.149)	(0.151)	(0.248)
D.Log GP density	0.019	-0.047	0.087**	-0.151*
	(0.020)	(0.051)	(0.044)	(0.080)
D.Non professional Log income /100	0.069	-0.300	0.094	-0.305
	(0.054)	(0.187)	(0.086)	(0.332)
D.Non physician Log income /100	-0.041	-0.060	0.020	-0.478
	(0.036)	(0.131)	(0.076)	(0.307)
D.Child/ex-spouse support (y/n)	0.003	0.013	0.003	0.013
	(0.003)	(0.012)	(0.005)	(0.013)
D.$\leq$3 yo child (y/n) x Women	-0.004	-0.040	-0.013	-0.098
	(0.007)	(0.026)	(0.019)	(0.063)
D.$\leq$3 yo child (y/n) x Men	-0.014**	0.001	-0.006	0.008
	(0.006)	(0.017)	(0.013)	(0.021)
D.Log Nb persons in Household	0.006	0.015	-0.003	0.040**
	(0.004)	(0.019)	(0.008)	(0.019)
D.Log local population	-0.016	0.086	-1.151**	0.684
	(0.096)	(0.293)	(0.352)	(0.681)
D.Local log median income	0.555***	-0.596	2.532***	-2.472**
	(0.119)	(0.367)	(0.460)	(0.882)
L.Experience in years/10	0.008	-0.151***	-0.014	-0.142***
	(0.006)	(0.022)	(0.012)	(0.040)
L.Experience^2/100	-0.002	0.021***	0.004	0.011
	(0.002)	(0.007)	(0.003)	(0.011)
Constant	-0.056***	0.296***	-0.215***	0.504***
	(0.013)	(0.040)	(0.042)	(0.085)
Observations	5868	5868	5767	5767
endogeneity test (pval)	0.000	0.171	0.000	0.007
# instruments	2.000	2.000	2.000	2.000
1st st. F excluded for S1-med dens	127.402	127.402	24.256	24.256
1st st. F excluded for S2-med dens	160.389	160.389	12.934	12.934
Sanderson-Windmeijer F-test for S1-med dens	240.121	240.121	85.844	85.844
Sanderson-Windmeijer F-test for S2-med dens	241.550	241.550	55.188	55.188
Stock-Wright S (joint 0) (pval)	0.000	0.319	0.000	0.019
Anderson-Rubin (joint 0) (pval)	0.000	0.318	0.000	0.018

Note: IV regressions are performed only on physicians staying at the same location within a time period. Changes in log medical densities are instrumented by lagged log density of physicians older than 60.Regressions include also controls for years, specialties (pediatricians, ophthalmologists, gynecologists) and age composition of local population. Standard errors clustered by physician are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 17: Price and output of free-billing physicians depending on regulatory environment

	More fee-regulated physicians than median		Fewer fee-regulated physicians than median	
	OLS	IV	OLS	IV
D.Free-billing Compet. Log Output	0.009	0.089	-0.000	0.972
	(0.006)	(0.061)	(0.007)	(1.045)
D.Regulated Compet. Log Output	0.014	0.126	0.025**	0.690
	(0.015)	(0.152)	(0.010)	(0.919)
D.Local GP log density	-0.035	-0.043	-0.051	-0.046
	(0.050)	(0.052)	(0.059)	(0.089)
D.Non professional Log income /100	-0.279	-0.262	-0.276	-0.567
	(0.187)	(0.190)	(0.326)	(0.485)
D.Non physician Log income /100	-0.055	-0.068	-0.462	-0.509
	(0.131)	(0.132)	(0.298)	(0.347)
D.Child/ex-spouse support (y/n)	0.012	0.014	0.019	0.002
	(0.011)	(0.012)	(0.012)	(0.031)
D.$\leq$3 yo child (y/n) x Women	-0.041	-0.044*	-0.117*	-0.106
	(0.026)	(0.026)	(0.061)	(0.064)
D.$\leq$3 yo child (y/n) x Men	-0.000	0.002	0.002	-0.006
	(0.017)	(0.017)	(0.019)	(0.026)
D.Log Nb persons in Household	0.014	0.018	0.043**	0.047**
	(0.019)	(0.019)	(0.019)	(0.023)
D.Log local population	-0.067	-0.158	-0.335	-1.291
	(0.254)	(0.265)	(0.393)	(1.183)
D.Local log median income	-0.693**	-0.459	-1.066**	0.213
	(0.353)	(0.449)	(0.492)	(1.862)
L.Experience in years/10	-0.154***	-0.152***	-0.156***	-0.147***
	(0.022)	(0.022)	(0.038)	(0.046)
L.Experience^2/100	0.022***	0.021***	0.014	0.012
	(0.007)	(0.007)	(0.010)	(0.013)
Constant	0.309***	0.248***	0.393***	-0.033
	(0.037)	(0.071)	(0.064)	(0.544)
Observations	5868	5868	5767	5767
R^2	0.096		0.076	
$R^2 adj$	0.093		0.073	
endogeneity test (pval)		0.387		0.014
# instruments		2.000		2.000
1st st. F excluded for S1 compet. output		46.329		5.963
1st st. F excluded for S2 compet. output		24.455		6.124
Sanderson-Windmeijer F-test S1 compet. output		67.924		3.780
Sanderson-Windmeijer F-test for S2 compet. output		61.653		3.594
Stock-Wright S (joint 0) (pval)		0.319		0.019
Anderson-Rubin (joint 0) (pval)		0.318		0.018

Note: OLS and IV regressions include only gynecologists, pediatricians, ophthalmologists staying at the same location with the time period. D. denotes controls in first differences, L. indicates lagged value control. Controls include also years, specialties (gynecologists, pediatricians and ophthalmologists), and age composition of local population (not reported). In IV regressions, changes in log medical density are instrumented by lagged log density of physicians older than 60 by sector. Standard errors clustered by physicians are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 18: Output response of free-billing physicians depending on regulatory environment

Additional results by specialty

	OLS		IV	
	Price	Output	Price	Output
D.Log sector 2 medical density	-0.045***	-0.036	-0.591***	0.743***
	(0.012)	(0.040)	(0.100)	(0.263)
D.Log sector 1 medical density	0.006	-0.035	-0.187**	0.449
	(0.013)	(0.040)	(0.095)	(0.278)
D.Log GP density	-0.050**	-0.002	0.025	-0.132
	(0.019)	(0.058)	(0.029)	(0.083)
D.Non professional Log income /100	0.064	-0.376*	0.107	-0.447**
	(0.058)	(0.205)	(0.069)	(0.213)
D.Non physician Log income /100	-0.010	-0.482**	-0.010	-0.490**
	(0.043)	(0.201)	(0.049)	(0.203)
D.Child/ex-spouse support (y/n)	-0.004	0.038***	-0.005	0.039***
	(0.003)	(0.015)	(0.004)	(0.015)
D.$\leq$3 yo child (y/n) x Women	0.001	-0.041	-0.001	-0.037
	(0.009)	(0.028)	(0.010)	(0.030)
D.$\leq$3 yo child (y/n) x Men	-0.011	-0.021	-0.017*	-0.013
	(0.008)	(0.016)	(0.010)	(0.018)
D.Log Nb persons in Household	0.000	0.044*	0.001	0.040*
	(0.005)	(0.023)	(0.005)	(0.023)
D.Log local population	0.156	-0.173	-0.176	0.496
	(0.107)	(0.307)	(0.166)	(0.481)
D.Local log median income	0.701***	-0.812**	0.737***	-0.854**
	(0.132)	(0.376)	(0.172)	(0.416)
L.Experience in years/10	-0.003	-0.118***	-0.010	-0.109***
	(0.006)	(0.027)	(0.008)	(0.028)
L.Experience^2/100	0.001	0.010	0.002	0.009
	(0.002)	(0.009)	(0.002)	(0.009)
Constant	-0.041**	0.240***	-0.031	0.231***
	(0.014)	(0.042)	(0.019)	(0.046)
Observations	5103	5103	5103	5103
R^2	0.158	0.071		
$R^2 adj$	0.155	0.068		
rho	-0.219			
Breusch_Pagan_pvalue	0.000			
endogeneity test (pval)			0.000	0.002
Nb instruments			2.000	2.000
1st st. F for S1-medical density			109.704	109.704
1st st. F for S2-medical density			109.489	109.489
Sanderson-Windmeijer F-test for S1-med dens			102.378	102.378
Sanderson-Windmeijer F-test for S2-med dens			100.248	100.248
Stock-Wright S (joint 0) (pval)			0.000	0.004
Anderson-Rubin (joint 0) (pval)			0.000	0.004

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years and age composition of local population (not reported).In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 19: Price and output of free-billing Gynecologists: first difference analysis

	OLS		IV	
	Price	Output	Price	Output
D.Log sector 2 medical density	-0.028	-0.191***	-0.816***	-0.009
	(0.021)	(0.064)	(0.198)	(0.458)
D.Log sector 1 medical density	0.021	-0.120*	-0.103	0.036
	(0.022)	(0.062)	(0.167)	(0.504)
D.Log GP density	-0.056*	-0.059	-0.075*	-0.062
	(0.032)	(0.114)	(0.042)	(0.122)
D.Non professional Log income /100	0.124	0.160	0.171*	0.139
	(0.078)	(0.740)	(0.099)	(0.720)
D.Non physician Log income /100	-0.000	-0.140	0.049	-0.162
	(0.064)	(0.694)	(0.094)	(0.715)
D.Child/ex-spouse support (y/n)	0.001	0.015	-0.001	0.015
	(0.005)	(0.012)	(0.007)	(0.012)
D.≤3 yo child (y/n) x Women	0.004	-0.194**	-0.004	-0.193**
	(0.017)	(0.091)	(0.021)	(0.092)
D.≤3 yo child (y/n) x Men	-0.006	-0.048	-0.018	-0.045
	(0.015)	(0.055)	(0.018)	(0.058)
D.Log Nb persons in Household	0.012	-0.010	0.002	-0.007
	(0.007)	(0.030)	(0.011)	(0.030)
D.Log local population	-0.543**	0.516	-0.799**	0.598
	(0.219)	(0.776)	(0.310)	(0.776)
D.Local log median income	0.860***	-2.553**	0.890**	-2.455**
	(0.245)	(1.221)	(0.384)	(1.064)
L.Experience in years/10	0.013	-0.254***	-0.012	-0.245***
	(0.011)	(0.066)	(0.016)	(0.070)
L.Experience^2/100	-0.002	0.042**	0.005	0.040*
	(0.003)	(0.019)	(0.005)	(0.020)
Constant	-0.038	0.424**	-0.035	0.414***
	(0.026)	(0.136)	(0.040)	(0.123)
Observations	1632	1632	1632	1632
R^2	0.226	0.110		
$R^2 adj$	0.218	0.101		
rho	-0.160			
Breusch_Pagan_pvalue	0.000			
endogeneity test (pval)			0.000	0.900
Nb instruments			2.000	2.000
1st st. F excluded for S1-med dens			16.050	16.050
1st st. F excluded for S2-med dens			14.466	14.466
Sanderson-Windmeijer F-test for S1-med dens			58.568	58.568
Sanderson-Windmeijer F-test for S2-med dens			57.060	57.060
Stock-Wright S (joint 0) (pval)			0.000	0.997
Anderson-Rubin (joint 0) (pval)			0.000	0.997

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years and age composition of local population (not reported).In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 20: Price and Output of free-billing Pediatricians: first difference analysis

	OLS		IV	
	Price	Output	Price	Output
D.Log sector 2 medical density	-0.038***	-0.082**	-0.846***	0.045
	(0.011)	(0.037)	(0.255)	(0.564)
D.Log sector 1 medical density	-0.023**	0.002	-0.642**	0.241
	(0.009)	(0.024)	(0.225)	(0.486)
D.Log GP density	0.010	-0.067	0.027	-0.063
	(0.019)	(0.058)	(0.031)	(0.061)
D.Non professional Log income /100	0.014	-0.350	0.058	-0.364
	(0.066)	(0.320)	(0.088)	(0.317)
D.Non physician Log income /100	-0.041	-0.055	-0.038	-0.064
	(0.048)	(0.229)	(0.070)	(0.229)
D.Child/ex-spouse support (y/n)	0.003	-0.007	0.008	-0.009
	(0.004)	(0.011)	(0.005)	(0.011)
D.$\leq$3 yo child (y/n) x Women	-0.002	-0.020	-0.006	-0.021
	(0.009)	(0.036)	(0.012)	(0.036)
D.$\leq$3 yo child (y/n) x Men	-0.006	0.020	-0.001	0.017
	(0.006)	(0.019)	(0.009)	(0.019)
D.Log Nb persons in Household	-0.005	0.027	-0.005	0.028
	(0.006)	(0.018)	(0.008)	(0.018)
D.Log local population	0.338***	-0.700**	-0.548	-0.452
	(0.102)	(0.315)	(0.348)	(0.787)
D.Local log median income	0.618***	-0.372	1.243***	-0.499
	(0.142)	(0.451)	(0.295)	(0.667)
L.Experience in years/10	0.017**	-0.137***	0.006	-0.136***
	(0.007)	(0.030)	(0.010)	(0.032)
L.Experience^2/100	-0.003	0.013	-0.002	0.013
	(0.002)	(0.009)	(0.003)	(0.009)
Constant	-0.087***	0.312***	-0.129***	0.325***
	(0.015)	(0.053)	(0.028)	(0.062)
Observations	4905	4905	4905	4905
R^2	0.054	0.067		
$R^2 adj$	0.051	0.064		
rho	-0.340			
Breusch_Pagan_pvalue	0.000			
endogeneity test (pval)			0.000	0.551
Nb inst.			2.000	2.000
1st st. F excluded for S1-med dens			67.245	67.245
1st st. F excluded for S2-med dens			93.982	93.982
Sanderson-Windmeijer F-test for S1-med dens			18.172	18.172
Sanderson-Windmeijer F-test for S2-med dens			18.723	18.723
Stock-Wright S (joint 0) (pval)			0.000	0.299
Anderson-Rubin (joint 0) (pval)			0.000	0.301

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years and age composition of local population (not reported).In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 21: Price and Output of free-billing Ophthalmologists: first difference analysis

	OLS	IV
D.Log sector 2 medical density	-0.000	-0.080
	(0.018)	(0.103)
D.Log sector 1 medical density	-0.097**	-0.058
	(0.048)	(0.211)
D.Log GP density	0.052	0.063
	(0.074)	(0.077)
D.Non professional Log income /100	-0.606**	-0.598**
	(0.230)	(0.223)
D.Non physician Log income /100	-0.032	-0.034
	(0.172)	(0.172)
D.Child/ex-spouse support (y/n)	-0.014*	-0.014*
	(0.008)	(0.008)
D.$\leq$3 yo child (y/n) x Women	-0.126*	-0.122*
	(0.064)	(0.065)
D.$\leq$3 yo child (y/n) x Men	0.015	0.016
	(0.030)	(0.030)
D.Log Nb persons in Household	-0.028	-0.027
	(0.020)	(0.020)
D.Log local population	0.428	0.453
	(0.263)	(0.317)
D.Local log median income	0.227	0.273
	(0.345)	(0.349)
L.Experience in years/10	0.017	0.016
	(0.042)	(0.042)
L.Experience^2/100	-0.022*	-0.022*
	(0.012)	(0.012)
Constant	0.103**	0.102**
	(0.051)	(0.051)
Observations	4709	4709
R^2	0.036	
$R^2 adj$	0.033	
endogeneity test (pval)		0.390
Nb instruments		2.000
1st st. F excluded for S1-med dens		178.612
1st st. F excluded for S2-med dens		118.554
Sanderson-Windmeijer F-test for S1-med dens		139.499
Sanderson-Windmeijer F-test for S2-med dens		128.649
Stock-Wright S (joint 0) (pval)		0.677
Anderson-Rubin (joint 0) (pval)		0.677

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years and age composition of local population (not reported).In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 22: Output of fee-regulated Gynecologists: first difference analysis

	OLS	IV
D.Log sector2 medical density	-0.045	-0.158
	(0.031)	(0.221)
D.Log sector 1 medical density	-0.151**	-0.247
	(0.049)	(0.289)
D.Log GP density	0.035	0.045
	(0.058)	(0.064)
D.Non professional Log income /100	-1.244**	-1.275**
	(0.491)	(0.521)
D.Non physician Log income /100	-0.779**	-0.788**
	(0.324)	(0.328)
D.Child/ex-spouse support (y/n)	0.009	0.008
	(0.022)	(0.022)
D.$\leq$3 yo child (y/n) x Women	-0.123***	-0.125***
	(0.026)	(0.026)
D.$\leq$3 yo child (y/n) x Men	0.007	0.009
	(0.039)	(0.039)
D.Log Nb persons in Household	0.091**	0.089**
	(0.040)	(0.040)
D.Log local population	-0.182	-0.270
	(0.421)	(0.462)
D.Local log median income	-0.337	-0.355
	(0.522)	(0.522)
L.Experience in years/10	0.001	-0.002
	(0.050)	(0.051)
L.Experience^2/100	-0.016	-0.016
	(0.014)	(0.014)
Constant	0.062	0.066
	(0.067)	(0.070)
Observations	3648	3648
R^2	0.043	
$R^2 adj$	0.038	
endogeneity test (pval)		0.871
Nb instruments		2.000
1st st. F excluded for S1-med dens		62.930
1st st. F excluded for S2-med dens		62.011
Sanderson-Windmeijer F-test for S1-med dens		160.589
Sanderson-Windmeijer F-test for S2-med dens		154.482
Stock-Wright S (joint 0) (pval)		0.646
Anderson-Rubin (joint 0) (pval)		0.645

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years and age composition of local population (not reported).In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 23: Output of fee-regulated Pediatricians: first difference analysis

	OLS	IV
D.Log sector 2 medical density	-0.039**	-0.204
	(0.013)	(0.151)
D.Log sector 1 medical density	-0.056*	-0.279
	(0.030)	(0.186)
D.Log GP density	-0.039	-0.029
	(0.031)	(0.033)
D.Non professional Log income /100	-0.382*	-0.354*
	(0.209)	(0.213)
D.Non physician Log income /100	-0.242	-0.199
	(0.177)	(0.186)
D.Child/ex-spouse support (y/n)	0.018	0.019
	(0.012)	(0.012)
D.≤3 yo child (y/n) x Women	-0.075**	-0.086**
	(0.028)	(0.031)
D.≤3 yo child (y/n) x Men	-0.072	-0.073
	(0.077)	(0.077)
D.Log Nb persons in Household	-0.023	-0.023
	(0.017)	(0.017)
D.Log local population	-0.472**	-0.629**
	(0.194)	(0.249)
D.Local log median income	-0.233	-0.216
	(0.356)	(0.362)
L.Experience in years/10	-0.068**	-0.063**
	(0.028)	(0.028)
L.Experience^2/100	0.002	0.001
	(0.007)	(0.007)
Constant	0.264***	0.262***
	(0.042)	(0.042)
Observations	4638	4638
R^2	0.047	
$R^2 adj$	0.043	
endogeneity test (pval)		0.445
Nb instruments		2.000
1st st. F excluded for S1-med dens		137.190
1st st. F excluded for S2-med dens		114.039
Sanderson-Windmeijer F-test for S1-med dens		113.176
Sanderson-Windmeijer F-test for S2-med dens		94.468
Stock-Wright S (joint 0) (pval)		0.293
Anderson-Rubin (joint 0) (pval)		0.292

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years and age composition of local population (not reported).In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 24: Output of fee-regulated Ophthalmologists: first difference analysis

Removing year 2014

	OLS		IV	
	Price	Output	Price	Output
D.Log sector 2 medical density	-0.039***	-0.068**	-1.239***	1.050**
	(0.008)	(0.031)	(0.196)	(0.362)
D.Log sector 1 medical density	-0.006	-0.026	-0.605***	0.590*
	(0.008)	(0.024)	(0.163)	(0.304)
D.Log GP density	-0.141***	0.093*	-0.044	0.002
	(0.021)	(0.054)	(0.042)	(0.064)
D.Non professional Log income /100	0.052	-0.153	0.155**	-0.253
	(0.046)	(0.223)	(0.074)	(0.225)
D.Non physician Log income /100	-0.037	-0.045	-0.050	-0.038
	(0.035)	(0.187)	(0.060)	(0.195)
D.Child/ex-spouse support (y/n)	-0.001	0.006	-0.000	0.005
	(0.003)	(0.010)	(0.005)	(0.010)
D.$\leq$3 yo child (y/n) x Women	0.004	-0.048	0.006	-0.050
	(0.008)	(0.032)	(0.012)	(0.034)
D.$\leq$3 yo child (y/n) x Men	-0.003	0.006	-0.007	0.009
	(0.006)	(0.017)	(0.011)	(0.019)
D.Log Nb persons in Household	0.001	0.022	0.003	0.020
	(0.004)	(0.018)	(0.007)	(0.018)
D.Log local population	-0.083	0.202	-1.228***	1.319**
	(0.086)	(0.282)	(0.296)	(0.559)
D.Local log median income	0.895***	-1.249***	1.028***	-1.381***
	(0.104)	(0.332)	(0.202)	(0.395)
L.Experience in years/10	0.009*	-0.174***	-0.015	-0.151***
	(0.005)	(0.025)	(0.010)	(0.028)
L.Experience^2/100	-0.001	0.022**	0.003	0.018**
	(0.001)	(0.007)	(0.003)	(0.008)
Constant	-0.070***	0.317***	-0.059**	0.310***
	(0.011)	(0.039)	(0.022)	(0.045)
Observations	7949	7949	7949	7949
R^2	0.073	0.088		
$R^2 adj$	0.071	0.086		
rho	-0.269			
Breusch_Pagan_pvalue	0.000			
endogeneity test (pval)			0.000	0.001
Nb instruments			2.000	2.000
1st st. F excluded for S1-med dens			85.892	85.892
1st st. F excluded for S2-med dens			75.176	75.176
Sanderson-Windmeijer F-test for S1-med dens			63.795	63.795
Sanderson-Windmeijer F-test for S2-med dens			62.023	62.023
Stock-Wright S (joint 0) (pval)			0.000	0.003
Anderson-Rubin (joint 0) (pval)			0.000	0.003

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years, specialties and age composition of local population (not reported).In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 25: Price and output of free-billing physicians: First difference analysis wo 2014

	OLS	IV
D.Log sector 2 medical density	-0.041***	-0.020
	(0.011)	(0.107)
D.Log sector 1 medical density	-0.104**	0.030
	(0.032)	(0.167)
D.Log GP density	-0.007	-0.012
	(0.059)	(0.063)
D.Non professional Log income /100	-0.806***	-0.802***
	(0.235)	(0.235)
D.Non physician Log income /100	-0.270*	-0.281*
	(0.149)	(0.152)
D.Child/ex-spouse support (y/n)	0.009	0.009
	(0.011)	(0.011)
D.$\leq$3 yo child (y/n) x Women	-0.099***	-0.097***
	(0.023)	(0.023)
D.$\leq$3 yo child (y/n) x Men	-0.017	-0.017
	(0.045)	(0.045)
D.Log Nb persons in Household	-0.008	-0.008
	(0.020)	(0.020)
D.Log local population	-0.245	-0.169
	(0.224)	(0.248)
D.Local log median income	0.181	0.218
	(0.259)	(0.248)
L.Experience in years/10	-0.003	-0.002
	(0.033)	(0.033)
L.Experience^2/100	-0.016*	-0.016*
	(0.009)	(0.009)
Constant	0.166***	0.163***
	(0.041)	(0.041)
Observations	9202	9202
R^2	0.040	
$R^2 adj$	0.038	
endogeneity test (pval)		0.666
Nb instruments		2.000
1st st. F excluded for S1-med dens		220.871
1st st. F excluded for S2-med dens		144.459
Sanderson-Windmeijer F-test for S1-med dens		276.706
Sanderson-Windmeijer F-test for S2-med dens		224.897
Stock-Wright S (joint 0) (pval)		0.910
Anderson-Rubin (joint 0) (pval)		0.910

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years, specialties and age composition of local population (not reported).In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 26: Output of fee-regulated specialists: First difference analysis wo 2014

Equilibrium equations with competitors characteristics

	OLS		IV	
	Price	Output	Price	Output
D.Log sector 2 medical density	-0.035***	-0.083**	-0.718***	0.614**
	(0.008)	(0.025)	(0.087)	(0.233)
D.Log sector 1 medical density	-0.008	-0.020	-0.358***	0.516**
	(0.007)	(0.020)	(0.076)	(0.214)
D.Log GP density	-0.020	-0.041	0.033*	-0.100**
	(0.013)	(0.039)	(0.018)	(0.050)
D.Non professional Log income /100	0.041	-0.252	0.088*	-0.311**
	(0.039)	(0.191)	(0.047)	(0.129)
D.Non physician Log income /100	-0.018	-0.268*	-0.010	-0.285**
	(0.030)	(0.161)	(0.037)	(0.106)
D.Child/ex-spouse support (y/n)	0.000	0.015*	0.001	0.014*
	(0.002)	(0.008)	(0.003)	(0.008)
D.≤3 yo child (y/n) x Women	-0.001	-0.061**	-0.005	-0.057**
	(0.006)	(0.027)	(0.008)	(0.024)
D.≤3 yo child (y/n) x Men	-0.009*	0.000	-0.012**	0.003
	(0.005)	(0.013)	(0.006)	(0.015)
D.Log Nb persons in Household	-0.001	0.029**	-0.001	0.029**
	(0.003)	(0.013)	(0.004)	(0.012)
D.Log local population	0.153**	-0.317	-0.371**	0.353
	(0.069)	(0.219)	(0.129)	(0.357)
D.Local log median income	0.755***	-0.916**	0.962***	-1.115**
	(0.091)	(0.301)	(0.131)	(0.364)
L.Experience in years/10	0.008*	-0.147***	-0.003	-0.136***
	(0.004)	(0.020)	(0.006)	(0.016)
L.Experience^2/100	-0.001	0.016**	0.001	0.014**
	(0.001)	(0.006)	(0.002)	(0.005)
Stayer Compet. Child/ex-spouse support (y/n)	0.005	0.006	0.006	0.001
	(0.005)	(0.016)	(0.010)	(0.024)
Stayer Compet. Non professional Log income /100	0.185**	-0.304	0.027	-0.116
	(0.093)	(0.294)	(0.153)	(0.434)
Stayer Compet. Non physician Log income /100	-0.059	0.093	0.041	-0.042
	(0.083)	(0.243)	(0.186)	(0.385)
Stayer Compet. ≤3 yo child (y/n) x Women	0.004	0.024	0.013	0.005
	(0.015)	(0.050)	(0.027)	(0.072)
Stayer Compet. ≤3 yo child (y/n) x Men	-0.001	0.001	-0.044**	0.037
	(0.010)	(0.025)	(0.019)	(0.046)
Constant	-0.064***	0.278***	-0.075***	0.295***
	(0.010)	(0.034)	(0.014)	(0.039)
Observations	11594	11594	11594	11594
R^2	0.118	0.082		
R^2adj	0.116	0.080		
rho	-0.265			
endogeneity test (pval)			0.000	0.008
Nb inst.			2.000	2.000
1st st. F excluded for S1-med dens			189.776	369.186
1st st. F excluded for S2-med dens			169.901	414.059
Sanderson-Windmeijer F-test for S1-med dens			161.780	161.780
Sanderson-Windmeijer F-test for S2-med dens			165.714	165.714
Stock-Wright S (joint 0) (pval)			0.000	0.024
Anderson-Rubin (joint 0) (pval)			0.000	0.024

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years, specialties and age composition of local population (not reported).In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 27: Price and output of free-billing physicians: first difference analysis, with competitor characteristics

	OLS	IV
D.Log sector 2 medical density	-0.018	-0.027
	(0.012)	(0.074)
D.Log sector 1 medical density	-0.092***	-0.048
	(0.025)	(0.121)
D.Log GP density	0.009	0.009
	(0.033)	(0.036)
D.Non professional Log income /100	-0.716***	-0.715***
	(0.179)	(0.115)
D.Non physician Log income /100	-0.320**	-0.324**
	(0.131)	(0.100)
D.Child/ex-spouse support (y/n)	0.003	0.003
	(0.008)	(0.007)
D.≤3 yo child (y/n) x Women	-0.108***	-0.107***
	(0.020)	(0.024)
D.≤3 yo child (y/n) x Men	-0.022	-0.022
	(0.035)	(0.027)
D.Log Nb persons in Household	0.003	0.003
	(0.014)	(0.010)
D.Log local population	-0.025	0.000
	(0.161)	(0.206)
D.Local log median income	-0.187	-0.174
	(0.238)	(0.272)
L.Experience in years/10	-0.013	-0.013
	(0.025)	(0.017)
L.Experience^2/100	-0.014**	-0.014**
	(0.007)	(0.005)
Stayer Compet. Child/ex-spouse support (y/n)	0.034**	0.034**
	(0.017)	(0.016)
Stayer Compet. Non professional Log income /100	-0.136	-0.124
	(0.343)	(0.368)
Stayer Compet. Non physician Log income /100	-0.068	-0.053
	(0.240)	(0.297)
Stayer Compet. ≤3 yo child (y/n) x Women	-0.001	0.002
	(0.041)	(0.063)
Stayer Compet. ≤3 yo child (y/n) x Men	0.045	0.042
	(0.052)	(0.063)
Constant	0.199***	0.198***
	(0.032)	(0.031)
Observations	12893	12893
R^2	0.035	
R^2adj	0.033	
endogeneity test (pval)		0.834
Nb instruments		2.000
1st st. F excluded for S1-med dens		503.458
1st st. F excluded for S2-med dens		392.229
Sanderson-Windmeijer F-test for S1-med dens		452.834
Sanderson-Windmeijer F-test for S2-med dens		401.614
Stock-Wright S (joint 0) (pval)		0.916
Anderson-Rubin (joint 0) (pval)		0.916

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years, specialties and age composition of local population (not reported).In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 28: Output of fee-regulated specialists: first difference analysis, with competitor characteristics

Gender and income effects

	OLS			IV		
	Price	Output	Fees	Price	Output	Fees
D.Log sector 2 medical density	-0.016	-0.106***	-0.120***	-0.662***	0.566**	-0.144
	(0.010)	(0.029)	(0.028)	(0.110)	(0.257)	(0.229)
D.Log sector 1 medical density	-0.016**	-0.008	-0.024	-0.359***	0.497**	0.108
	(0.008)	(0.023)	(0.021)	(0.082)	(0.192)	(0.171)
D.Log GP density	-0.002	-0.065	-0.075	0.045*	-0.115**	-0.075
	(0.017)	(0.051)	(0.049)	(0.025)	(0.055)	(0.049)
D.Non professional Log income /100	0.061	-0.326	-0.290	0.114*	-0.391	-0.299
	(0.053)	(0.241)	(0.246)	(0.068)	(0.245)	(0.246)
D.Non physician Log income /100	0.036	-0.307*	-0.283	0.050	-0.339*	-0.298
	(0.040)	(0.185)	(0.184)	(0.052)	(0.190)	(0.185)
D.Child/ex-spouse support (y/n)	-0.001	0.014	0.013	0.003	0.009	0.012
	(0.003)	(0.011)	(0.011)	(0.004)	(0.011)	(0.011)
D.$\leq$3 yo child (y/n) x Men	-0.007	-0.004	-0.011	-0.010*	-0.002	-0.012
	(0.005)	(0.013)	(0.012)	(0.006)	(0.013)	(0.012)
D.Log Nb persons in Household	-0.001	0.042**	0.040**	-0.001	0.042**	0.040**
	(0.005)	(0.019)	(0.019)	(0.005)	(0.019)	(0.019)
D.Log local population	0.209**	-0.179	0.009	-0.272*	0.409	0.077
	(0.090)	(0.270)	(0.254)	(0.150)	(0.363)	(0.324)
D.Local log median income	1.000***	-1.264***	-0.230	1.147***	-1.418***	-0.225
	(0.120)	(0.326)	(0.304)	(0.169)	(0.366)	(0.308)
L.Experience in years/10	0.005	-0.157***	-0.151***	-0.000	-0.151***	-0.151***
	(0.006)	(0.020)	(0.019)	(0.007)	(0.021)	(0.019)
L.Experience^2/100	-0.001	0.021***	0.020***	-0.000	0.020**	0.020***
	(0.002)	(0.006)	(0.006)	(0.002)	(0.006)	(0.006)
Constant	-0.086***	0.307***	0.281***	-0.098***	0.327***	0.287***
	(0.013)	(0.034)	(0.032)	(0.018)	(0.038)	(0.032)
Observations	6247	6247	6247	6247	6247	6247
R^2	0.104	0.104	0.091			
$R^2 adj$	0.102	0.102	0.088			
rho	-0.311					
Breusch_Pagan_pvalue	0.000					
endogeneity test (pval)				0.000	0.017	0.298
Nb instruments				2.000	2.000	2.000
1st st. F excluded for S1-med dens				98.141	98.141	98.141
1st st. F excluded for S2-med dens				93.584	93.584	93.584
Sanderson-Windmeijer F-test for S1-med dens				94.080	94.080	94.080
Sanderson-Windmeijer F-test for S2-med dens				93.266	93.266	93.266
Stock-Wright S (joint 0) (pval)				0.000	0.024	0.115
Anderson-Rubin (joint 0) (pval)				0.000	0.024	0.116

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years, specialties and age composition of local population (not reported).In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 29: Price, output and fees of free-billing physicians: First difference analysis, men only

	OLS			IV		
	Price	Output	Fees	Price	Output	Fees
D.Log sector 2 medical density	-0.063***	-0.042	-0.115**	-0.752***	0.725**	-0.105
	(0.012)	(0.047)	(0.046)	(0.124)	(0.322)	(0.300)
D.Log sector 1 medical density	0.011	-0.052	-0.047	-0.328**	0.558	0.152
	(0.011)	(0.037)	(0.036)	(0.132)	(0.370)	(0.357)
D.Log GP density	-0.044**	-0.002	-0.049	0.013	-0.078	-0.061
	(0.020)	(0.058)	(0.054)	(0.027)	(0.072)	(0.067)
D.Non professional Log income /100	0.013	-0.171	-0.157	0.048	-0.222	-0.167
	(0.058)	(0.300)	(0.308)	(0.065)	(0.298)	(0.304)
D.Non physician Log income /100	-0.090**	-0.214	-0.320	-0.091*	-0.209	-0.317
	(0.044)	(0.277)	(0.285)	(0.050)	(0.277)	(0.283)
D.Child/ex-spouse support (y/n)	0.001	0.017	0.019	-0.001	0.020	0.019
	(0.003)	(0.013)	(0.013)	(0.004)	(0.014)	(0.014)
D.≤3 yo child (y/n) x Women	-0.001	-0.061**	-0.062**	-0.005	-0.057**	-0.063**
	(0.007)	(0.028)	(0.026)	(0.008)	(0.029)	(0.026)
D.Log Nb persons in Household	-0.000	0.012	0.012	0.000	0.011	0.012
	(0.005)	(0.019)	(0.019)	(0.006)	(0.019)	(0.019)
D.Log local population	0.088	-0.527	-0.465	-0.462**	0.310	-0.270
	(0.111)	(0.367)	(0.347)	(0.209)	(0.611)	(0.582)
D.Local log median income	0.344**	-0.409	-0.063	0.632***	-0.694	-0.038
	(0.140)	(0.564)	(0.559)	(0.188)	(0.617)	(0.599)
L.Experience in years/10	0.011*	-0.136***	-0.125**	-0.008	-0.115**	-0.125**
	(0.006)	(0.038)	(0.039)	(0.008)	(0.040)	(0.040)
L.Experience^2/100	-0.001	0.010	0.009	0.002	0.005	0.009
	(0.002)	(0.011)	(0.011)	(0.002)	(0.011)	(0.011)
Constant	-0.022	0.231***	0.272***	-0.034*	0.246***	0.274***
	(0.015)	(0.065)	(0.065)	(0.021)	(0.069)	(0.067)
Observations	5393	5393	5393	5393	5393	5393
R^2	0.145	0.067	0.052			
$R^2 adj$	0.142	0.064	0.049			
rho	-0.229					
Breusch_Pagan_pvalue	0.000					
endogeneity test (pval)				0.000	0.030	0.588
Nb inst.				2.000	2.000	2.000
1st st. F excluded for S1-med dens				86.188	86.188	86.188
1st st. F excluded for S2-med dens				97.403	97.403	97.403
Sanderson-Windmeijer F-test for S1-med dens				76.301	76.301	76.301
Sanderson-Windmeijer F-test for S2-med dens				81.426	81.426	81.426
Stock-Wright S (joint 0) (pval)				0.000	0.047	0.386
Anderson-Rubin (joint 0) (pval)				0.000	0.045	0.388

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years, specialties and age composition of local population (not reported).In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 30: Price, output and fees of free-billing physicians: First difference analysis, women only

	Output		Fees	
	OLS	IV	OLS	IV
D.Log sector 2 medical density	-0.044***	-0.058	-0.039**	-0.129
	(0.013)	(0.081)	(0.013)	(0.086)
D.Log sector 1 medical density	-0.053	-0.056	-0.102**	-0.158
	(0.038)	(0.206)	(0.038)	(0.207)
D.Log GP density	0.011	0.012	0.015	0.021
	(0.048)	(0.051)	(0.048)	(0.050)
D.Non professional Log income /100	-0.585**	-0.583**	-0.504**	-0.494**
	(0.208)	(0.208)	(0.202)	(0.202)
D.Non physician Log income /100	0.056	0.055	0.054	0.048
	(0.116)	(0.116)	(0.114)	(0.115)
D.Child/ex-spouse support (y/n)	-0.001	-0.001	-0.002	-0.002
	(0.009)	(0.009)	(0.009)	(0.009)
D.≤3 yo child (y/n) x Men	-0.019	-0.019	-0.016	-0.016
	(0.035)	(0.035)	(0.035)	(0.035)
D.Log Nb persons in Household	-0.006	-0.006	-0.004	-0.005
	(0.016)	(0.016)	(0.015)	(0.016)
D.Log local population	-0.056	-0.060	0.001	-0.047
	(0.252)	(0.313)	(0.244)	(0.307)
D.Local log median income	-0.112	-0.111	-0.019	-0.023
	(0.283)	(0.281)	(0.274)	(0.272)
L.Experience in years/10	-0.028	-0.027	-0.029	-0.028
	(0.029)	(0.029)	(0.028)	(0.028)
L.Experience^2/100	-0.007	-0.007	-0.007	-0.007
	(0.007)	(0.007)	(0.007)	(0.007)
Constant	0.220***	0.220***	0.211***	0.211***
	(0.034)	(0.035)	(0.033)	(0.034)
Observations	5193	5193	5193	5193
R^2	0.051		0.050	
$R^2 adj$	0.048		0.047	
endogeneity test (pval)		0.971		0.399
Nb instruments		2.000		2.000
1st st. F excluded for S1-med dens		127.381		127.381
1st st. F excluded for S2-med dens		114.496		114.496
Sanderson-Windmeijer F-test for S1-med dens		140.147		140.147
Sanderson-Windmeijer F-test for S2-med dens		142.948		142.948
Stock-Wright S (joint 0) (pval)		0.734		0.285
Anderson-Rubin (joint 0) (pval)		0.733		0.284

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years, specialties and age composition of local population (not reported). In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 31: Output and fees of fee-regulated physicians: First difference analysis, men only

	Output		Fees	
	OLS	IV	OLS	IV
D.Log sector 2 medical density	0.004	-0.033	0.002	-0.115
	(0.018)	(0.124)	(0.018)	(0.130)
D.Log sector 1 medical density	-0.123***	-0.073	-0.150***	-0.172
	(0.032)	(0.154)	(0.030)	(0.158)
D.Log GP density	0.008	0.013	-0.001	0.011
	(0.046)	(0.048)	(0.046)	(0.048)
D.Non professional Log income /100	-0.779**	-0.780**	-0.755**	-0.756**
	(0.253)	(0.252)	(0.258)	(0.258)
D.Non physician Log income /100	-0.599**	-0.599**	-0.605**	-0.592**
	(0.210)	(0.213)	(0.213)	(0.217)
D.Child/ex-spouse support (y/n)	0.007	0.007	0.007	0.008
	(0.012)	(0.012)	(0.012)	(0.012)
D.$\leq$3 yo child (y/n) x Women	-0.109***	-0.109***	-0.112***	-0.114***
	(0.020)	(0.020)	(0.020)	(0.021)
D.Log Nb persons in Household	0.009	0.009	0.009	0.008
	(0.022)	(0.022)	(0.022)	(0.022)
D.Log local population	-0.055	-0.034	0.002	-0.024
	(0.212)	(0.240)	(0.218)	(0.248)
D.Local log median income	-0.196	-0.170	-0.055	-0.037
	(0.363)	(0.362)	(0.374)	(0.374)
L.Experience in years/10	0.002	0.002	-0.003	-0.004
	(0.036)	(0.036)	(0.037)	(0.037)
L.Experience^2/100	-0.020*	-0.020*	-0.018*	-0.018*
	(0.010)	(0.010)	(0.010)	(0.010)
Constant	0.174***	0.173***	0.168***	0.171***
	(0.048)	(0.048)	(0.049)	(0.048)
Observations	7802	7802	7802	7802
R^2	0.032		0.031	
$R^2 adj$	0.030		0.028	
endogeneity test (pval)		0.799		0.586
Nb instruments		2.000		2.000
1st st. F excluded for S1-med dens		237.312		237.312
1st st. F excluded for S2-med dens		170.336		170.336
Sanderson-Windmeijer F-test for S1-med dens		319.713		319.713
Sanderson-Windmeijer F-test for S2-med dens		260.492		260.492
Stock-Wright S (joint 0) (pval)		0.893		0.527
Anderson-Rubin (joint 0) (pval)		0.893		0.527

Note: OLS and IV regressions on physicians staying at the same location within a time period. D. denotes controls in first differences. L. indicates that lagged value of controls are included in the regressions. Controls also include years, specialties and age composition of local population (not reported).In IV regressions, variations of Log medical densities are instrumented with lagged log density of physicians older than 60. Standard errors clustered by physician in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 32: Output and fees of fee-regulated physicians: First difference analysis, women only