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Entry into the Physicians' Market: Empirical Evidence from the Outpatient Sector in Austria

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Abstract

In forming strategies to improve the macro performance of health care systems, effective interaction between the public and private service provisions is considered an important aspect of institutional design. Recent economic research has provided valuable insights into the significance of this interaction. We study the market entry decisions of private physicians in the outpatient health care sector in Austria by applying an entry/exit model at two different spatial levels of aggregation and using data from the time period 2002–2008. By estimating a Poisson panel data model with community/district fixed effects, we find a significantly negative effect of existing physician capacities in a specialty, both in the public and private sectors, on the entry of new private physicians. On the contrary, we find a significantly positive effect of existing private general practitioners on the entry of private specialists. These findings indicate that private physicians tend to (i) compensate for regional differences in public outpatient capacities, and (ii) establish cooperative networks where they collaborate with other private physicians in the local market.

Keywords

Entry, Outpatient Health Care, Physician Density, Physician Location

I. Introduction

Recently, firm turnover has attracted increased interest in economic research, as the entry of new firms increases competition and encourages efficiency gains. Moreover, the induced changes in the market structure promote productivity growth, because firm entry usually

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leads to innovation and new technologies. Previous research focused mainly on microeconomic explanations for firm entry, mostly based on the theory of industrial organizations.[4] Market entry decisions in the health care sector differ from that in other industries because of specific production and market characteristics, including (i) information asymmetries, (ii) quality rather than price competition, and (iii) the specific institutional design of market entry and exit. Bresnahan and Reiss (1988, 1990, 1991) derive a general model of market entry depending on the existing market structure. The basic idea behind this approach is simple: competition gets tougher when a growing number of firms are confronted with a fixed amount of demand. The application of this hypothesis to the outpatient health care sector is straightforward. With more physicians entering the market, the profit margins of existing physicians decrease, leading to a higher "break-even" population ratio to cover the entry costs. While this approach uses market structure and population as key variables for the model, it does not require data on price-cost margins or prices (usually not available for the health care sector). In the recent past, several authors applied the Bresnahan/Reiss-model to the health care sector in empirical studies. Thereby, Abraham et al. (2007) find that entry leads to a significant increase in competition in hospital markets, and thus, to higher consumer welfare. Capps et al. (2009) find that urban hospital dropouts lead to a reduction in social welfare, but the cost savings for the patients exceed the reduction in welfare. Schaumans and Verboven (2008) present an empirical entry model for pharmacies and physicians in Belgium considering both entry restrictions and strategic complements. They find that, unlike unregulated market entry, entry restrictions directly reduce the number of pharmacies by more than 50% and indirectly reduce the number of physicians by about 7%. Furthermore, a removal of entry restrictions combined with a reduction in regulated markups for pharmacies would increase rents for consumers, without reducing the availability of pharmacies.

In addition to the research following the Bresnahan-Reiss approach mentioned above, a broader literature exists on different aspects of market entry in the health care industry in general (see Al-Amin et al., 2010, Al-Amin and Hosman, 2012). Overall, however, our empirical knowledge of the determinants of entry decisions in the health care and physician markets is limited. This is especially true for the effect of different governance structures in the health care sector. In this paper we therefore focus on an important dimension of this governance structure. Thereby, we analyze the entry decisions of physicians working in the private outpatient sector of a two-tiered (public/private) health care system by analyzing data from Austria. The outpatient sector of the health care system in Austria is characterized by a separation of private and public physicians. While private physicians can work at any preferred location, market entry for public physicians is strictly regulated by the public health insurance system. Furthermore, remuneration policies, benefit catalogs, and insurance coverage vary widely between the private and public sectors. This institutional split in the physician labor supply makes it difficult to study entry decisions at an aggregated level without differentiating between private and public physicians. On the other hand, our

[4] Related empirical studies on this topic are, among others, Orr (1974a), Orr (1974b), Hirschey (1981), Duetsch (1984), Dunne et al. (1988), Chappell et al. (1990), Geroski (1991), Sleuwaegen and Dehandschutter (1991), Dunne and Roberts (1991), Mayer and Chappell (1992), Rosenbaum (1993), and Siegfried and Evans (1994).

focus on private physicians allows us to investigate the relation between the entry decisions of private physicians and existing public capacities. While an essential part of the literature on industrial organizations focuses on the profits and costs of firms, information of this kind is not available for private physicians in Austria. Thus, we adopt a model where entry decision is related to the market shares of existing (public and private) capacities and the resulting competitive forces in the health care system. We use data from 2,379 local communities and 121 districts in Austria collected during 2002–2008 to estimate a Poisson panel data model. We are particularly interested in how the given capacity of public physicians (GPs and specialists), their private counterparts, and the exit of physicians of the same specialty, influence the entry of private physicians.

Our paper contributes to previous research on physician entry in several directions. As already mentioned above, we explicitly consider differences in the regulatory framework of the physician supply by focusing on private physicians, while most previous studies analyze physicians as one homogeneous aggregate (e.g. Bresnahan and Reiss, 1988, 1990, 1991, Schaumans and Verboven, 2008). This differentiation allows us to analyze the relationship between the private sector, existing public physician capacities, and exit of private physicians, in terms of gross entry. These findings provide additional insight into the market entry of physicians. Previous research on this topic was focused on health care systems where physicians serve the private and public sectors simultaneously (for instance, in the US). Furthermore, most of the existing empirical studies on entry behavior in health care markets use cross-sectional data (e.g. Bresnahan and Reiss, 1988, 1990, 1991, Schaumans and Verboven, 2008). Our approach, on the contrary, allows us to estimate a panel data model, which is widely recognized in the IO literature, to explain firms' entry behavior into the physicians' market. By observing market entries over time, we are able to capture the dynamic behavior of physicians by analyzing the determinants of physicians' gross entry rates. Furthermore, our results confirm the recent empirical evidence that private physicians might collaborate in local networks by referring to each other, as suggested by Gächter et al. (2012). Thus, recent strategies to improve the macro performance of health care systems consider the interaction between public and private service provisions as an important aspect of institutional design. In this context, our findings are important because they provide empirical insights into how a specific institutional design affects the relationship between physicians of different categories. Thus, our work points to the impact of the institutional design on the outcome of the health care system.

The structure of the paper is as follows. Section II gives a brief overview of the institutional framework in Austria, while section III explains the related theoretical background and derives our hypotheses. Section IV describes our empirical model, while section V presents and discusses the most relevant empirical results. Finally, section VI presents some conclusions.

II. Institutional framework

The public health insurance system acts as the first tier of outpatient care in the Austrian health care system. Membership in this system is obligatory for both wage earners in the public and private sectors and self-employed persons (including farmers). The financing is mainly based on income-related contributions. Individuals without any insurance coverage having family ties to obligatory insured persons receive free health coverage. Overall, public health insurance covers around 98.5 percent of the whole population, excluding only marginal groups. Private health insurance and out-of-pocket payments constitute the second tier of the Austrian health care system. Roughly 35 percent of the population have signed contracts with private health insurance companies that predominantly offer supplementary coverage in addition to the first tier services.

Similarly, the supply of outpatient care can be split into two parts: health care services offered by public and private physicians. This separation exists for general practitioners (GPs) and specialists (SPs).[5] Individuals in both groups are self-employed and predominantly have independent practices (see Hofmarcher and Rack, 2006, p. 118). Public physicians have a treatment contract with the public health insurance system. The public health insurance system is split into different schemes. The majority of the population (80%) is covered by insurance carriers organized on the level of the provinces (*"Gebietskrankenkassen"*). Besides this broad scheme there exist separate schemes for farmers, self-employed persons and public sector workers. In principle, public physicians can also treat privately insured patients who pay their physician fees out of pocket. However, due to the existing regulation, this is not an important option for the majority of public physicians, especially for those with a contract with the insurance scheme on the provincial level. In our empirical strategy we therefore neglect this detail and only differentiate between private and public physicians. The spatial distribution of physicians is based on a location plan that is approved by the public health insurance system and the Chamber of Physicians at the provincial level. It specifies the regional distribution of the physician workforce based on the health needs of the relevant population and ensures a sufficient provision of medical services based on the existing state of medical standards. The physician contracts do not have time limitations. The assignment of the contract to a physician is based on criteria like waiting time for the contract and professional experience. The individual contract of a public physician is based on bilateral agreements between the Main Association of Social Insurances at the federal level and the Chamber of Physicians. It states the important aspects of physician services, such as practice style (e.g., office hours, treatment guidelines, and restrictions of additional occupations). Public physicians generate income from fee-for-service and lump-sum payments, which can be claimed for initial contacts and for the provision of basic services. The share of lump-sum payments in total physician earnings varies widely over different fields of specialization. At an aggregate level, it amounts to about 68 percent for public general practitioners ($CGPs$) and around 34 percent for public specialists ($CSPs$) (see Theurl and Winner, 2010). The

[5] Public outpatient care in Austria is also provided by hospitals and by the public health insurance system directly. In our empirical approach, we do not explicitly include these facilities for reasons explained in section III.

fee-for-service part of remuneration includes earning caps implying decreasing marginal earnings. Within specified limits, public physicians are allowed to earn extra money by providing additional services beyond the contract (e.g., medical services in schools). Private physicians are free to choose their work location, and their remuneration is based on a fee-for-service system. The service fee is decided based on agreement between the physician and patients, although the Chamber of Physicians at the provincial level recommends a physician pricing policy. Private physicians are free to earn extra money, for example, by working in a private hospital (approximately 25% of the private physicians in our sample work at a private hospital).

Even individuals with public health insurance can choose between public and private physicians. However, the costs of the two options differ substantially. The utilization of public outpatient health care is based on a benefit-in-kind scheme without substantial cost sharing for physician services for the patient. The utilization of private outpatient health care, on the other hand, is based on a cost reimbursement scheme. The treatment costs in the private sector are covered by three sources: (i) out of the individual's pocket, (ii) by private health insurances, and/or (iii) by public health insurance. The public health insurance system partly reimburses the bill of private physicians. The maximum amount of refunding for physician services included in the public benefit catalogue is fixed at 80 percent of the amount a public physician would receive. However, since the cost of private physicians is normally well above that of public physicians, the cost-sharing rate for these services is usually much higher than 20 percent.[6]

III. Theoretical background and hypotheses

Our hypotheses are based on the institutional framework of the Austrian health care system. Thereby, we argue that public and private physicians are to some extent substitutes leading to competition between the two physician groups (see Propper, 2000 for a similar approach for the UK). Public physicians offer physician services on a benefit-in-kind-basis for the majority of those patients without substantial cost-sharing. The target population of public physician services is almost the whole Austrian population (98.5%). But in principle, patients with public health insurance can choose between public and private physician services. The standard packages of the two physician groups are similar, but for the patients the utilization of private physicians often offers the advantage of shorter waiting times and lower distances. On the other hand, the utilization of the private sectors results in substantial amounts of cost sharing. Thus, patients face a trade-off between better treatment quality in some dimensions and a higher treatment price. If we assume that physicians of the same specialty are homogenous and therefore have the same payoff

[6] Rough calculations for the period 2000–2004 suggest that the cost sharing percentage for the submitted physician bills amounts to about 40 to 70 percent, with huge differences among specialties. Public insurance officials argue that only 50 percent of the public insured patients submit their physician bills for reimbursement. Thus, we presume that the overall percentage of cost sharing to utilize private physician services is even higher than the share mentioned above. In addition, our data show that the public health insurance system spends around 10 percent of its expenditure for outpatient care to reimburse the costs of private physicians.

function (see, for instance, Mazzeo, 2002), the payoff for a physician entering the market i depends on the total number of practicing physicians. Thus, public and private physicians of the same specialty are assumed to be substitutes of each other (Schaumans and Verhoven, 2008).

To summarize, if the density of SP (GP) is below the equilibrium in a market, the demand for SP (GP) services will exceed supply, and each SP (GP) will earn positive profits $\prod_{i,t} \geq 0$. If this assumption holds, additional private specialists (PSP) (private general practitioners; (PGP)) will enter the market until supply equals demand for health care services (i.e., profits are zero).

Hypothesis 1: Due to the "competition effect", the entry of $PGPs$ ($PSPs$) is negatively related to the density of $PGPs$ ($PSPs$).

Further, we assume that physicians consider not only the number of competitors in a market but also the referral behavior of all market participants. Propper (2000) showed that the relationship between the private and public forces is quite complicated, for example, the past use of public care services is positively associated with the present use of private care services and vice versa. The complexity of the referral behavior of public and private physicians was also shown by Fabbri and Monfardini (2003) and Atella et al. (2004). Interestingly, none of the studies include substitutive or complementary effects in the physicians' market. Therefore, Attela and Deb (2008) applied a simultaneous equation model and found that private and public primary care physicians are complements.

Typically, GPs represent the first contact in the health care system and are therefore able to influence patient flows to other physicians through referrals. In general, referrals by GPs are not a precondition in the Austrian health care system to consume the services of specialists and are rather unusual.[7] This is especially true for the relationship between $CGPs$ and $PSPs$. Therefore, we expect weak competition effect between $CGPs$ and $PSPs$, which might also depend on the type of specialty of $PSPs$.

Hypothesis 2: The entry of $PSPs$ is weakly negatively related to the density of $CGPs$, as they are partly providing the same services and referrals from public to private physicians are rather unusual.

On the other hand, the referral effect should be stronger for $PGPs$ if treatments are cumbersome or time consuming (see Schaumans and Verboven, 2008). Then, the density of $PSPs$ should be higher in locations with a higher PGP density, and vice versa (i.e., $PGPs$ benefit from the presence of SPs as they create referral opportunities). Based on this possible referral behavior, we expect a complementary relation between $PSPs$ and $PGPs$, as recently proposed by Gächter et al. (2012).

[7] Compared with other health care systems, the gate keeping function of GPs is underdeveloped. (see Hofmarcher and Rack, 2006 for details). For some specific services (e.g., computer tomography or magnetic resonance), however, referral is compulsory.

Hypothesis 3: The entry of $PSPs$ ($PGPs$) is positively related to the density of $PGPs$ ($PSPs$), because they benefit from referrals if treatments are cumbersome or time consuming.

Finally, we analyze the exit decision of private physicians of the same specialty in a location. There are several reasons for leaving the private physicians' market, for example, (i) retirement, (ii) change to contracted physician, or (iii) movement to another market. In the case of (iii), the exit is motivated by the level of competition in the market; hence, if there is an excess supply of physicians, existing physicians will leave the market owing to a loss of $\prod_{i,t} < 0$. In this case, we would expect an exit decision to have a negative relation with entry decision. On the other hand, movement to another market as CP could be the result of a job offer. If this holds true, the private physician would be replaced by a new entrant, and therefore we can expect a positive influence from the exit decision on market entry. The retirement of a physician causes a supply shock and indicates to possible entrants that profits can be earned in this market. Thus, a retired private physician will possibly be displaced by another private physician, and therefore, we can expect a positive relation between the two variables. Similarly, the change to CP would affect the short-run competition in the market. The conclusion of a contract with the social health insurance system is usually caused by the dropout of an existing CP. Therefore, the reduced number of $PSPs$ ($PGPs$) might encourage private physicians to enter the market.

Hypothesis 4: There is a positive relation between the entry of $PSPs$ ($PGPs$) and the exit behavior of physicians of the same specialty.

As in Mazzeo (2002), we assume that physicians decide on their market entry sequentially by observing previous entries. Mazzeo (2002) assumes that firms first join the market and then choose their specialty type. In our case, this approach is possible, but quite unlikely. Physicians spend a lot of time in training and specializing in their profession. After all, our description of the Austrian health care system shows that the entry of each particular type of physician is affected by the density of the other types of physicians. Below, we propose a specific empirical framework to address these interrelations.

IV. Model and data

Empirical specification

Earlier studies on the entry of firms have considered three different measures, namely, (i) net entry/exit rates, which is the difference in the number of incumbent firms between time t and $t-1$, (ii) gross entry rates, only reflecting entries, and thus, neglecting the displacement of other firms/physicians, and (iii) effective entry/exit rates, where entries and exits are weighted by their impact (e.g., market share). For the purpose of our empirical analysis, we choose gross entry rates.

The exclusion of the displacement of existing firms/physicians (which is an important factor, because many practices are passed on to young physicians after retirement) from gross entry rates is adjusted by including gross exit rates in our estimation equation. As independent medical practice is common in the Austrian health care system, approximately equal market shares for each practicing physician can be assumed. Thus, the examination of gross entry rates seems appropriate in our case. On the contrary, effective entry rates should be considered when the market shares of single firms differ significantly. Although exact data on market shares (or the number of patients, revenues, etc.) are not available, the institutional design and the supply structure of the Austrian health care sector makes an unequal distribution of market shares unlikely. Thus, we use gross entries as our dependent variable.

To keep our empirical model as simple as possible, we make several assumptions about the market structure. First, we assume that there are homogeneous firms in the market (physicians of the same specialty in our case) delivering homogeneous goods (health care services). Thus, each firm in the market can be considered to have a similar cost structure. Furthermore, we assume that entering the market is based on free-entry competition, which holds true for the private sector of the Austrian outpatient health care system. Hence, we are able to relate the unobservable profits and costs to the market shares, that is, physician densities, in market i during any time period t. Based on these assumptions, the entry equation is derived as follows:

$$\begin{aligned}
Entry(PSP_{i,t}) &= a_1 PGP_{i,t-1} + a_2 PSP_{i,t-1} + a_3 CGP_{i,t} + a_4 CSPs_{i,t} + \\
&= +a_5 Exit(PSP_{i,t}) + a_6 T_t + \mathrm{e}_{i,t} \\
Entry(PGP_{i,t}) &= a_1 PGP_{i,t-1} + a_2 PSP_{i,t-1} + a_3 CGP_{i,t} + a_4 CSPs_{i,t} + \\
&= +a_5 Exit(PGP_{i,t}) + a_6 T_t + \mathrm{e}_{i,t}
\end{aligned}$$

where $Entry(PSP_{i,t})/Entry(PGP_{i,t})$ denotes the entry of private specialists ($PSPs$)/ general practitioners ($PGPs$) in market i at time t. We study the gross entry of $PSPs$ and $PGPs$ as a whole as well as important groups of $PSPs$ separately. Thus, our model implicitly assumes that entering physicians have information on the number of incumbent physicians (supply) and the population (indicating the potential demand for physician services) in a market. Therefore, the probability of entry into a market can increase or decrease with the density of private physicians at time $t-1$ (PSP_{i,t_1}, $PGP_{i,t-1}$), the density of contracted physicians ($CSPs_{i,t}$, $CGP_{i,t}$), and the exit rates of physicians of the same specialty at time t ($ExitPSP_{i,t}$, $ExitPGP_{i,t}$). Private physician densities are lagged in our model, as we would otherwise face endogeneity problems (simultaneous decisions because of unregulated location decisions). Furthermore, the exit rates of physicians consider the displacement effect. The coefficients for the exit rates, however, have to be considered with caution because of the obvious endogeneity problem. Therefore, we only use them as a control variable, and no causality can be inferred. Moreover, we assume that the private physician supply does not influence the physician supply in the public sector. This assumption is supported by the fact that the private physician capacity does not affect the location plans of public physicians in the Austrian institutional setting. Finally, T_t denotes a trend variable.

Since the focus of this paper is on examining the effect of existing capacities and competitive forces on the entry decision of private practicing physicians, we adopt a simple entry model to explain the entry behavior in our data set. More precisely, we deal with count data – the number of physician entries per community (district) – thus, standard OLS regression methods are not appropriate for several reasons.[8] Because of the discrete and non-negative properties of our dependent variable (gross entries), we apply a Poisson regression model.[9] By including community fixed effects in our panel regression model, we are able to control for observed as well as unobserved time-invariant differences between different communities/districts in our estimations (e.g., differences in the level of outpatient care offered by hospitals and the public health insurance system). While this estimator reduces the threat of an omitted variable bias, we are unable to estimate the influence of variables with little within variation, such as population, income, or educational qualification. However, as our panel data set covers only seven years, it seems reasonable to assume that such variables do not vary considerably over this short time period.
To estimate our entry equation, we have to define relevant geographic levels mirroring local markets for physicians. As in the health care system in Belgium (Schaumanns and Verboven, 2008), physicians in the Austrian health care system are not allowed to advertise their services, so the patient's choice is driven by local information. Schaumans and Verboven (2008) find that 85% of patients travel less than five kilometers to visit a physician in Belgium. Moreover, 94% are used to a fixed physician who is located close to the patient's location. Thus, the relevant market for our analysis should be the community level, while we use the district level for robustness purposes.

Data

Entry and exit rates of physicians and their specialty are self-generated from *Handbuch für die Sanitätsberufe Österreichs [Manual for Medical Service Professions in Austria]* (Göschl CD MED, 2002–2008). Our data cover the time period 2002–2008 and include 2,379 communities[10] and 121 districts[11] (including the 23 districts of Vienna). As each geographical unit constitutes one observation, we analyze a balanced panel with 16,653 (communities) and 968 (districts) observations. To compute the density of physicians, we use the population data from the Austrian census 2001 (*Statistik Austria 2001*). Because of

[8] This includes the existence of heteroskedasticity as well as non-normal conditional distributions (typically positively skewed with many low-count observations and no observations below zero).
[9] Important modifications over standard OLS methods are that (i) it allows transformations of the predicted outcome (while the observed scores are counts, the predicted scores are typically natural logarithms of the counts) and (ii) the Poisson regression assumes the residuals $\epsilon_{i,t}$ being conditionally Poisson distributed. The Poisson distribution is a discrete distribution that takes on a positive probability value only for non-negative integers, making it an excellent choice for modeling count data (see, for instance, Cameron and Trivedi (2005) for further details).
[10] Under the NUTS classification, the local community level is LAU2. The districts in Vienna are counted as 23 local communities. In the Austrian political system, local communities act as agents in the administration of public functions of the central state and provinces and fulfill several self-governing tasks.
[11] Districts are geographically separated jurisdictions below the NUTS3-level and above the LAU1-level. They act as agents in the public administration of functions of the central state and the states, and their number/size is based on historical reasons and not a priority of an optimal spatial organization of public policy (e.g., in the health care sector). Districts do not have legislative functions.

the lagged explanatory variables, we do not have observation data for one year (2002) both at the community and district level. In 2002, we observed 13,464 physicians in the Austrian outpatient market; while most of them (8,229) had a contract with at least one of the social health insurers, the remainder belonged to the second private tier of the health care system. Table 1 shows the turnover margin of all physicians in the outpatient sector of the Austrian health care system. In total, the number of physicians increased by approximately 8.3% from 2002 to 2008. Because of the public capacity plans, the number of contracted physicians was quite stable, whereas the number of private practicing physicians increased considerably (about 27.8%) over the sample period.
By using 2002, with 5,235 private practicing physicians, as our base year, we computed entries, exits, and the changes in the contract status for the following years until 2008.[12] Table 1 shows the turnover margin for private physicians in Austria, revealing a steady increase in the absolute number of private physicians.

Table 1: Physicians in Austria 2002–2008

	2002	2003	2004	2005	2006	2007	2008
Total	13,464	13,925	14,178	14,805	15,063	15,225	15,315
Exit of Physicians	384	268	406	582	393	615	–
Cumulative Exit of Physicians	384	652	1,058	1,640	2,033	2,648	2,648
Entry of Physicians	–	845	521	1,033	840	555	705
Cumulative Entry of Physicians	–	845	1,366	2,399	3,239	3,794	4,499
Physician Growth (%)	–	3.31	1.78	4.24	1.71	1.06	0.59

Table 2: Private physicians 2002–2008

	2002	2003	2004	2005	2006	2007	2008
Total	5,235	5,743	5,992	6,627	6,921	7,113	7,254
Entry of Private Physicians	–	749	474	919	743	491	634
Change from Public to Private Physician	–	34	15	65	54	36	54
Cumulative Entry of Private Physicians	–	749	1,223	2,142	2,885	3,376	4,010
Exit of Private Physicians	213	152	208	363	230	404	–
Change from Private to Public Physician	–	62	88	141	140	105	143
Cumulative Exit of Private Physicians	213	365	573	936	1,166	1,570	1,570
Private Physician Growth (%)	–	8.85	4.16	9.58	4.25	2.70	1.94

V. Empirical results

First, we present the estimations of gross entry numbers of $PGPs$ and $PSPs$ depending on the prevailing competition within a certain region (measured by physician densities). For robustness purposes, we estimate the equations explained above both at the community and district levels.

[12] The change in contract status is treated as an entry/exit in the private or public sectors. More precisely, a change from private to public physician by concluding a contract is counted as an exit of a private physician.

Empirical results for market entry of $PSPs$ and $PGPs$ are reported in Table 3.[13] Referring to column (1), as expected, the entry of $PSPs$ is more likely if the PSP density is low in a certain region. Thus, the density of $PSPs$ seems to be an indicator of the possibility of earning profits, while a lower level of competition makes entry more likely (see *Hypothesis 1*). The effect of existing GPs capacities is less clear a priori from a theoretical perspective (see chapter 2). Interestingly, we find no significant effect of the existing capacities of $CGPs$ on the market entry of $PSPs$. As mentioned above, the competition and referral effect might cancel each other out in this case. Thus, a PSP does not seem to anticipate possible referrals from $CGPs$ (*Hypothesis 2*). This effect is driven by the institutional design of the Austrian health care system, where such referrals are rather uncommon. On the contrary, $PGPs$ are most likely to give referrals because of the existence of cooperation networks within the second (private) tier of the Austrian health care system (see *Hypothesis 3*). More precisely, $PSPs$ consider expected referrals from $PGPs$, as confirmed by earlier studies by Atella and Deb (2008) or Gächter et al. (2012). As expected, the exit of $PSPs$ has a positive impact on the market entry of physicians of the same specialty. However, as already mentioned above, this finding has to be interpreted with caution because of possible endogeneity problems (*Hypothesis 4*). The results are highly robust at the district level, albeit some coefficients are less significant.

Table 3: Estimation for private specialists and private general physicians

	PS Entry	**PS Entry**	**PGP Entry**	**PGP Entry**
Regional Level	**Community**	**District**	**Community**	**District**
PSP Density$_{t-1}$	−0.804***	−0.521***	−0.341**	−0.210
	(0.092)	(0.149)	(0.167)	(0.276)
PGP Density$_{t-1}$	0.732***	0.838***	−1.789***	−3.169***
	(0.187)	(0.295)	(0.247)	(0.530)
CGP Density$_t$	−0.248	−1.075	−2.293***	−2.614*
	(0.461)	(0.919)	(0.566)	(1.384)
CSP Density$_t$	−0.008	−0.440	−0.426	−3.437***
	(0.285)	(0.498)	(0.491)	(0.822)
Exit(PSP$_{i,t}$)	0.009**	0.007*		
	(0.004)	(0.003)		
Exit(PGP$_{i,t}$)			0.083***	0.081***
			(0.016)	(0.012)
Trend	0.084***	0.027*	0.091***	0.049**
	(0.015)	(0.014)	(0.022)	(0.020)
N	1806	720	1614	720
Log likelihood	−1576.65	−1155.68	−1006.93	−901.59

*Notes: ***, **, and * denote 10%, 5%, and 1% significance levels.*

Variables: PSP – Private specialists, CGP – Contracted general practitioners, PGP – Private general practitioners, CSP – Contracted specialists

[13] For robustness purposes, we controlled for more than one lag in the explanatory variables (not shown). As the coefficients were robust, we adopted a simpler model instead. Furthermore, the inclusion of spatial effects, where we weighted the independent variables of communities (districts) in the neighborhood by means of a distance matrix, also did not lead to different conclusions regarding the statistical significance and/or economic magnitude of our findings.

The second part of Table 3 (columns 3 to 4) shows empirical results for the market entry of $PGPs$. Most results derived above are confirmed for $PGPs$. As expected, the density of negatively influences the market entry of new $PGPs$ (*Hypothesis 1*). Surprisingly, we find a negative effect of $PSPs$ at the community level on the market entry rates of $PGPs$. More precisely, the entry into existing networks/cooperations seem to differ between $PSPs$ and $PGPs$. Remarkably, this finding is not consistent with that of earlier studies (see, for instance, Gächter et al., 2012), where cooperation/network effects are reported between $PGPs$ and $PSPs$ and vice versa. Nevertheless, the opposite effects of possible referrals and competition among $PSPs$ makes this relationship theoretically ambiguous, and more importantly, dependent on the type of specialty of the PSP. Furthermore, the positive relationship between PGP and PSP densities (as reported in Gächter et al., 2012) might be because of unobserved heterogeneity across regions (which might shift the demand for health care services), whereas our estimation primarily focuses on the entry decision of private physicians.

Table 4: Estimation of entry of private specialists

	PIN Entry	**PIN Entry**	**PGYN Entry**	**PGYN Entry**
Regional Level	**Community**	**District**	**Community**	**District**
POWN Density$_{t-1}$	−3.728***	−4.861***	−6.660***	−8.654***
	(0.652)	(0.997)	(1.412)	(2.002)
PGP Density$_{t-1}$	1.156**	1.277*	0.408	0.139
	(0.485)	(0.660)	(0.730)	(0.928)
CGP Density$_t$	−0.452	−1.378	−0.458	0.286
	(1.352)	(2.047)	(2.141)	(3.013)
COWN Density$_t$	−3.349*	−4.599*	−7.255*	−9.710*
	(1.795)	(2.647)	(3.867)	(5.186)
Exit(POWN$_{i,t}$)	0.053**	0.056**	0.216***	0.161***
	(0.029)	(0.026)	(0.068)	(0.061)
Trend	0.038	0.029	0.126***	0.102**
	(0.032)	(0.029)	(0.047)	(0.042)
N	732	642	540	552
Log likelihood	−483.28	−544.86	−311.62	−398.06

*Notes: ***, **, and * denote 10%, 5%, and 1% significance levels.*

Variables: CGP – Contracted general practitioners, PGP – Private general practitioners, COWN – Contracted specialists of the same specialty, POWN – Private specialists of the same specialty, PGYN – Private Gynecologists, PIN – Private Internists.

Overall, the results suggest a strong collaboration/network effect within the private sector for $PSPs$, whereas the competition (substitution) effect might play a larger role for $PGPs$, who partly offer the same services as $PSPs$ (depending on their specialty). The density of contracted specialists does not appear significant, most likely because of (i) possible canceling out of the effects between different specialties, and (ii) the low variation in the public physician densities within our sample, as the capacity plan of the social health insurance fund hardly changes over time.

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In order to investigate certain specialty-specific effects, we estimated equation (1) separately for internal specialists and gynecologists (Table 4). As the results are consistent with the findings above, we focus on important differences in these estimations. In general, as the number of observations is lower than in our previous estimations (because of a higher number of communities with no entries in a specific specialty), the results appear less significant. Essentially, we find two interesting differences in the results of Table 4. Firstly, the cooperation/network effect between $PGPs$ and $PSPs$ does not appear to be present in the case of gynecologists (the coefficients are positive but not significant). Because of the institutional design of the Austrian health care system, it is not compulsory to be referred by a GP for visits to a SP. In the case of gynecologists, it is quite obvious that women visit their doctor without a referral. On the other hand, we find a relation between private internists and $PGPs$. Private internists seem to act as complements, rather than substitutes, to $PGPs$. Secondly, we find a negative impact of public (contracted) specialists ($CSPs$) on the entry of $PSPs$ *of the same specialty*, confirming the hypothesis discussed above that this effect cancels out in the aggregated estimation over all specialties, as reported in Table 4. Most of the results at the community level also hold true for the district level, albeit with a lower significance, probably owing to higher heterogeneity among districts.

VI. Conclusion

In this paper, we tried to shed some light on the entry decisions of private physicians in the Austrian health care system. As no data is available for revenues, losses, and activities (number of patients treated), we adopted a simple entry/exit model at two different levels of aggregation (communities and districts). More precisely, our model regards both the population (potential demand) and the number of physicians in the private and public sectors (competitors) as important factors influencing location decision. By applying a Poisson panel data model with community/district fixed effects, we find a significantly negative effect of existing capacities, measured by the densities of both private and public physicians of the same specialty, on the entry of new private physicians. Thus, we conclude that physicians anticipate their future earnings in a market by considering the expected demand for their services. On the contrary, we find a significantly positive effect of existing $PGPs$ on the entry of $PSPs$. Based on the results of previous literature, we conclude that private physicians establish networks to cooperate in terms of mutual referrals. While our analysis contributes to the literature on physicians' location decisions by investigating physicians' market entry at two levels of aggregation, it adopts a new approach by applying a Poisson model to this specific research question.

Our study contributes to the ongoing debate on the role of private physicians in the Austrian health care system in general, and as a provider of care for clients of the public insurance system in particular (see also Gächter et al., 2012). To date, private (non-contract) resources of outpatient care are not included in the physician capacity plans of the public health insurance system, although the relevance of the private health care sector will increase further in the near future due to the high number of medical graduates from medical universities and restrictive capacity plans for public physicians. From a health policy perspective, the positive relationship between different private physicians could simply reflect the existence of efficient referral systems. However, it could also indicate an increase of supplier induced demand, which could adversely influence the macroeconomic stability and efficiency of the outpatient sector as a whole. The negative relationship between the entry of private physicians and the existing capacities of public physicians – signaling a substitution effect – could favor the interpretation that the private sector is an alternative to the public sector, and therefore should be considered in public capacity plans.

However, our study has some important limitations. First of all, we are aware of the problem of niche overlap and density dependence, although we do not exclusively deal with this problem in our empirical strategy. To tackle the problem of niche overlap seriously, we would need utilization data which are not available on an Austria wide scale. The same holds true for the role of supplier induced demand in explaining positive relationships between private and public capacities. Therefore, further research based on utilization data on the level of the individual physician and better information on personal characteristics of the physician (age, medical education, practice style) seems necessary to investigate the interdependencies of different specialties in the outpatient health care market.

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