labor&welfareSTATE

Entry and Exit of Physicians in a two-tiered public/private Health Care System

by

Martin GÄCHTER
Peter SCHWAZER
Engelbert THEURL

Working Paper No. 1101

January 2011

Supported by the Austrian Science Funds

FWF

The Austrian Center for Labor Economics and the Analysis of the Welfare State

JKU Linz
Department of Economics
Altenberger Strasse 69
4040 Linz, Austria
www.labornrn.at

Corresponding author: peter.schwazer@uibk.ac.at
phone +43 (0) 512 507-7167, -2970 (fax)

Entry and Exit of Physicians in a two-tiered public/private Health Care System

Martin Gächter*†, Peter Schwazer*‡ and Engelbert Theurl*

Abstract

Firm turnover has recently attracted increased interest in economic research. The entry of new firms increases competition and promises efficiency gains. Moreover, changes in the market structure influence productivity growth, because firm entry usually leads to increased innovation. The health care market exhibits important differences as compared to other markets, including various forms of market failure and, as a consequence, extensive market regulation. Thus, the economic effects of entries and exits in health care markets are less obvious. The following paper studies the determinants of entry and exit decisions of physicians in the private sector of the outpatient part of the Austrian health care system. We apply a Poisson panel estimation to a data set of 2,379 local communities and 121 districts in Austria in the time period 2002 - 2008. We are particularly interested in the question how public physicians (GPs/specialists) and their private counterparts influence the entrance and exit of private physicians. We find a significantly negative effect of existing capacities, measured by both private and public physician density of the same specialty, on the entry of new private physicians. On the contrary, we find a significantly positive effect of private GPs on the entry of private specialists. Interestingly, this cooperation/network effect also works in the other direction, as a higher density of private specialists increases the probability of the market entry of private GPs. Based on the results of previous literature, we thus conclude that private physicians establish networks to cooperate in terms of mutual referrals etc. Our estimations for market exits basically confirm the entry results, as higher competitive forces positively influence the market exit of private physicians.

JEL classification: I11, I18, L14
Keywords: Entry, Exit, Health Care, Physician location

*University of Innsbruck, Department of Economics and Statistics; Universitaetsstrasse 15, A-6020 Innsbruck, Austria; National Research Network (NRN) *The Austrian Center for Labor Economics and the Analysis of the Welfare State*.

†Johannes Kepler University of Linz, Department of Economics; Altenberger Strasse 69, A-4040 Linz, Austria.

‡*Corresponding author:* peter.schwazer@uibk.ac.at.

1 Introduction

Firm turnover has recently attracted increased interest in economic research. The entry of new firms increases competition and encourages efficiency gains. Moreover, the induced changes in the market structure influence productivity growth, because firm entry usually leads to innovation and new technologies. As high entry rates often coincide with high rates of firm death, the impact of exits has to be accounted for when analyzing the effect of market entries. Previous research focused mainly on microeconomic explanations for firm entry, mostly derived from the theory of industrial organizations. The following paragraphs give a brief overview of the relevant literature in industrial organization and health economics. Moreover, this short review motivates our empirical strategy for analyzing entries and exits in the outpatient sector of the Austrian health care system.

Generally, we are able to distinguish two main sources of entry, (i) the entry of incumbent firms from other markets (foreign producers or sellers of the same product/service in other geographic markets), and (ii) the entry of new startup competitors. Most of previous empirical research on entry behavior is based on data from the manufacturing industry. Dunne et al. (1988) use data from the U.S. census to examine patterns of entry, survival and exit of manufacturing firms in the U.S. from 1963 to 1982. They find that diversifying firms with new plants, compared to existing capacities, enter the market with the largest market shares, grow faster after entry and have the highest survival rate. Orr (1974b) compares the market entry between the banking and manufacturing industries and concludes that the birth of firms in the banking sector is probably determined by structural relations, as opposed to the manufacturing industry. Siegfried and Evans (1994) find that new business starters are correlated to the exit of firms which entered the market through diversification.

With regard to the determinants of market entry, the literature identifies two main incentives to enter, namely (i) expected profitability and/or (ii) market growth. Profit-maximizing firms will enter the market if the risk-adjusted anticipated revenues exceed the expected costs of entry and the expected operating costs after entry. These expectations are always influenced by present and past profits, and also depend on potential entrants in the market. In this line of research, many papers find a positive correlation between profitability and net entry (e.g. Hirschey 1981, Chappell et al. 1990 and Rosenbaum 1993). The second strand of literature focuses on market growth, where the potential entrant can expect a faster growth rate compared to existing firms. Empirical studies generally confirm a positive correlation between growth rates and the entry of new firms (see, for instance, Orr 1974a, Hirschey 1981, Chappell et al. 1990 and Rosenbaum 1993).

When investigating market entries of firms, we also have to account for exits in order to model total market turnover. Firms leave the market if consumers demand less of a good or service, or if they earn (too) low profits. The majority of the exit models estimate multiple linear regression models, and find three main incentives to leave the market, (i) low profits, (ii) market growth and (iii) displacement. Related empirical studies use price-cost margins as indicators for gross exits, e.g. Dunne/Roberts (1991) and Mayer/Chappell (1992). Moreover, a steady decrease of demand leads to an exit of firms, see for example Duetsch (1984), Dunne/Roberts (1991) and Mayer/Chappell (1992). Finally, incumbents may exit due to displacement by more efficient new entrants. Caves and Porter (1976) find a positive relation between entry and exit, which is also confirmed in numerous other studies (Dunne et al. 1988, Geroski 1991 or Sleuwaegen/Dehandschutter 1991).

The entry behavior in the health care sector differs from other industries due to several market imperfections, including (i) information asymmetries, (ii) quality rather than price competition, and (iii) specific regulations of market entry and exit. Bresnahan/Reiss (1988, 1990, 1991) derive a general entry condition depending on the market structure. The basic idea behind this approach is simple: Competition gets tougher with a growing number of firms (and a given population). With additional 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 requires data of the market structure and population as key variables for the model, no data on price-cost margins or prices are required (which are usually not available in the health care industry). Abraham et al. (2007) extend the Bresnahan-Reiss model and find that entry leads to a significant increase in competition in hospital markets, and thus, to a higher consumer welfare. Capps et al.

(2009), on the other hand, find that urban hospital dropouts reduce social welfare, but the cost savings for the patient exceed the reduction of his welfare. Schaumans and Verboven (2008) present an empirical entry model for pharmacies and physicians in Belgium, by both allowing for entry restrictions and strategic complements. They find that entry restrictions directly reduce the number of pharmacies by more than 50%, and also indirectly reduce the number of physicians by about 7% compared to a free entry situation. Furthermore, a removal of the entry restrictions, combined with a reduction in the regulated markups of pharmaceutical prices, would generate a large shift of rents to consumers, without reducing the availability of pharmacies.

Overall, empirical research on the entry/exit decision in the health care sector is quite scarce. In the following paper we analyze the entry and exit decisions of physicians working in the private outpatient sector of the Austrian health care system. The outpatient sector of the health care system in Austria is characterized by a strict separation of private and public physicians. Private physicians are free in their location decision while the market entry for public physicians is strongly regulated by public financing agencies. Furthermore, remuneration policies, benefit catalogs and insurance coverage vary widely between the private and the public sector. This split in physician labor supply makes it impossible to study the entry/exit question at an aggregated level without differentiating between private and public physicians. On the other hand, our focus on private physicians allows us to investigate the interaction between the entry/exit decisions of private physicians and existing capacities of public physicians. While an essential part of the literature in industrial organization focuses on profits and costs of firms, information of that kind is not available for private physicians in Austria. Thus, we apply a model where the entry/exit decision is related to the market shares of existing (public and private) capacities and the resulting competitive forces in the health care system. By using information from 2,379 local communities and 121 districts in Austria in the time period 2002 - 2008 we estimate a Poisson panel data model. We are particularly interested in the question how the given capacity of public physicians (GPs and specialists) and their private counterparts influence the entrance and exit of private physicians. Entry/exit is analyzed for GPs and specialists as a whole and for the most important groups of specialists.

Our paper enriches the previous knowledge on physician location decision in several directions. As already mentioned we adjust for differences in the regulatory framework of physician supply by focusing on private physicians, while previous studies mainly analyze physicians as one aggregate. This split allows us to stress the interaction of entry/exit between and within the private sector and existing public physician capacities. The findings from a health care system with a pronounced two-tier-structure adds insights to our knowledge of physician location from health care systems were physician service the private and the public sector simultaneously (e.g. in the US.). While the majority of the existing literature studies the determinants of physician density, we explicitly focus on the entry/exit decision. To our knowledge it is the first application of a Poisson panel data model - which is widely recognized in the IO literature - to explain firms' entry/exit behavior to the physicians market.

The structure of the paper is as follows. Section two gives a brief overview of the outpatient sector in Austria. Section three develops our empirical model, while section four presents empirical results and discusses them. Finally, section five draws selected conclusions.

2 Institutional Framework

In this section we present a brief overview of the institutional design of the outpatient health care sector in Austria as a necessary prerequisite for our empirical analysis.[1] We start with the demand side. The public health insurance system in Austria acts as the basic tier of health risk coverage in a two-tiered health care system. Membership in this system is obligatory both for wage earners in the public and private sector and self-employed persons (including farmers). Apart from that, individuals with family ties to obligatory insured and without coverage on their own get free health insurance coverage. Overall, the public health insurance covers roughly 98.5 per cent of the population, excluding mainly marginal groups from obligatory public health insurance. The public health insurance system is mainly financed by income based contributions and is structured on territorial and occupational principles. Thereby, roughly 80 percent of the Austrian population is covered

[1] For a more comprehensive description see Hofmarcher/Rack 2006.

by insurance institutions at the provincial level (the so called „Gebietskrankenkasse“)[2]. From the coverage and financing perspective, private health insurance and out-of-pocket payments constitute the second tier of the Austrian health care system. Roughly 35 percent of the Austrian population have signed contracts with private health insurance companies, which predominantly offer supplementary coverage in addition to the first tier services and/or widen the freedom of provider choice within the system.

Outpatient health care provision in Austria is mainly provided by self-employed public and private physicians predominantly working in individual single practices.[3] The certificate to practice as a physician enables the physician[4] either (i) to work in a public or private hospital (mainly on a salary basis), (ii) to offer medical services as a „private“ practicing physician in the outpatient sector of the health care system or (iii) to apply for a contract with the public health insurance system and work as a public physician. The provision of public outpatient health care services is based on a benefit-in-kind-scheme without substantial cost-sharing for physician services. The spatial distribution of public capacities is based on a location plan which is agreed between the public health insurance funds and the Physicians' Chambers of the provinces. This plan specifies the regional distribution of the physicians workforce based on the health need of relevant population characteristics.[5] Public physicians generate income from fee-for-service and lump-sum payments. Lump-sum payments can be claimed for initial contacts per quarter and for the provision of basic medical services. The share of lump-sum payments to total physician earnings varies widely over different fields of specialties. At an aggregate level, it amounts to about 68 percent for GPs and around 34 percent for specialists. The fee-for-service part of the remuneration includes earning caps implying decreasing marginal earnings. Public physicians are allowed to earn extra money by providing additional services beyond the

[2] The public health insurance system is the predominant financing institution of publicly organized outpatient care.

[3] In 2010 less than 2 percent of the physicians practices in Austria were organized as group practice.

[4] Other potential occupations are excluded here.

[5] The physician contracts are not limited in time and its assignment is based on criteria like waiting time, professional experience and educational criteria (additional educational efforts). The physician capacity plan should ensure a sufficient provision of medical services based on the existing state of the art. The individual physician contract is based on bilateral agreements (basic contracts) between the Main Association of Social Insurances on the federal level and the Chamber of Physicians and determines important dimensions of physician services, such as important features of the practice style (office hours, treatment guidelines, restrictions for additional occupations etc.) and the physicians' payment scheme.

contract.

Physicians working in the private part of the outpatient health care sector are free in their location decision. Service fees are agreed between the physician and the client, albeit there exists a recommendation for the physician pricing policy by the Chamber of Physicians on the provincial level. The treatment costs in the private sector are paid out of three sources: (i) out of the individual pocket, (ii) by private health insurance, and/or (iii) by public health insurance. Under certain restrictions, the public health insurance system reimburses a share of the private physician bill. Currently, roughly 50 percent of all self-employed physicians have signed a contract with the public health insurance system, approximately 50 percent of them are GPs. The share of private physicians grows sharply because of the increasing number of medical graduates and fixed capacities for public physicians.

For private physicians the location decision has important economic consequences as it is a specific investment. The motivations of locating as a private physician are quite diverse.[6] In general, we can identify at least three different types of firm profiles: (i) to act as a private physician as the main job, (ii) to combine the supply of outpatient private services with the (main) job as a physician in a private or public hospital[7], and (iii) to act as a private physician as a transitional career stage before starting the job as contracted physician. This transitional stage is counted as waiting time in the process of applying for the job as contracted physician and therefore improves the probability to get the job. Clearly, the significance of the variables influencing the entry/exit decision will depend on the firm profile. Unfortunately, we are not able to separate between the different firm profiles of private physicians in our empirical study. Thus, we offer a more general framework for exit and entry decisions.

[6]See Hofreiter (2005) for details.

[7]This combination can be chosen by the physician for several reasons, e.g. portfolio effects, supply of aftercare, enrichment of demand, etc.

3 Model and Data

The majority of previous research on physician location studies the determinants of physician density. In our study, on the contrary, we explicitly focus on entry and exit in the physician market. Earlier studies on entry/exit of firms has considered three different measures, namely (i) net entry/exit rates, which is the difference in the number of incumbent firms between time t and $t\text{-}1$, (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 will choose net entry/exit rates for several reasons. While gross entry rates neglect the displacement of existing firms/physicians (which is an important factor, because many practices are carried over to young physicians after retirement), net entry/exit rates make sense for the Austrian outpatient health care sector, as the single practice is the common form, and thus, (approximately) equal market shares for each practicing physician can be assumed. On the contrary, effective entry/exit 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 net entries and exits as our dependent variable.

To keep our empirical model as simple as possible, we have to make several assumptions about the market structure. First, we assume that there are homogeneous firms in the market, in our case physicians of the same specialty, delivering a homogeneous good (health care services). 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. Moreover, based on our homogeneous goods assumption, we also assume that each firm in the market faces costs of similar size. Accordingly, a firm only enters the market if the expected revenues exceed the expected costs, and thus, profits $\Pi_{i,t} \geq 0$. As profits and costs are not observable, we assume an identical and independent distribution of profits and costs in the market. Hence, we are able to relate the unobservable profits and costs to the market shares, physician densities, in the market i in any time period t. Thus, if we assume that the density of physicians is below the equilibrium in a market, demand for physician services will exceed supply, and every physician will earn positive profits $\Pi_{i,t} \geq 0$. If this assumption holds, additional physicians will enter the market until supply equals demand of health care services. On the contrary, if there is an excess supply of physicians in a market, physicians will leave the market due to a loss of $\Pi_{i,t} < 0$. Based on these assumptions the entry equation is given by

$$Entry(PP_{i,t}) = a_0 + a_1 PGP_{i,t-1} + a_2 PS_{i,t-1} + a_3 CGP_{i,t} + a_4 CS_{i,t} \quad (1)$$

where $Entry(PP_{i,t})$ denotes the net entrants of various private physicians in market i at time t. We study the entry of private GPs and specialists as a whole as well as important groups of private specialists 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 entry probability into a market can increase or decrease with the density of private general practitioners ($PGP_{i,t-1}$), the density of private specialists ($PS_{i,t-1}$), the density of contracted general practitioners ($CGP_{i,t}$) and the density of contracted specialists ($CS_{i,t}$). Private physician densities are lagged in our model, as we would otherwise face an endogeneity problem (simultaneous decision due to the unregulated location decision). Furthermore, the lagged density of the same specialty takes into account the displacement effect. Moreover, we expect that the private physician supply does not influence public supply. This assumption is supported by the fact that the private physician capacity does not influence the location plans for public physicians.

Taking into account the institutional design of the outpatient sector in Austria (see section 2) we are able to derive hypotheses on the relationships presented in equation (1). In line with our model we expect a negative relationship between the entry of private physicians of any given type/specialty and the already existing private capacity of the same type. We assume that private physicians visits lead to extra costs for the patient which have to be compared with the extra benefits (e.g. shorter travel and waiting times, better quality, enlargement of market choices). This backs our hypothesis of a negative relationship between the entry of defined private physicians and the existing public capacity of the same type. In both cases we expect a dominance of the competition effect, meaning that physicians of the same type are assumed to be substitutes. Taking into account the financing rules, we expect that the degree of substitutability is higher within the private sector.

The remaining relationships of equation (1) are somehow ambiguous, because the competition (substitution) and complementary effect might cancel out each other, leading to unclear net effects. Contracted physicians are generally the first contact for a patient in the health care system (Hofmacher/Rack 2006, p. 119), although the Austrian system is not a typical gate-keeping system. In general, within an accounting period (quarter of a year), patients are only allowed to contact one contracted general practitioner and one contracted specialist (per specialty). Alternatively, people can choose a private (non-contracted) physician. To some extent, contracted general practitioners have a gatekeeper function, as they are able to control patient flows by referrals, although referrals are not necessary in most of the cases[8]. Thus, although compulsory referrals only play a minor role, referrals still are important to understand the competitive situation in the health care market. Due to the strong lump-sum elements and decreasing fee-for-service elements per patient in the payment scheme of public physicians, they may behave as number maximizers (in terms of the number of patients treated) in order to maximize their own payoffs. Thus, we expect a positive effect of contracted general practitioners' density on the entry decision of specialists, as they can be seen as complements. On the contrary, the role of private general practitioners is less clear, as the effects are ambiguous (Schaumans 2008, p. 3): On the one hand, (private) general practitioners benefit from the presence of a specialist as they are able to refer when it would otherwise require a lot of effort to treat the patient („referral/cooperation effect“). On the other hand, general practitioners and specialists partly deliver similar services and are, therefore, competing for patients („competition effect“). Baumgardner (1988) provides empirical evidence regarding the degree of

[8]This is the case when several specialists are consulted in one accounting period or when hospital stays and/or treatment in hospital outpatient departments is required, see Hofmarcher/Rack (2006) for details. However, for some contracted physicians a referral by a general practitioner is a prerequisite, e.g. for radiologists, computer tomographies or magnetic resonance.

labor division among physicians across geographically local markets on an aggregate level (county basis) and on an individual level. Specialization on the aggregate level is correlated with local demand shifters for medical services, in our case incumbent physicians. Moreover, public GPs might be substitutes rather than complements to private specialists, as they might act as profit maximizers and prefer longer treatment processes instead of referring to a private specialist. This effect could be driven by the institutional design of the Austrian system, where general practitioners are able to make a referral to a specialist when necessary. However, as the probability of getting a referral by a contracted general practitioner is quite low for a private specialist, we expect a negative correlation between existing contracted capacities and the entry of private physicians. On the contrary, certain cooperation effects in terms of mutual referrals etc. between private GPs and private specialists could lead to a positive effect of the density of private GPs on the entrance of private specialists and a negative effect on the exit decision.

Similarly to equation (1), the exit equation includes the same explanatory variables already mentioned above. As the exit decision should be based on the same determinants, we basically expect the opposite sign for our independent variables.

$$Exit(PP_{i,t}) = a_0 + a_1 PGP_{i,t-1} + a_2 PS_{i,t-1} + a_3 CGP_{i,t} + a_4 CS_{i,t} \quad (2)$$

Since the focus of this paper is on the effect of existing capacities and competitive forces on the entry and exit decision of private practicing physicians, we choose a simple entry/exit model to explain the entry/exit behavior in our data set. As we deal with count data, namely the number of physicians per community, standard OLS regression methods are not appropriate for several reasons.[9] Due to the discrete and non-negative properties of our explanatory variable, entries and exits, we apply a Poisson regression model to our data set (see, for instance, Cameron and Trivedi (2005) for further details). 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/regions in our estimations. While this estimator reduces the threat of an omitted variable bias, we

[9] 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).

are not able to estimate the influence of variables with little within variation, such as the population, income or the educational level. As our panel data set includes only seven years, it seems reasonable that such variables do not vary considerably over this short time period.

To estimate our entry and exit equations, we have to define relevant geographic levels mirroring local markets for physicians. Physicians in the Austrian health care system are not allowed to advertise their services, so the patient's choice is driven by local information. Moreover, empirical evidence from surveys shows that patients do not visit a physician outside their hometown. Schaumans (2008) finds that 85% of the patients travel less then five kilometers for a physician visit in Belgium. Moreover, 94% are used to a fixed physician, who is located close to the patient location. Thus, the relevant market for our analysis is the community level, while we use the county level for robustness purposes.

Entry and exit data of physicians and their specialty are self-generated from various sources[10]. Our data cover the time period 2002 to 2008 and include 2,379 communities and 121 districts (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, respectively. To compute the density of physicians, we used population data from the Austrian population census 2001. Due to the lagged explanatory variables, we lose one year of observations (2002) both at the community and district level. In 2002, we observe 16,711 physicians in the Austrian outpatient market, while most of them (10,918) had a contract with at least one of the social health insurers, whereas the remaining part belongs 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 12% from 2002 to 2008. Accordingly, the number of contracted physicians is quite stable over the time period, whereas the number of private practicing physicians grows considerably (about 42%) in the observed period.

By using 2002 with 5,793 private practicing physicians as our base year, we computed

[10] Göschl CD MED (2002-2008).

Table 1: Physicians in Austria 2002-08

	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Total	16,711	17,215	17,475	18,134	18,369	18,475	18,593
Exits Physicians	433	301	466	680	691	731	-
Cumul. Exits Physicians	433	734	1,200	1,880	2,571	3,302	3,302
Entry Physicians	-	937	561	1,125	915	797	849
Cumul. Entry Physicians	-	937	1,498	2,623	3,538	4,335	5,184
Physician Growth (in%)	-	3.02	1.51	3.77	1.30	0.58	0.64

Table 2: Private Physicians 2002-08

	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Total	5,793	6,344	6,590	7,265	7,550	7,664	7,782
Entries Private Physicians	-	803	496	987	790	550	674
Change Public to Private Physician	-	40	23	74	55	124	57
Cumul. Entries Private Physicians	-	803	1,299	2,286	3,076	3,626	4,300
Exits Private Physicians	223	163	223	407	317	442	-
Change Private to Public Physician	-	69	110	163	153	243	171
Cumul. Exits Private Physicians	223	386	609	1,016	1,333	1,775	1,775
Private Physician Growth (in%)	-	9.51	3.88	10.24	3.92	1.51	1.54

entries, exits and the changes in the contract status (from private to public physicians) for the following years until 2008. *Table 2* shows the turnover margin for private physicians in Austria with a steady increase in the absolute number of private physicians. Within private specialists, the main specialties are internists (18.0%), followed by surgeons (17.3%), neurologists/psychiatrists (11.1%) and gynecologists (10.5%).

4 Empirical Results

First of all, we present estimations for the net entry and exit of private general practitioners (GPs) and private specialists (PS) depending on the prevailing competition within a certain region (physician densities). For robustness purposes we estimated our equation explained above both at the community and the district level. In a further step, we split up the groups of PS by specialty. More precisely, we discuss regressions regarding the largest four groups of PS, namely internists, surgeons, gynecologists and neurologists.

Empirical results for market entry and exit of private specialists (PS) and general practitioners (GPs) are reported in *Table 3*. As expected, an entry of a PS is more likely if the density of both private and public specialists is low in a region. Similarly, market exit becomes more likely the higher the density of specialists in a community or county, respectively. Thus, a low density of specialists seems to indicate the possibility for earning profits, which makes an entry more likely.

The effect of general practitioners is less clear a priori from a theoretical perspective (see Schaumans 2008, p. 3). Interestingly, we find a negative effect of existing capacities in public GPs on the market entry of private specialists and, as expected, a reversed effect for market exit. On the contrary, private GPs seem to play a different role, as their density is positively related to the market entry of PS (and negatively connected to market exits of PS). Thus, we conclude that the magnitude of both effects clearly depend on the institutional conditions, as public and private GPs seem to have a reversed influence on the market entry of PS. While the negative effect of public GPs is likely due to the practice that public GPs tend to refer to public specialists rather than to private ones (and less likely due to a substitutive effect between public GPs and PS), the positive effect of private GPs is most likely due to the existence of cooperation networks within the second (private) tier of the Austrian health care system. In a nutshell, the results are highly robust at the district level, albeit some coefficients are less significant.

The second part of *Table 3* (columns 5 to 8) shows the empirical results for market entry/exit for private GPs. Most results derived above are confirmed for private GPs. As expected, the density of private GPs negatively influences the market entry of new private GPs. The positive effect of private specialists (both at the community and district level) on market entry rates once again confirm the network/cooperation effect among private physicians. Somehow surprisingly, the density of contracted specialists does not appear significant in these models, most likely due to two main reasons, namely that (i) the effects between different specialties might cancel out each other, and (ii) because of the low within-variation in public physician densities in our sample, as the capacity plan of the social health insurance fund does hardly change over time.

Table 3: Estimation for Private Specialists and Private GPs

Dependent Variable	**PS Entry**	**PS Exit**	**PS Entry**	**PS Exit**	**PGP Entry**	**PGP Exit**	**PGP Entry**	**PGP Exit**
Regional Level	**Community**	**Community**	**County**	**County**	**Community**	**Community**	**County**	**County**
PS Density$_{t-1}$	-0.853***	5.704***	-3.275***	12.714***	0.273***	0.729***	1.127***	0.186
	(0.033)	(0.132)	(0.224)	(1.030)	(0.076)	(0.146)	(0.409)	(0.606)
PGP Density$_{t-1}$	0.544***	-1.168***	2.301***	-2.199	-2.652***	10.299***	-9.805***	29.579***
	(0.079)	(0.185)	(0.389)	(1.479)	(0.136)	(0.402)	(0.931)	(2.347)
CS Density$_t$	-0.735***	1.800***	-2.097***	6.455***	-0.269	-0.856*	-1.003	1.288
	(0.116)	(0.198)	(0.760)	(1.290)	(0.226)	(0.466)	(1.110)	(2.155)
CGP Density$_t$	-2.255***	2.345***	-1.769	0.531	-2.584***	4.594***	-5.583***	5.478
	(0.227)	(0.534)	(1.441)	(3.955)	(0.272)	(0.850)	(2.034)	(3.966)
N	3228	1386	720	546	3432	1296	720	624
Log likelihood	-8034.633	-4122.506	-1130.462	-390.4111	-3849.258	-1920.224	-793.1736	-313.1966

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

Variables: PS ... Private specialists, CGP ... Contracted general practitioners, PGP ... Private general practitioners, CS ... Contracted specialists.

Table 4: Estimation for Private Specialists Entry

Dependent Variable	PIN Entry	PIN Entry	PCHIRU Entry	PCHIRU Entry	PGYN Entry	PGYN Entry	PNEURO Entry	PNEURO Entry
Regional Level	**Community**	**County**	**Community**	**County**	**Community**	**County**	**Community**	**County**
POWN Density$_{t-1}$	-4.668***	-12.726***	-3.261***	-9.716***	-7.277***	-17.218***	-6.490***	-18.967***
	(0.289)	(1.567)	(0.297)	(1.558)	(0.621)	(2.670)	(0.536)	(3.034)
PGP Density$_{t-1}$	1.927***	3.329***	1.542***	4.107***	-0.316	0.627	0.489**	1.511
	(0.226)	(1.101)	(0.251)	(1.113)	(0.302)	(1.144)	(0.235)	(1.069)
COWN Density$_t$	-3.224***	-10.183***	-2.718***	-1.159	-8.662***	-20.039***	-0.857	-6.016
	(0.870)	(3.905)	(0.743)	(3.919)	(1.952)	(6.877)	(1.122)	(7.987)
CGP Density$_t$	1.092*	-1.470	-0.528	-3.683	-3.682***	-0.671	-2.648***	-1.220
	(0.613)	(2.960)	(0.547)	(2.647)	(1.022)	(3.653)	(0.987)	(3.813)
N	1386	636	1254	612	1026	582	732	492
Log likelihood	-1890.348	-444.1703	-1848.266	-449.4413	-1112.481	-346.9935	-1292.25	-275.3765

*, **, ***denote 10%, 5% and 1% significance levels.
Variables: CGP ... Contracted general practitioners, PGP ... Private general practitioners, COWN ... Contracted specialists of the same specialty, PSUR ... Private Surgeons, PNEURO ... Private Neurologists, PGYN ... Private Gynecologists, PIN ... Private Internists.

Table 5: Estimation for Private Specialists Exit

Dependent Variable	PIN Exit	PIN Exit	PCHIRU Exit	PCHIRU Exit	PGYN Exit	PGYN Exit	PNEURO Exit	PNEURO Exit
Regional Level	**Community**	**County**	**Community**	**County**	**Community**	**County**	**Community**	**County**
POWN Density$_{t-1}$	21.228***	31.422***	14.157***	24.264***	19.352***	56.235***	14.633***	22.505***
	(1.069)	(4.178)	(0.860)	(3.503)	(1.712)	(9.889)	(1.207)	(4.260)
PGP Density$_{t-1}$	-0.554*	-0.643	0.421	1.968	0.119	0.806	-0.034	-1.113
	(0.332)	(1.354)	(0.505)	(1.830)	(0.838)	(3.087)	(0.389)	(1.567)
COWN Density$_t$	3.088*	-1.588	13.866***	0.209	7.504*	-2.988	-1.340	4.662
	(1.621)	(5.100)	(1.697)	(4.950)	(3.905)	(7.520)	(2.404)	(5.093)
CGP Density$_t$	5.370***	7.128	2.600*	5.942	-5.108*	15.295	3.585**	-1.973
	(1.518)	(6.070)	(1.339)	(9.240)	(2.662)	(13.603)	(1.528)	(8.193)
N	546	480	480	468	312	354	306	390
Log likelihood	-971.2281	-197.4255	-1098.809	-205.7376	-444.3943	-125.081	-866.1336	-175.0199

*, **, ***denote 10%, 5% and 1% significance levels.
Variables: CGP ... Contracted general practitioners, PGP ... Private general practitioners, COWN ... Contracted specialists of the same specialty, PSUR ... Private Surgeons, PNEURO ... Private Neurologists, PGYN ... Private Gynecologists, PIN ... Private Internists.

In general, the estimations of market exits confirm our results, as an oversupply of both private and public GPs lead to a higher probability of market exits. Somehow surprisingly, we find a positive impact of private specialists and a weakly negative impact of contracted specialists on the market exit of private GPs. At first sight, this could be interpreted as evidence against possible network or cooperation effects explained above. However, the competitive effect of specialists (both private and public) on private GPs critically depend on the specialty of the specialist within the relevant community. Thus, the effect of the density of specialists on market entries and exits of private GPs must be taken with care, as it depends on the specialty. We will shed some light on these ambiguous relationships between the overall density of private and contracted specialists to private GPs by splitting up different specialties in our following regressions.

In order to investigate certain specialty-specific effects, we estimated equations (1) and (2) for internal specialists, surgeons, neurologists and gynecologists in *Table 4*. As the results strongly resemble 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 (due to a higher number of communities with no entries/exits of a specific specialty), the results appear less significant. In particular, the coefficients for public physicians (both specialists and GPs) are hardly significant due to the low within-variation in these variables. Essentially, we find two interesting differences to the results of *Table 3*, namely that (i) the cooperation/network effect between private GPs and specialists does not appear to be present in the case of gynecologists, and that (ii) private internists seem to have a complementary relationship not only to private GPs (as expected), but also to public GPs. Thus, we conclude that referrals to private internists from public GPs might be more common than to other private specialists. Once again, we have to take the results for public physicians with caution, as the within-variation in the sample is quite low. Most of the results at the community level also hold true for the district level, albeit with a lower significance, probably due to higher heterogeneity among districts.

Table 5 represents the estimation results of market exits by specialty. The results basically validate our findings from *Table 3*, confirming the strong competition effect of private specialists to both private and public specialists of the same specialty. While the network/cooperation effect appears less obvious in these estimations (only being significant for the exit of internists), the positive influence of contracted GPs is basically confirmed, albeit with one exception: In the case of private gynecologists, a higher density of public GPs leads to a lower probability of market exit. One possible explanation for this effect might be that a gynecologist can expect referrals from public GPs in the case of rural areas, where the transportation costs to the closest public gynecologist would be too high. However, most conclusions are confirmed for both the community and the district level.

For robustness purposes, we also ran the above estimations with time fixed effects by including time dummies in our panel model. Although the magnitude of some coefficients changed slightly, the results and conclusions from our estimations are unaffected in this specification. Moreover, we also tried to include spatial effects, where we weighted the independent variable of communities/districts in the neighborhood by means of a distance matrix. Once again, the lion's share of the results was unaffected from this change in the specification.

5 Conclusion

In this paper we tried to shed some light on entry and exit 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 applied a simple entry/exit model at two different levels of aggregation (communities and districts). More precisely, our model considers both the population (potential demand) and the number of physicians in both the private and public sector (competitors) as important factors for the location decision. By applying a Poisson panel data model with community/district fixed effects, we find a significantly negative effect of existing capacities as measured by both private and public physician density of the same specialty on the entry of new private physicians. Thus, we conclude that physicians anticipate their future earnings in a market by taking into account the expected demand for their services. On the contrary, we find a significantly positive effect of private GPs on the entry of private specialists. Interestingly, this cooperation/network effect also works in the other causal direction, as a higher density of private specialists increase the probability of the market entry of private GPs. Based on the results of previous literature, we thus conclude that private physicians establish networks to cooperate in terms of mutual referrals etc. Our estimations for market exits basically confirm the results mentioned above, as higher competitive forces positively influence the market exit of private physicians. While our analysis adds to the literature on physician location decisions in terms of investigating the physicians' market entry and exit at two levels of aggregation, it also follows a new approach by applying a Poisson model to this specific research question. However, further research seems necessary to investigate the interdependencies of different specialties in the outpatient health care market.

6 References

Abraham, J.M., Gaynor, M. and Vogt, W.B., 2007, Entry and Competition in Local Hospital Markets, *The Journal of Industrial Economics*, 55, 265-288.

Baumgardner, J. R., 1988, Physicians' Services and the Division of Labor across Local Markets, *Journal of Political Economy*, 96, 5, 948-982.

Bresnahan, T.F. and Reiss, P.C., 1988, Do Entry Conditions Vary Across Markets?, *Brookings Papers on Economic Activity*, 99, 977-1009.

Bresnahan, T.F. and Reiss, P.C., 1990, Entry in Monopoly Markets, *Review of Economic Studies*, 57, 531-53.

Bresnahan, T.F. and Reiss, P.C., 1991, Entry and Competition in Concentrated Markets, *Journal of Political Economy*, 3, 833-882.

Cameron, A.C. and Trivedi, P.K., 2005, Microeconometrics - Methods and Applications, *Cambridge University Press.*

Chappell, W.F., Kimenyi, M.S. and Mayer, W.J., 1990, A Poisson Probability Model of Entry and Market Structure with an Application to U.S.Industries during 1972-77, *Southern Economic Journal*, 56, 918-927.

Capps, C., Dranove, D. and Lindrooth, R.C., 2009, Hospital Closure and Economic Efficiency, *Journal of Health Economics*, 29, 87-109.

Caves, R.E. and Porter, M.E., 1976, Barriers to Exit, in P. David Qualls and Robert Mason, eds, *Essays on Industrial Organizations in Honor of Joe S. Bain*, Cambridge, MA: Ballinger, 36-69.

Duetsch, L., 1984, Entry and the Extent of Multiplant Operations, *The Journal of Industrial Economics*, 32, 477-488.

Dunne, T., Roberts, M. and Samuelson, L., 1988, Patterns of Firm Entry and Exit in U.S.Manufacturing Industries, *Journal of Law and Economics*, 32, 233-271.

Dunne, T. and Roberts, M., 1991, Variation in Producer Turnover Across U.S.Manufacturing Industries,in P.A. Geroski and J. Schwalbach, eds, *Entry and Market Contestability*, Oxford: Basil Blackwell, 187-203.

Geroski, P.K., 1991, Market Dynamics and Entry, Oxford: Basil Blackwell.

Göschl CD-MED, 2002-2008, Handbuch für die Sanitätsberufe Österreichs, Wien: *Verlag Dieter Göschl*.

Hirschey, M., 1981, The Effect of Advertising on Industrial Mobility, *The Journal of Business*, 54, 329-339.

Hofmarcher, M.M. and Rack, H.M., 2006, Austria Health System Review, in: Riesberg, A. (ed.): *Health Systems in Transition*, Vol. 8, No. 3, 2006.

Hofreiter, A., 2005, Ökonomische Analyse des Wahlarztsystems in Österreich, *Thesis*, Innsbruck.

Mayer, W.J. and Chappell, W.F., 1992, Determinants of Entry and Exit: An Application of the Compounded Bivariate Poisson Distribution to U.S.Industries 1972-77, *Southern Economic Journal*, 58, 770-778.

Orr, D., 1974a, The Determinants of Entry: A Study of the Canadian Manufacturing Industries, *The Review of Economics and Statistics*, 56, 58-65.

Orr, D., 1974b, The Economic Determinants of Entry into Canadian Banking: 1963-7, *The Canadian Journal of Economics*, 7, 82-99.

Rosenbaum, D., 1993, Profit, Entry and Changes in Concentration, *International Journal of Industrial Organization*, 11, 185-203.

Schaumans, C. and Verboven, F., 2008, Entry and Regulation: Evidence from Health Care Professions, *RAND Journal of Economics*, 39, 949-972.

Siegfried, J.J. and Evans, L.B., 1994, Empirical Studies on Entry and Exit: A Survey of the Evidence, *Review of Industrial Organizations*, 11, 167-178.

Sleuwaegen, L. and Dehandschutter, W., 1991, Entry and exit in Belgian Manufacturing, in P.A. Geroski and J. Schwalbach, eds, *Entry and Market Contestability*, Oxford: Basil Blackwell, 111-142.