Physician Density in a Two-Tiered Health Care System

Martin Gächter

University of Innsbruck
Department of Economics & Statistics

iHEA 8th World Congress Pre-Symposium
The Private Sector in Health

Toronto, 9th July 2011

Introduction & Motivation

- Analysis of regional disparities in physician density
- Location decision of physicians in two-tiered HCSs
  - → Austrian Health Care System
  - → Distinction between contracted and private physicians
  - → Focus on second (private) tier of the HCS
- Competition between different types of physicians
  - → General practitioners (GPs) vs. specialists (SPs)
  - → Contracted vs. private
  - → Referral vs. competition effect
  - → Theoretically ambiguous

Previous research: Two strands of literature

1. **Focus on individual location decision**
   - 'Prior-contact theory' (Earickson 1970, Kaplan/Leinhard 1973)
   - Individual characteristics of physicians (Leonardson et al. 1985, Lin et al. 1997)
   - Industrial organization / market entry and exit (Bresnahan/Reiss 1988, 1990, 1991, Schaumans/Verboven 2008, Capps et al. 2009)

Previous research (ctd.)

2. Spatial distribution of physician densities

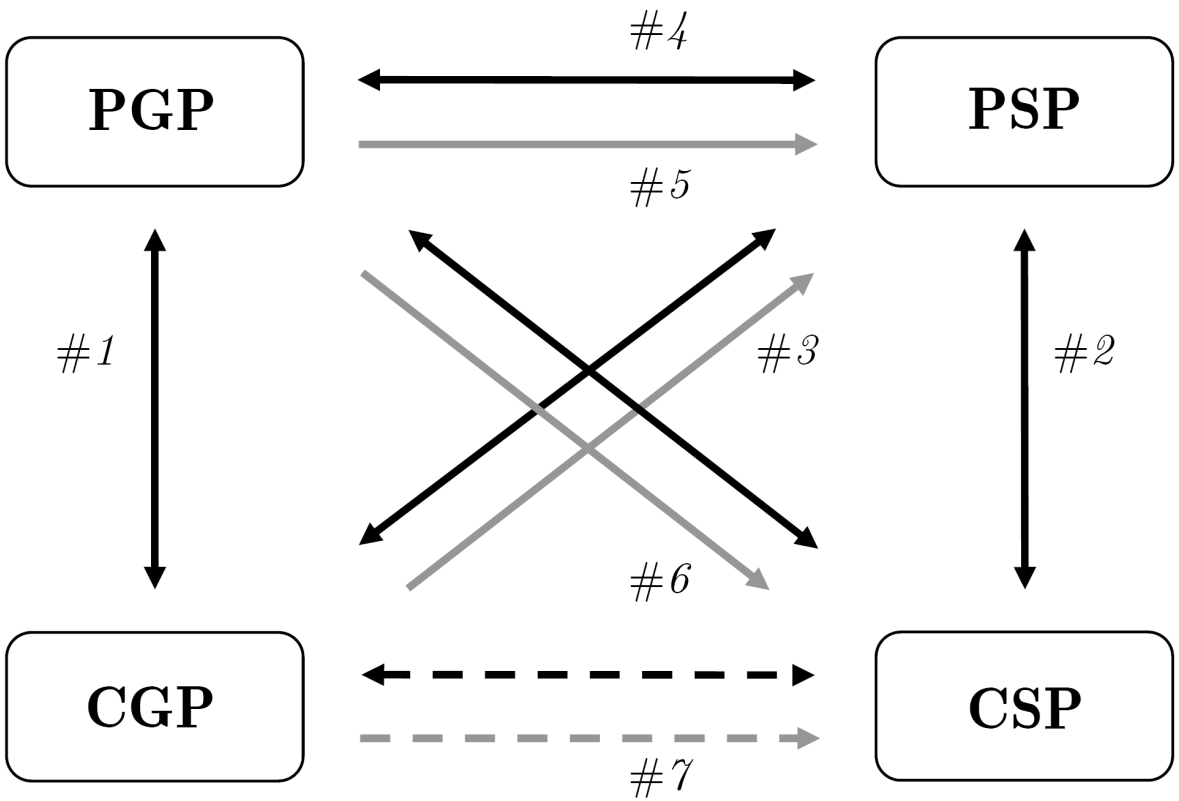
- Densities reflect entry decisions, but also migration and exits
- Disparities are explained by demand- and supply-driven factors, i.e. demographic, geographic, socioeconomic and institutional variables
- Noether 1986, Nocera/Wanzenried 2002, Jiang/Begun 2002

→ No specific focus on differences between private and public sector (institutional framework etc.)

Institutional Essentials of the Austrian HCS

- First tier of the outpatient health care system
  - → Obligatory location plan for public physicians based on agreements between SHI and the Chamber of Physicians
  - → Payment for public health physicians based on fee-for-service system with strong lump-sum elements
  - → Benefit-in-kind scheme without substantial cost-sharing for publicly insured
- Second tier of the outpatient health care system
  - → Free location decisions for private physicians
  - → Different economic roles of private practice
  - → Payment based on a fee-for-service system
  - → Publicly insured are free to visit private physicians with substantial cost-sharing

Hypotheses



Hypotheses (ctd.)

- **H1** - The density of PGPs (PSPs) should be negatively related to the density of CGPs (CSPs).
  - → Substitutive relationship between public and private
- **H2** - The density of PSPs should be negatively associated with the density of CGPs.
  - → PSPs and CGPs partly provide the same services (substitutes)
  - → Referrals from the public to the private sector are uncommon
- **H3** - The density of PSPs should be positively related to the density of PGPs and vice versa
  - → PSPs benefit due to referrals from PGPs
  - → PGPs benefit from cooperation with PSPs if treatments are time consuming

Data

- Outpatient Health Care Sector in Austria
- Level of aggregation: 121 political districts
- Years 2002 - 2008
- Sample includes 14,569 physicians (private and public) on average

Data (ctd.)

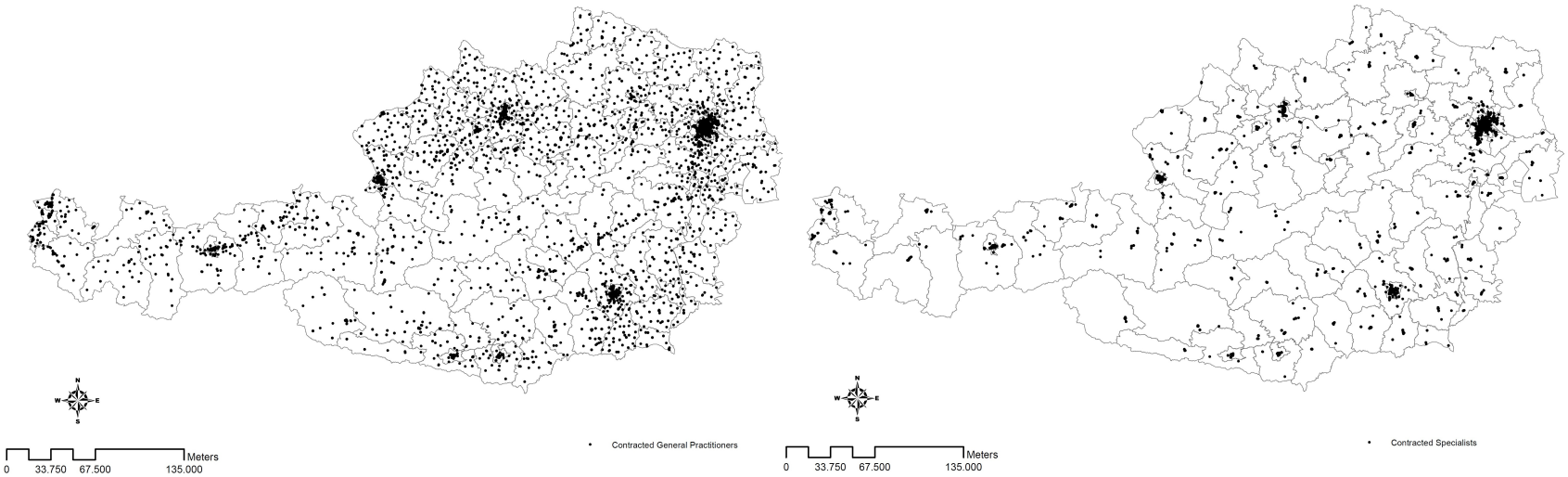


Figure: Distribution of CGPs (left) and CSs (right)

Data (ctd.)

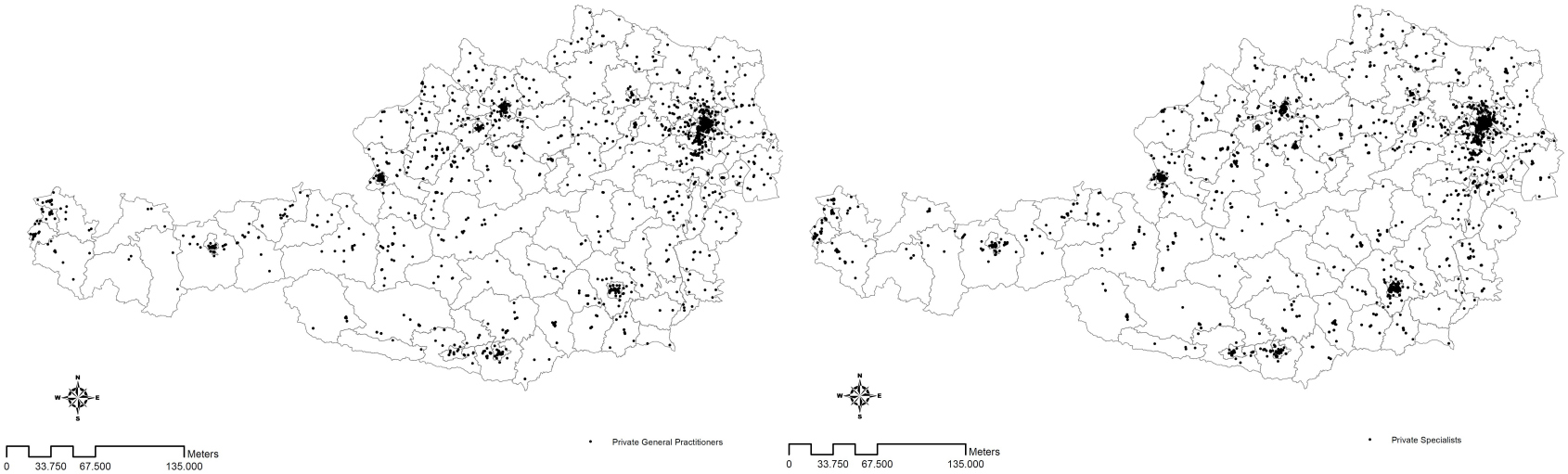


Figure: Distribution of PGPs (left) and PSs (right)

Empirical Specification

- **Hausman & Taylor (1981) Estimator**
- Dependent variable: Density of private physicians in county i and time t

$$PSP_{it}^{*} = \alpha_1 PGP_{it}^{*} + \alpha_2 CSP_{it}^{*} + \alpha_3 CGP_{it}^{*} + \mathbf{X}_i^{*}\boldsymbol{\delta} + \lambda_i^{*} + \nu_{it}^{*} \quad (1)$$

$$PGP_{it}^{*} = \beta_1 PSP_{it}^{*} + \beta_2 CSP_{it}^{*} + \beta_3 CGP_{it}^{*} + \mathbf{X}_i^{*}\boldsymbol{\gamma} + \mu_i^{*} + \varepsilon_{it}^{*} \quad (2)$$

- Vector $\mathbf{X}_i^{*}$ contains
  - district's availability of hospital beds (public and private)
  - average income
  - average educational level
  - living area

Empirical Results

	PSP	*PGP*
Density of *PSP*	–	0.371^{***}
		(0.038)
Density of *PGP*	0.679^{***}	–
	(0.118)	
Density of *CSP*	−0.036	−0.060
	(0.167)	(0.091)
Density of *CGP*	$-0.376^{\#}$	-0.396^{***}
	(0.254)	(0.127)
Density of private hospital beds	−0.017	0.003
	(0.077)	(0.025)
Density of public hospital beds	0.070^{***}	-0.022^{**}
	(0.026)	(0.010)
Average income	0.340	−0.181
	(0.327)	(0.191)
Education	1.656^{**}	0.342
	(0.591)	(0.255)
Living area	0.010	−0.011
	(0.028)	(0.012)
Observations	847	847
Overidentification: $\chi^2(13)$	13.953	10.727

Notes: *PSP* ... private specialist, *PGP* ... private general practitioner, *CSP* ... public specialist, *CGP* ... public general practitioner. Bootstrapped standard errors in parentheses (50 replications). ***, **, * and $^{\#}$ denote significance at 1, 5, and 10 and 15 percent levels.

Empirical Results (ctd.)

	Physician density			
Variable	PSP^S	PSP^N	PSP^G	PSP^I
Density of PGP	0.164^{***}	0.150^{***}	0.134^{***}	0.164^{***}
	(0.050)	(0.056)	(0.044)	(0.039)
Density of $CSP^{a)}$	-0.473	-0.300^{*}	-0.555^{**}	-0.469^{**}
	(0.468)	(0.183)	(0.199)	(0.166)
Density of CGP	-0.322^{*}	0.054	-0.056	-0.200^{**}
	(0.168)	(0.085)	(0.137)	(0.092)
Density of private hospital beds	0.010	0.096^{*}	0.067^{*}	-0.020
	(0.043)	(0.050)	(0.038)	(0.050)
Density of public hospital beds	0.021^{*}	-0.003	0.014	0.015
	(0.012)	(0.014)	(0.014)	(0.016)
Average income	0.132	$0.354^{\#}$	$0.314^{\#}$	-0.143
	(0.198)	(0.244)	(0.202)	(0.265)
Education	0.671^{*}	0.280	0.104	1.290^{***}
	(0.362)	(0.302)	(0.286)	(0.290)
Living area	-0.002	-0.030^{**}	$-0.017^{\#}$	0.002
	(0.007)	(0.013)	(0.012)	(0.009)
Observations	847	847	847	847
Overidentification: $\chi^2(13)$	14.556	9.465	9.597	17.500

Notes: $^{a)}$ Public physician with identical specialty as the corresponding dependent variable. PSP^S ... private surgeons, PSP^N ... private neurologist, PSP^G ... private gynecologists, PSP^I ... private internists. Intercept not reported. Bootstrapped standard errors in parentheses (50 replications). ***, **, * and $^{\#}$ denote significance at 1, 5, and 10 and 15 percent levels.

Conclusions

Major findings

- Positive association between densities of PGPs and PSPs
  - → strong referral effect
- Negative impact of CSPs on PSPs
  - → competition forces between private and public sector
- Negative impact of CGPs on PGPs and PSPs
  - → Referral behavior of CGPs

Policy implications & future outlook

- Services of private physicians should be considered in the capacity plans of the PHI, as relevance of private sector increases
- Considering private resources might contribute substantially to improve efficiency
- *Extension:* Spatial model

Thank you!

Data (ctd.)

	Number of physicians				
Year	PSP	PGP	CSP	CGP	*Sum*
2002	3,675	1,560	3,940	4,289	*13,464*
2003	4,013	1,730	3,924	4,258	*13,925*
2004	4,200	1,792	3,925	4,261	*14,178*
2005	4,612	2,015	3,932	4,246	*14,805*
2006	4,875	2,046	3,925	4,217	*15,063*
2007	5,025	2,088	3,918	4,194	*15,225*
2008	5,139	2,115	3,896	4,165	*15,315*
Average	*4,506*	*1,907*	*3,923*	*4,233*	*14,569*
Change 2002-08 (in %)	*28.49*	*26.24*	*-1.12*	*-2.98*	*12.09*
Average annual change (in %)	*5.79*	*5.30*	*-0.19*	*-0.49*	*2.18*