

*Effects of Ownership on Hospital Efficiency in
Germany – a Tobit Panel Data Approach Based on
DEA Efficiency Scores*

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Theoretical Background

- **According to the social view**
 - > Public firms are capable of curing market failures
 - > Public firms are expected to maximize social welfare whereas private firms are expected to maximize profits
 - **Strong critique of this theory by Agency-, Property Rights-, Public Choice- and Organization Theories due to**
 - > Large differences in objectives, incentives and control mechanism
 - > Political interference that result in over employment, etc.
 - > Differences in organizational characteristics (culture, organization structure, etc.)
- > From a theoretical point of view private ownership is superior due to a higher performance**

Characteristics of the German hospital sector

- **Hospital costs are the largest proportion of health expenditures in Germany**
 - > hospital sector was subject of a number of health care reforms; introduction of DRGs in 2002
 - **Substantial changes in terms of service provision and market structure**
 - > Sectoral borders decline, average length of stay ↓ and number of cases ↑ , increasing importance of quality insurance
 - > Number of beds were reduced due to overcapacities, formation of cooperation's and networks, ongoing privatization
- > The hospital environment is characterized by a consolidation and reorganisation process**
- > Hospitals enforce their efforts to cope with new competitive challenges by improving the efficiency of their operations**

Empirical Background

- **Latest literature reviews; Shen et al. 2005, Hollingsworth 2003 and Sloan 2000**
 - > Most of the studies show no significant differences between private-for-profit and non-for-profit hospitals
 - > In contrast to assumed behaviour in the economic theory, public hospitals are more efficient
 - > Private for-profit hospitals generate higher profits; this might be due to lower costs and especially due to higher prices and higher revenues per case
- **Only a few studies examine the efficiency of the German hospital sector; studies have major drawbacks**
 - > High level of aggregation (precludes adequate control of case-mix)
 - > Quality of efficiency parameters (detailed data rarely available)
 - > No accounting for the environmental and organizational characteristics (one-stage analysis)
 - > No indicators for quality of care included

Objectives

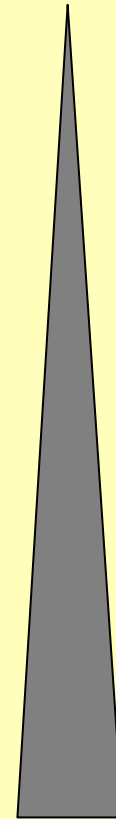
- To determine the relative efficiency of public, private-for-profit and non-for-profit hospitals in Germany
 - To explain variation in technical efficiency of hospitals according to ownership status and other explanatory factors (organizational and environmental characteristics)
 - To determine the changes in productivity over time
- > Based on previous studies our hypothesis is:
Public hospitals are more efficient

Data sample

- Data were obtained for the years 2002-2005 from annual hospital reports which are administered by the Federal Statistical Office of Germany
 - Due to data security issues we got randomly selected data for two third of the German acute care hospitals (n=1423)
 - Exclusion criteria: hospitals providing only psychiatric care, day clinics, number of beds ≤ 50 , content based plausibility checks
- > Balanced panel for the years 2002-2005; 982 hospitals per year remained in the sample

Five types of ownership in the German hospital sector

- Public I – organizationally and legally integrated in the public authorities
- Public II – organizationally and legally independent
- Public III – organizationally and legally constituted as private firms
- Non-for-profit
- Private-for-profit



***Autonomy of the
hospital management***

Methods

- 1) Data Envelopment Analysis (DEA) to determine the technical efficiency of the hospitals in Germany
- 2) Bootstrapping-procedure in order to validate the DEA Efficiency Scores
- 3) Tobit-Random-Effects-Regression with bootstrapped dependent “DEA Efficiency Scores”
 - > To determine the effect of ownership status and other explanatory factors on hospitals efficiency

Inputs and Outputs

Inputs

Clinical staff (FTE)

Nursing staff (FTE)

Medical and technical staff (FTE)

Administrative staff (FTE)

Other staff (FTE)

Supplies (in mn €)

Outputs

Hospital cases

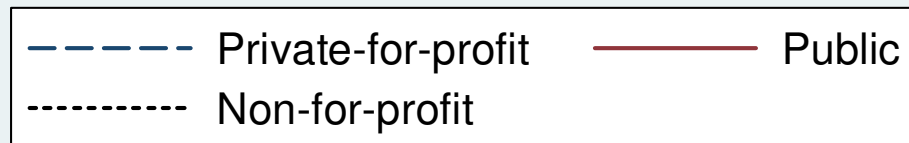
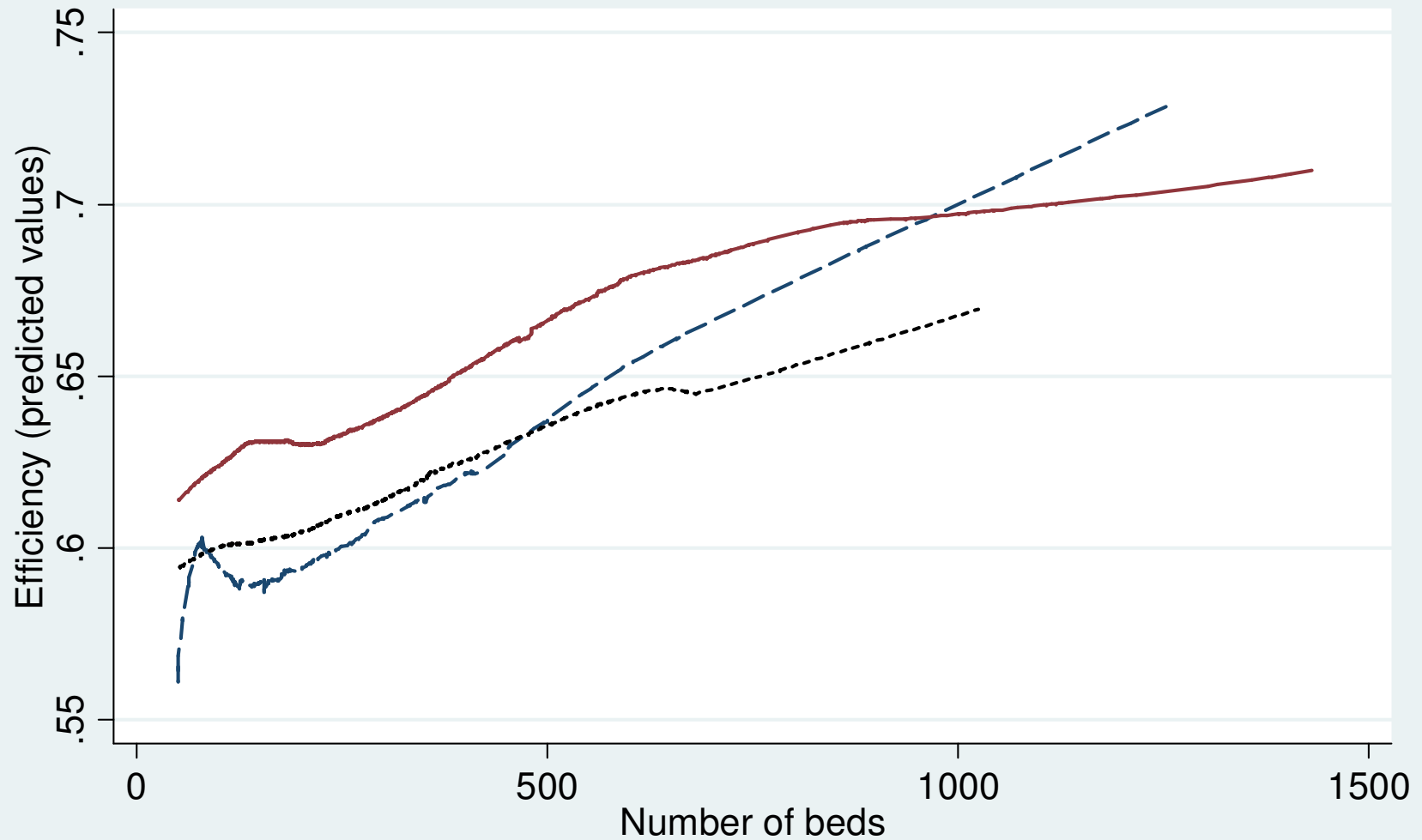
Inverse inhouse mortality

Regression results

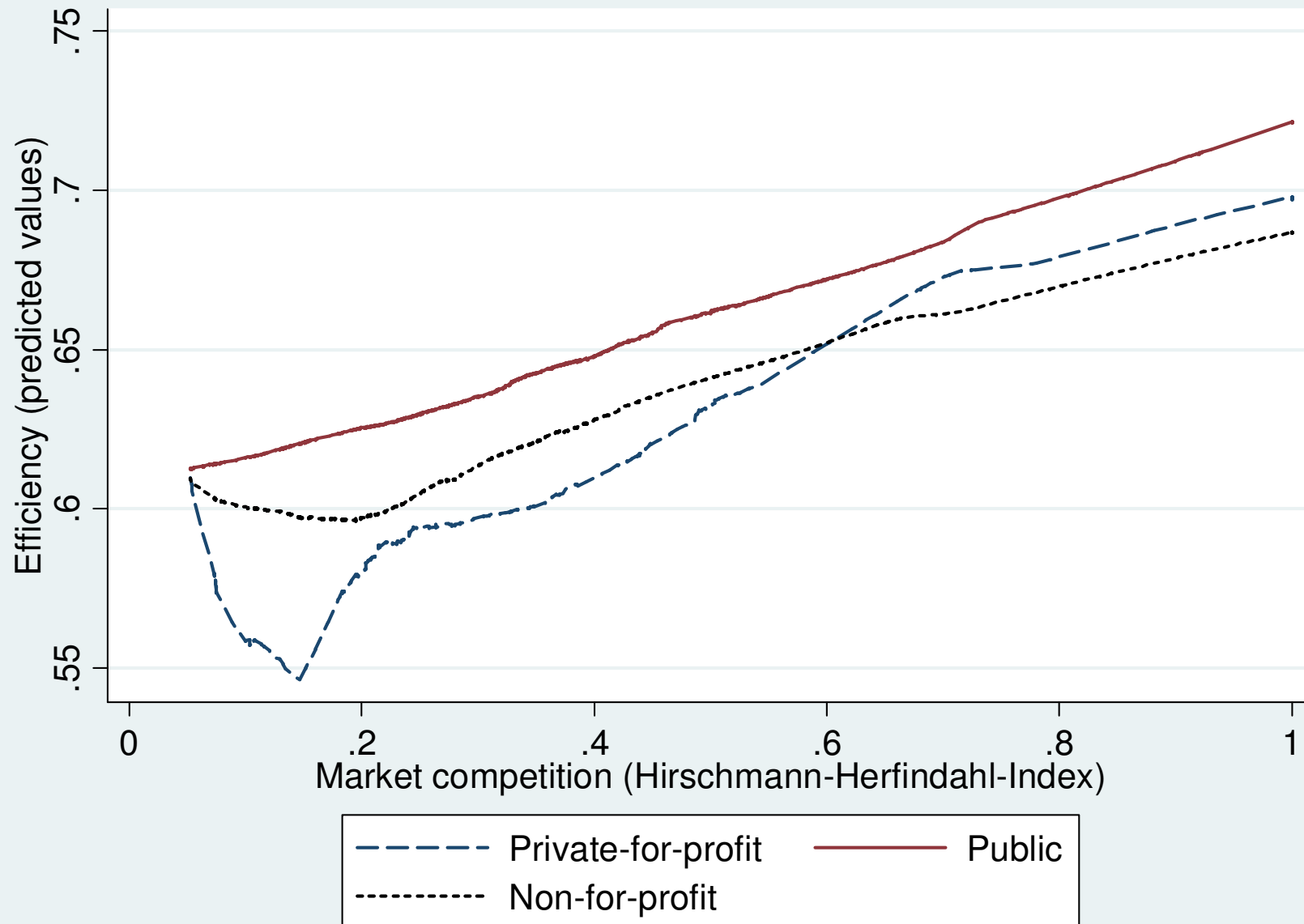
<i>Independent variables</i>	DEA I	DEA II	DEA III
	<i>Coefficients</i>		
Public I (integrated)	0.023***	0.028***	0.018*
Public II (independent)	0.026**	0.046***	0.044***
Public III (private)	0.030***	0.030***	0.019*
Non-for-profit	0.006	0.007	-0.002
Private-for-profit	served as reference category		
Market competition (HHI)	0.074***	0.072***	0.059***
Number of beds (in thds.)	0.039***	0.056***	0.038***
East Germany	0.023***	0.024***	0.036***
Ambulatory Care	-0.017***	-0.018***	-0.026***
Funding	-0.046**	-0.050**	-0.067***
Teaching	-0.003	-0.005	-0.011
Conversion	0.000	-0.002	-0.002
28 Case-Mix variables	included	included	included

* p≤0.05; ** p≤0.01; *** p≤0.001

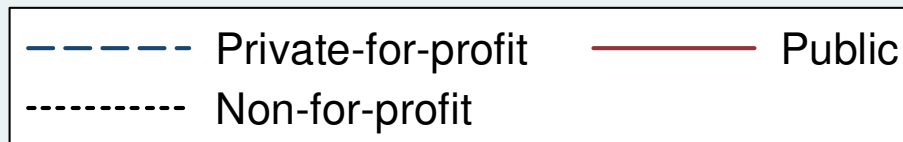
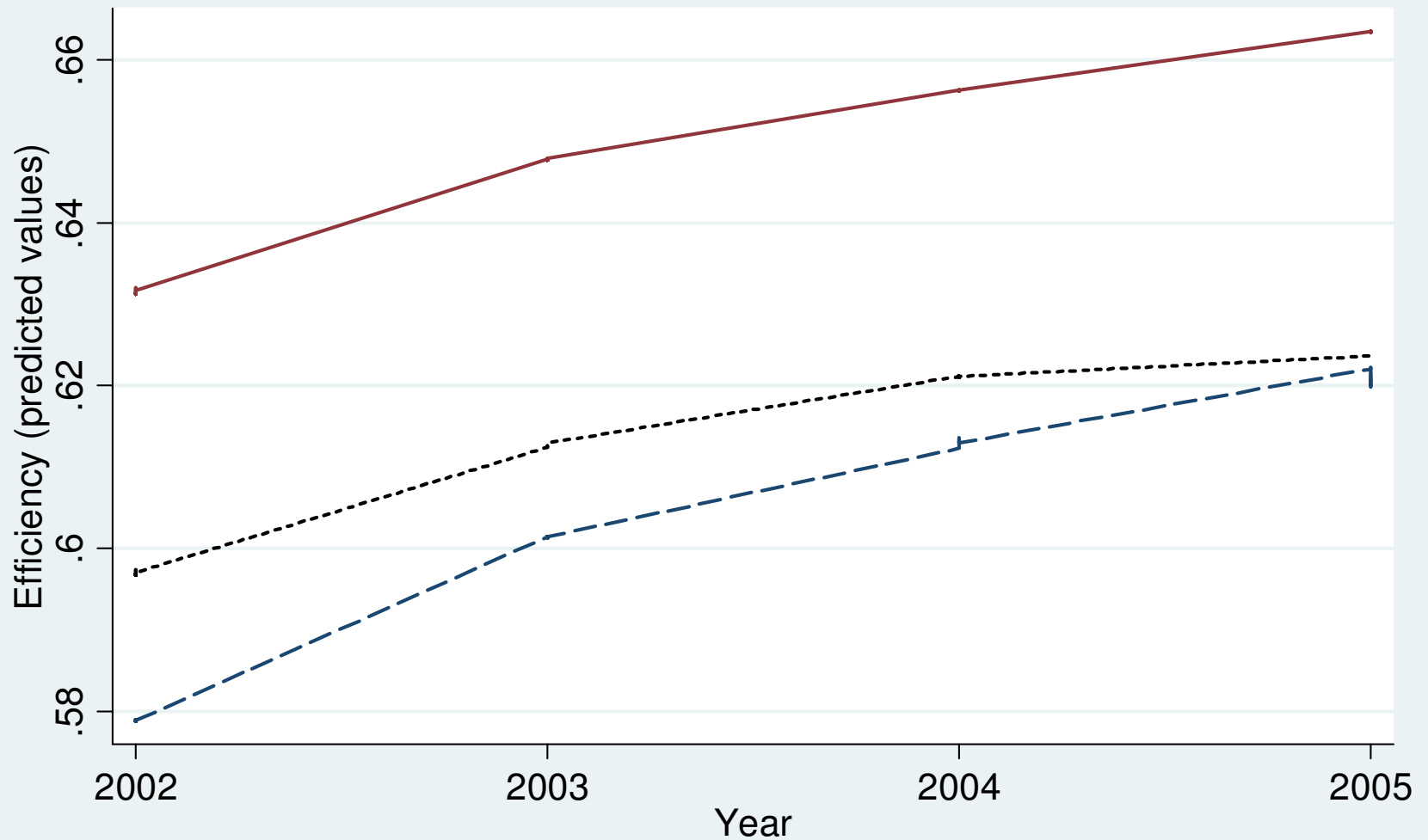
Number of beds and ownership



Market competition and ownership



Changes in productivity over time



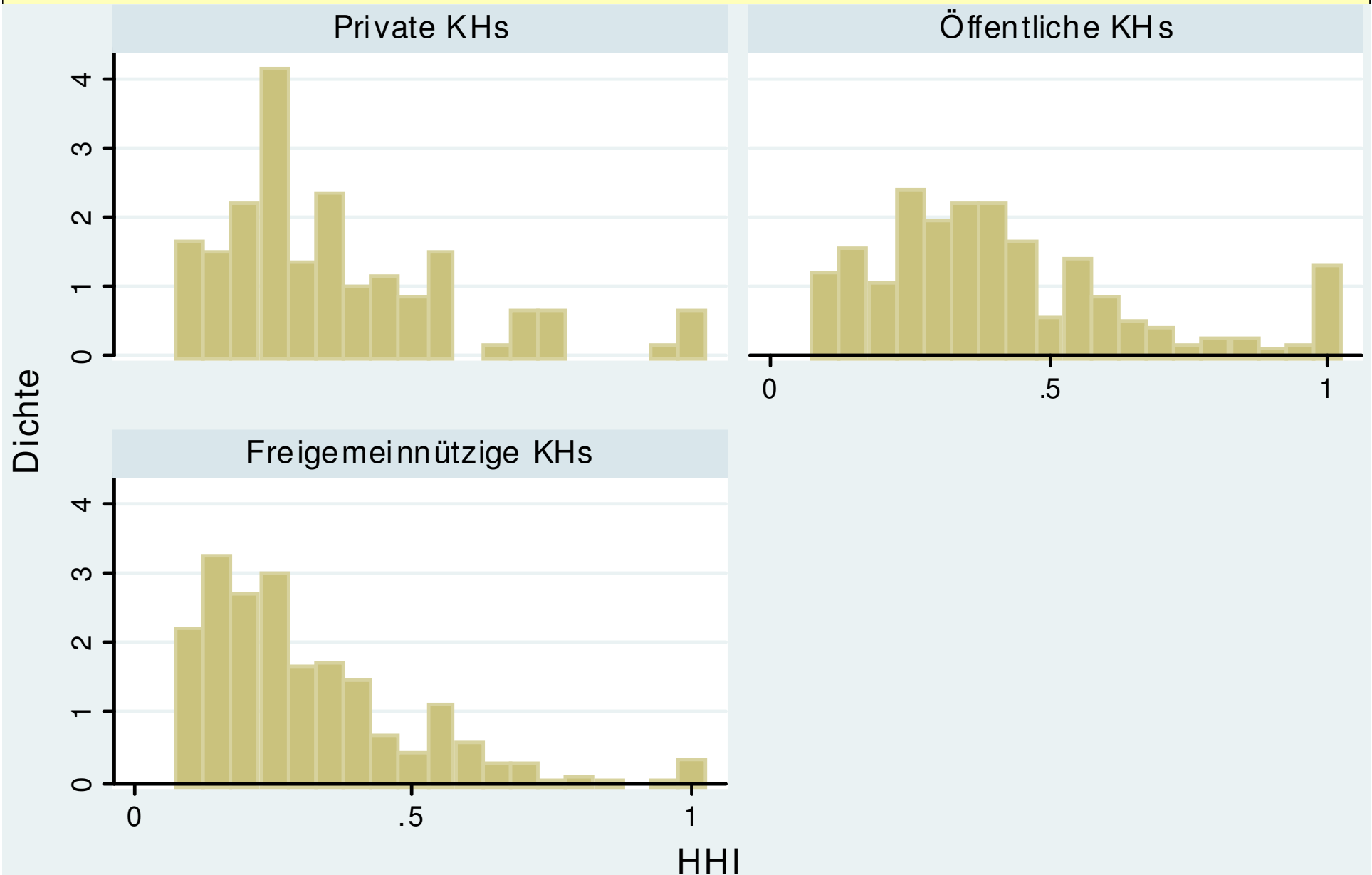
Discussion I

- Public ownership status is superior due to a higher performance; private-for-profit and not-for-profit hospitals are inefficient to the same extent
- Interaction effects of ownership status and number of beds and market competition
- > Ongoing privatization might not be appropriate in order to ensure the best use of the scarce resources in the hospital sector
- > Private hospital chains might change their acquisition strategy concerning size and location of hospitals

Discussion II

- Limitations:
 - 1) Additional in- and outputs for example ambulatory cases
 - 2) Additional explanatory factors (environmental and organizational characteristics)
- Further research:
 - > To measure and compare the efficiency of privatized hospitals and to assess their ability to increase efficiency

Market competition and ownership II



Histogramme nach Trägern