Preliminaries

Fu Zixuan[1]

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Contents

Chapter 1

Year 2016-2022

1.1 Regression tables

1.1.1 WG, BG, Random effect, Correalted random effect(Mundlak)

Notation

- Dependent variable:

$$\underbrace{y}_{NT\times 1} = \begin{pmatrix} y_1 \\ \vdots \\ y_N \end{pmatrix} \quad \underbrace{y_i}_{T\times 1} = \begin{pmatrix} y_{i1} \\ \vdots \\ y_{iT} \end{pmatrix}$$

- Independent variable:

$$\underbrace{X}_{NT\times K} = \begin{pmatrix} x_1 \\ \vdots \\ x_N \end{pmatrix} \quad \underbrace{x_i}_{T\times K} = \begin{pmatrix} x_{i1} \\ \vdots \\ x_{iT} \end{pmatrix}$$

- Matrix to calcualte the mean:

$$B_T = d_T(d_T'd_T)^{-1}d_T' \quad \text{where} \quad d_T = \begin{pmatrix} 1 \\ \vdots \\ 1 \end{pmatrix}$$

  Thus

$$B_T y_1 = \begin{pmatrix} \bar{y}_1 \\ \vdots \\ \bar{y}_1 \end{pmatrix}$$

  we set $B = I_N \otimes B_T$

- Matrix to demean the variable:

$$W_T = I_T - B_T$$

  Thus,

$$W_T y_i = \begin{pmatrix} y_{i1} - \bar{y}_1 \\ \vdots \\ y_{iT} - \bar{y}_1 \end{pmatrix}$$

  we set $W = I_N \otimes W_T$

Estimators

- WG:

$$\hat{\beta}_{WG} = (X'WX)^{-1}X'Wy$$

- BG:
$$\hat{\beta}_{BG} = (X'BX)^{-1}X'By$$
- RE: A linear combination of WG and BG
- CRE (Mundlak): equivalent to WG

> In empirical analysis of data consisting of repeated observations on economic units (time series on a cross section) it is often assumed that the coefficients of the quantitiative variables (slopes) are the same, whereas the coefficients of the qualitative variables (intercepts or effects) vary over units or periods. This is the constant-slope variable- intercept framework. In such an analysis an explicit account should be taken of the statistical dependence that exists between the quantitative variables and the effects. It is shown that when this is done, the random effect approach and the fixed effect approach yield the same estimate for the slopes, the "within" estimate. Any matrix combination of the "within" and "between" estimates is generally biased. When the "within" estimate is subject to a relatively large error a minimum mean square error can be applied, as is generally done in regression analysis. Such an estimator is developed here from a somewhat different point of departure.

1.1.2 Specification

Model 1 (Pseudoc Poisson)

$$\begin{aligned} y_{it} &= x_{it1}^{\beta_1} x_{it2}^{\beta_2} x_{it3}^{\beta_3} \theta_i \epsilon_{it} \\ &= f(x_{it}; \beta)\theta_i \epsilon_{it} \end{aligned}$$

Tables: Pois

Reference to Koen Jochman's lecture notes on panel data and model with multiplicative effect:

$$y_{it} = f(x_{it}; \beta)\theta_i \epsilon_{it} \quad \text{where} \quad \mathbb{E}\left[\epsilon_{it} | x_{i1}, \ldots, x_{iT}, \theta_i\right] = 1$$

Then following the same logic in additive effect, we difference out individual effect to get:

$$\mathbb{E}\left[\frac{y_{it}}{f(x_{it}; \beta)} - \frac{y_{i,t-1}}{f(x_{i,t-1}; \beta)} \middle| x_{i1}, \ldots, x_{iT}\right] = 0$$

Similarly,

$$\mathbb{E}\left[\frac{y_{it}}{f(x_{it}; \beta)} - \frac{\sum_{t=1} y_{it}}{\sum_{t=1} f(x_{it}; \beta)} \middle| x_{i1}, \ldots, x_{iT}\right] = 0$$

One of the unconditional moment equation given rise to is

$$\mathbb{E}\left[x_i t \left(\frac{y_{it}}{f(x_{it}; \beta)} - \frac{\sum_{t=1} y_{it}}{\sum_{t=1} f(x_{it}; \beta)}\right)\right] = 0 \tag{1.1}$$

The moment conditon is often called pseudo-poisson estimator (as if assuming $y_it|x_{i1}, \ldots, x_{iT}, \theta_i \sim Poisson(f(x_{it}; \beta)\theta_i)$ and then use maximum likelihood.) When regressors are not strictly exogenous, we can construct a **differencing** based estimator based on sequential moment restrictions. The `fixest` package doesn't provide the differencing based estimator.
TO BE CONSTRUCTED BY HAND LATER.

Model 2 (OLS)

$$\log(y_{it}) = \log(x_{it1})\beta_1 + \log(x_{it2})\beta_2 + \log(x_{it3})\beta_3 + \log(\theta_i) + \log(\epsilon_{it})$$

LHS: log(ETP INF);
RHS: log(STAC INPATIENT), log(STAC OUTPATIENT), log(SESSION),CASEMIX
Table: OLS, OLS_lag1
Figure: FixedEffect_OLS

Remark. The Pseudo poisson and Log OLS are equivalent if we assume that ϵ_{it} is independent of x_{it} and θ_i.

Remark. The Mundlak (1978) approach is to include the average of the individual-specific variables $\bar{x}_i$ in the regression. He shows that it is equivalent to within group estimator. (Correlated random effect $\sim$ WG estimator). If the true model is

$$y_{it} = x_{it}\beta + \theta_i + \epsilon_{it}$$

and $E(\theta_i|\bar{x}_i) = \bar{x}_i\gamma + \tilde{\theta}_i$, then

$$y_{it} = (x_{it} - \bar{x}_i)\beta + \bar{x}_i(\gamma + \beta) + \tilde{\theta}_i + \epsilon_{it}(x_{it} - \bar{x}_i)\beta_1 + \bar{x}_i\beta_2 + \tilde{\theta}_i + \epsilon_{it}$$

Only when the θ_i is uncorrelated with x_{it}, the $\beta_1 = \beta_2$.

Pois

Dependent Variable:	ETP_INF	
Model:	(1)	(2)
Variables		
log(SEJHC_MCO)	0.160^a	0.730^a
	(0.028)	(0.025)
log(SEJHP_MCO)	0.044^a	0.109^a
	(0.011)	(0.020)
log(SEANCES_MED)	0.032^a	0.044^a
	(0.008)	(0.011)
CASEMIX	0.007^a	0.014^a
	(0.002)	(0.003)
Fixed-effects		
FI	Yes	
FI_EJ		Yes
Fit statistics		
Observations	3,946	3,946
Squared Correlation	0.995	0.983
Pseudo R^2	0.966	0.956

Signif. Codes: a: 0.01, b: 0.05, c: 0.1

Back

OLS

Dependent Variable:	log(ETP_INF)	
Model:	(1)	(2)
Variables		
log(SEJHC_MCO)	0.184^a	0.676^a
	(0.026)	(0.031)
log(SEJHP_MCO)	0.032^a	0.097^a
	(0.011)	(0.022)
log(SEANCES_MED)	0.021^a	0.037^a
	(0.006)	(0.010)
CASEMIX	0.007^b	0.013^a
	(0.003)	(0.004)
Fixed-effects		
FI	Yes	
FI_EJ		Yes
Fit statistics		
Observations	3,923	3,923
Squared Correlation	0.993	0.980
Pseudo R^2	1.77	1.39

Signif. Codes: a: 0.01, b: 0.05, c: 0.1

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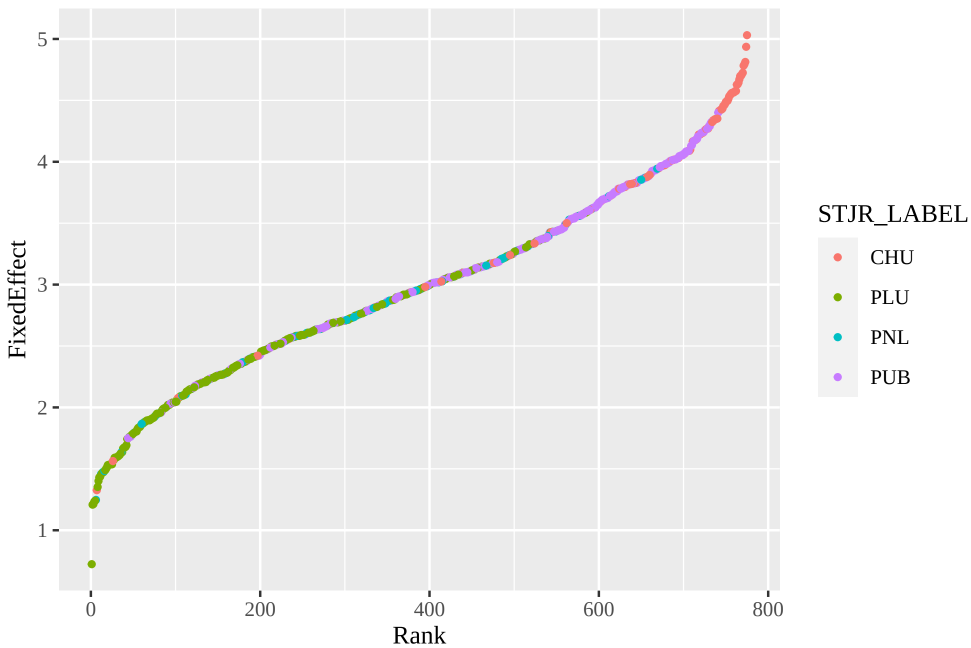
OLS_lag1

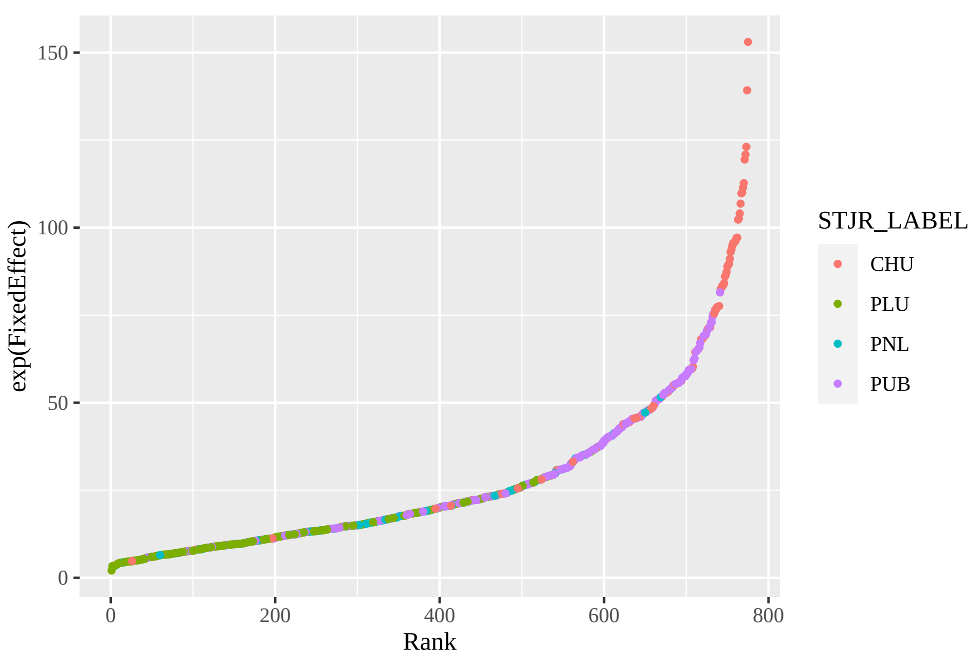
Dependent Variable:	log(ETP_INF)	
Model:	(1)	(2)
Variables		
log(SEJHC_MCO)	0.222^a	0.692^a
	(0.049)	(0.036)
log(SEJHP_MCO)	0.093^a	0.111^a
	(0.025)	(0.032)
log(SEANCES_MED)	0.040^c	0.047^a
	(0.023)	(0.015)
CASEMIX	0.013^a	0.014^a
	(0.003)	(0.005)
Fixed-effects		
FI	Yes	
FI_EJ		Yes
Fit statistics		
Observations	3,151	3,151
Squared Correlation	0.994	0.983
Pseudo R^2	1.84	1.48

Signif. Codes: a: 0.01, b: 0.05, c: 0.1

Back

FixedEffect_OLS Fixed effects extracted from OLS regression with fixed effect on each FI (not FI_EJ). Back





1.2 Descriptive Statistics

1.2.1 Stays per labor input

	STJR_LABEL	PUB	PLU	PNL	CHU	All
1	Q1	51.37	133.48	60.76	70.54	71.12
2	Q2	105.17	181.73	98.77	99.00	124.31
3	Q3	141.30	231.18	155.14	128.60	175.32
4	Mean	106.16	194.39	128.23	103.76	137.71
5	Nobs	2726.00	2004.00	741.00	606.00	6077.00

Table 1.1: SJMD MCO

	STJR_LABEL	PUB	PLU	PNL	CHU	All
1	Q1	208.36	181.51	177.67	500.10	198.23
2	Q2	1036.97	272.76	491.50	847.58	493.31
3	Q3	1427.00	430.11	1220.56	1154.48	1180.57
4	Mean	977.18	391.45	734.43	914.89	748.21
5	Nobs	2726.00	2004.00	741.00	606.00	6077.00

Table 1.2: SJMD TOT

	STJR_LABEL	PUB	PLU	PNL	CHU	All
1	Q1	23.80	138.27	32.23	33.15	35.41
2	Q2	47.15	185.18	62.83	48.93	61.51
3	Q3	62.56	240.04	108.09	57.38	150.86
4	Mean	47.11	214.42	93.66	46.43	108.00
5	Nobs	2736.00	2010.00	730.00	599.00	6075.00

Table 1.3: SJINF MCO

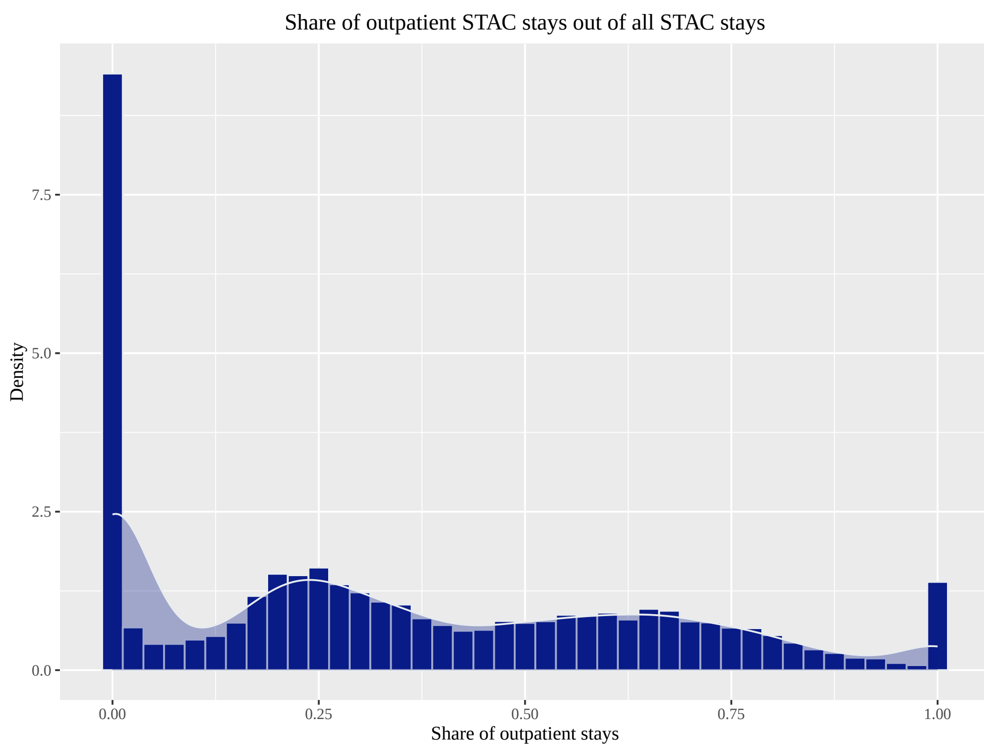
1.2.2 Share of outpatient stays

	STJR_LABEL	PUB	PLU	PNL	CHU	All
1	Q1	70.69	210.23	105.91	191.63	167.56
2	Q2	476.89	284.89	304.42	434.84	347.90
3	Q3	639.75	422.14	754.52	571.29	587.61
4	Mean	444.58	361.79	542.56	436.39	428.15
5	Nobs	2736.00	2010.00	730.00	599.00	6075.00

Table 1.4: SJINF TOT

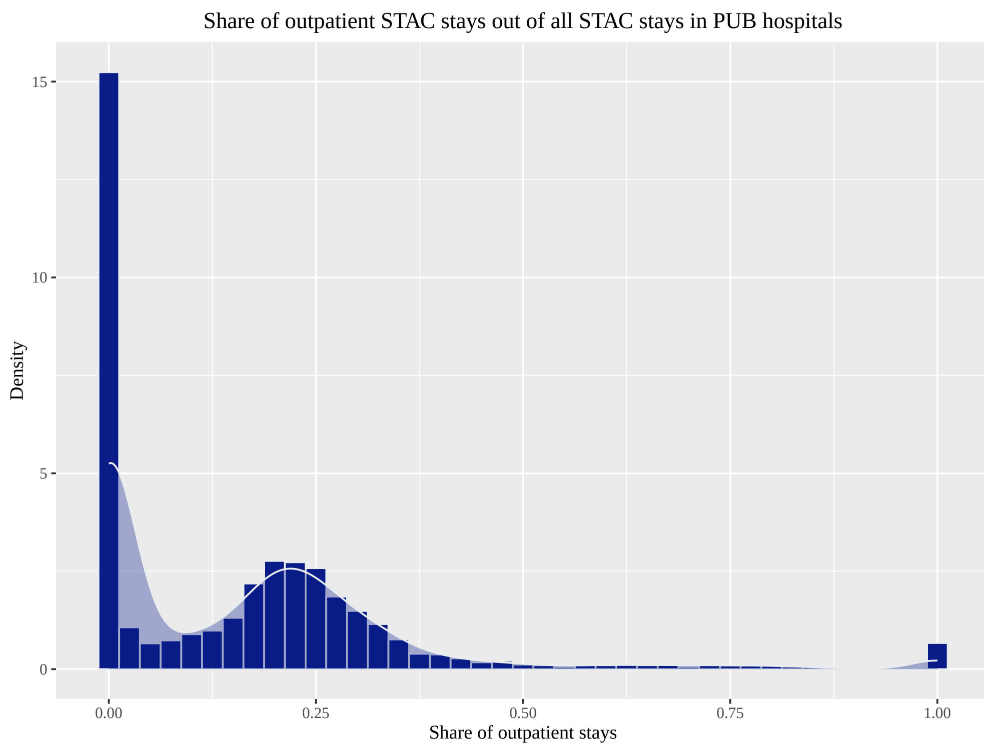
	STJR_LABEL	PUB	PLU	PNL	CHU	All
1	Q1	17.37	233.39	27.01	31.97	32.09
2	Q2	50.88	340.07	104.34	62.98	79.42
3	Q3	76.24	487.77	198.55	82.86	257.67
4	Mean	53.11	472.98	152.45	63.58	204.27
5	Nobs	2730.00	1990.00	727.00	600.00	6047.00

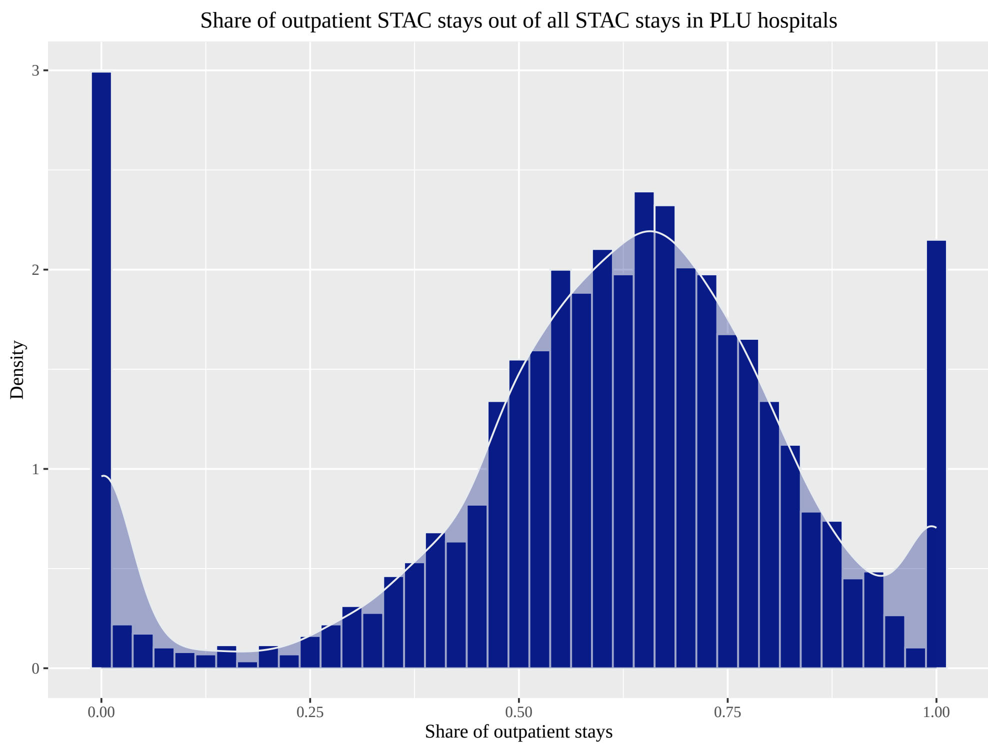
Table 1.5: SJAS MCO

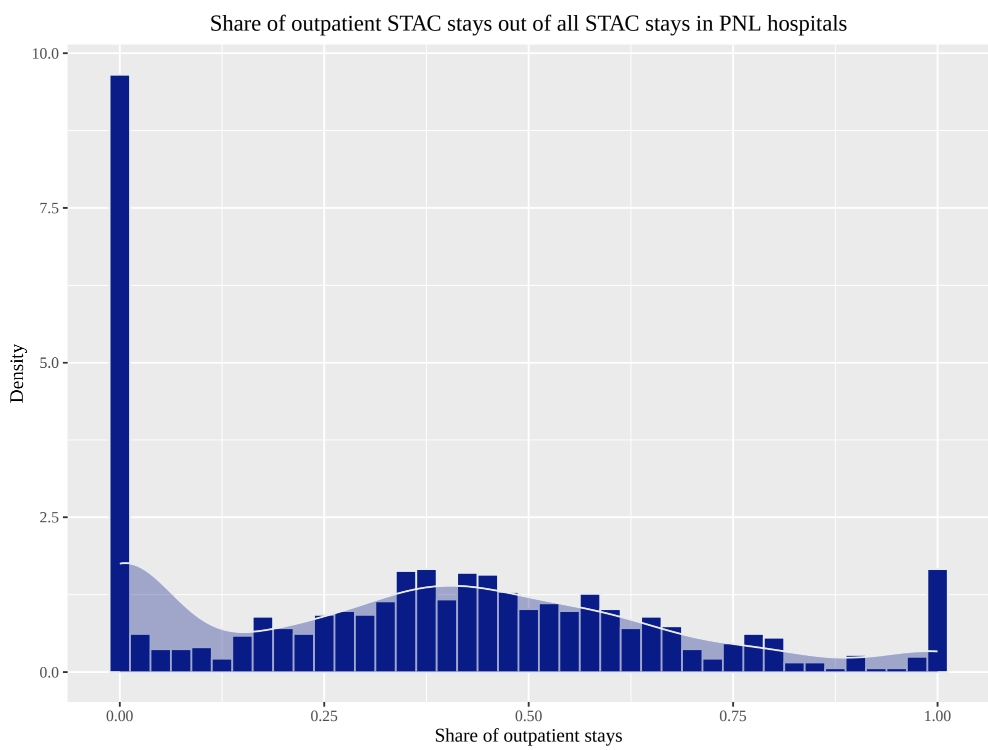


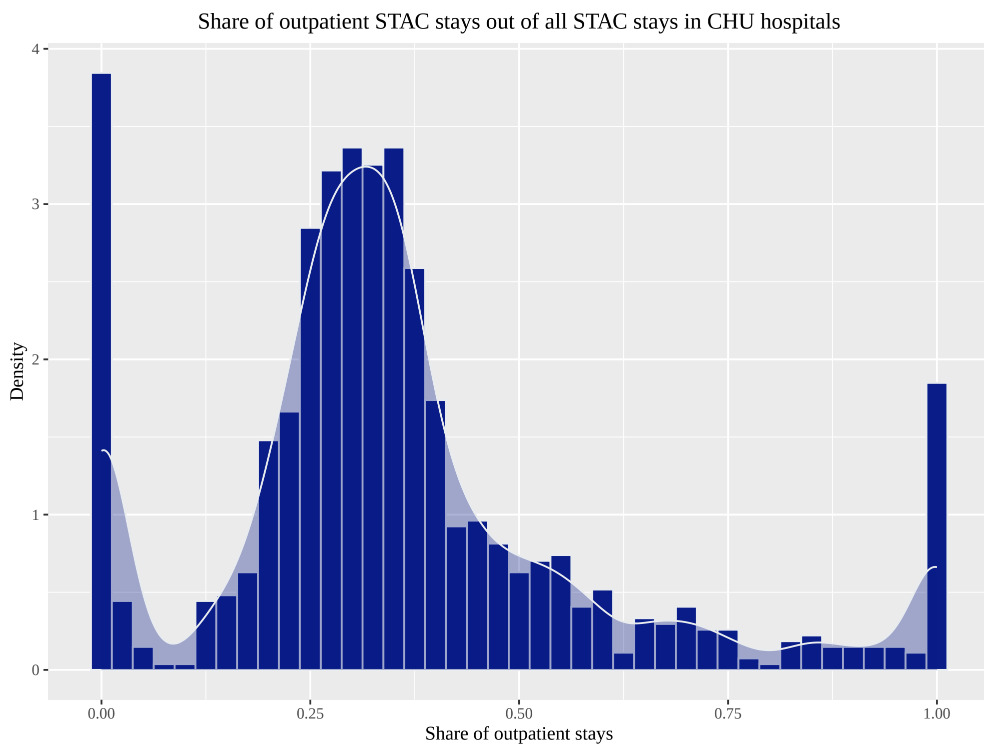
	STJR_LABEL	PUB	PLU	PNL	CHU	All
1	Q1	55.09	366.80	96.77	186.98	211.10
2	Q2	508.07	535.53	464.22	582.30	529.11
3	Q3	777.93	848.29	1262.24	826.61	827.01
4	Mean	525.48	828.41	929.30	583.77	679.50
5	Nobs	2730.00	1990.00	727.00	600.00	6047.00

Table 1.6: SJAS TOT

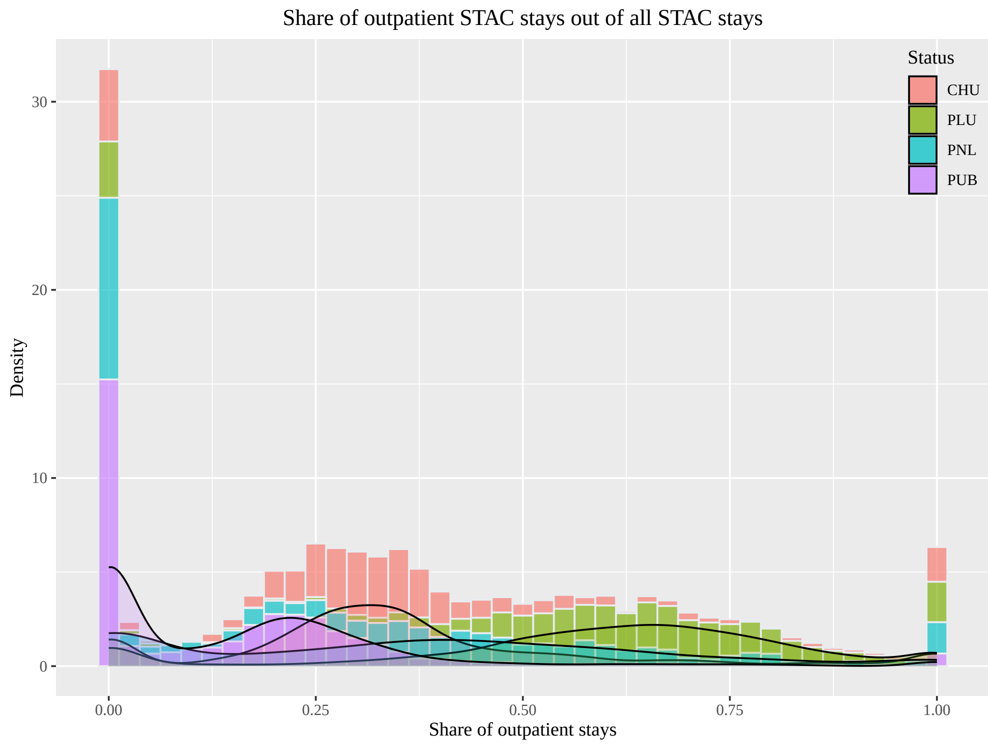



Share of outpatient STAC stays out of all STAC stays in PLU hospitals
Density
3
2
1
0
0.00
0.25
0.50
0.75
1.00
Share of outpatient stays


Share of outpatient STAC stays out of all STAC stays in PNL hospitals
Density
10.0
7.5
5.0
2.5
0.0
0.00
0.25
0.50
0.75
1.00
Share of outpatient stays



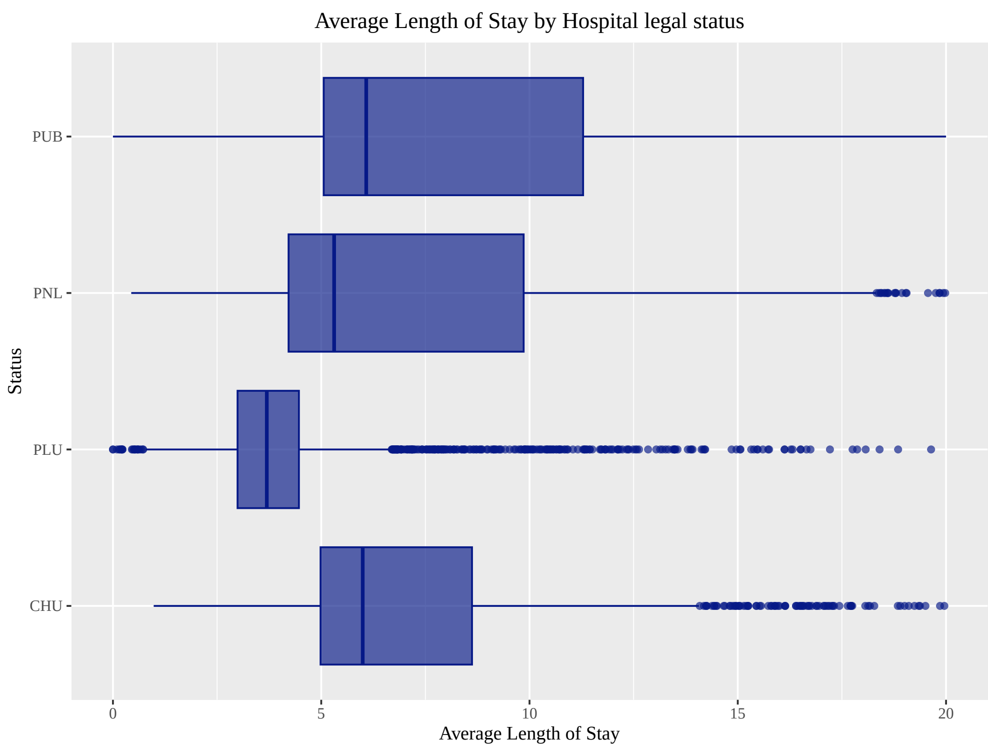
Share of outpatient STAC stays out of all STAC stays in CHU hospitals
Density
4
3
2
1
0
0.00
0.25
0.50
0.75
1.00
Share of outpatient stays



Share of outpatient STAC stays out of all STAC stays
Status
CHU
PLU
PNL
PUB
Density
30
20
10
0
0.00
0.25
0.50
0.75
1.00
Share of outpatient stays

1.2.3 Average length of stay

	STJR_LABEL	PUB	PLU	PNL	CHU	All
1	Q1	5.12	3.13	4.22	5.05	4.05
2	Q2	6.21	3.78	5.46	6.03	5.26
3	Q3	11.83	4.53	10.08	8.60	8.47
4	Mean	8.76	4.18	7.53	7.42	6.99
5	Std_dev	5.25	2.38	5.03	4.00	4.81
6	Nobs	2712.00	1926.00	715.00	584.00	5937.00



1.2.4 Selection of patients

	size	CHU	PLU	PNL	PUB
1	1	11.85	14.89	29.51	34.51
2	2	11.72	4.57	19.02	23.70
3	3	11.73	3.56	10.85	14.75
4	4	11.44	4.59	10.50	13.96

Table 1.7: Average casemix index by hospital legal status and size of hospital