Econometrics

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Partial effects

- Experience and wage

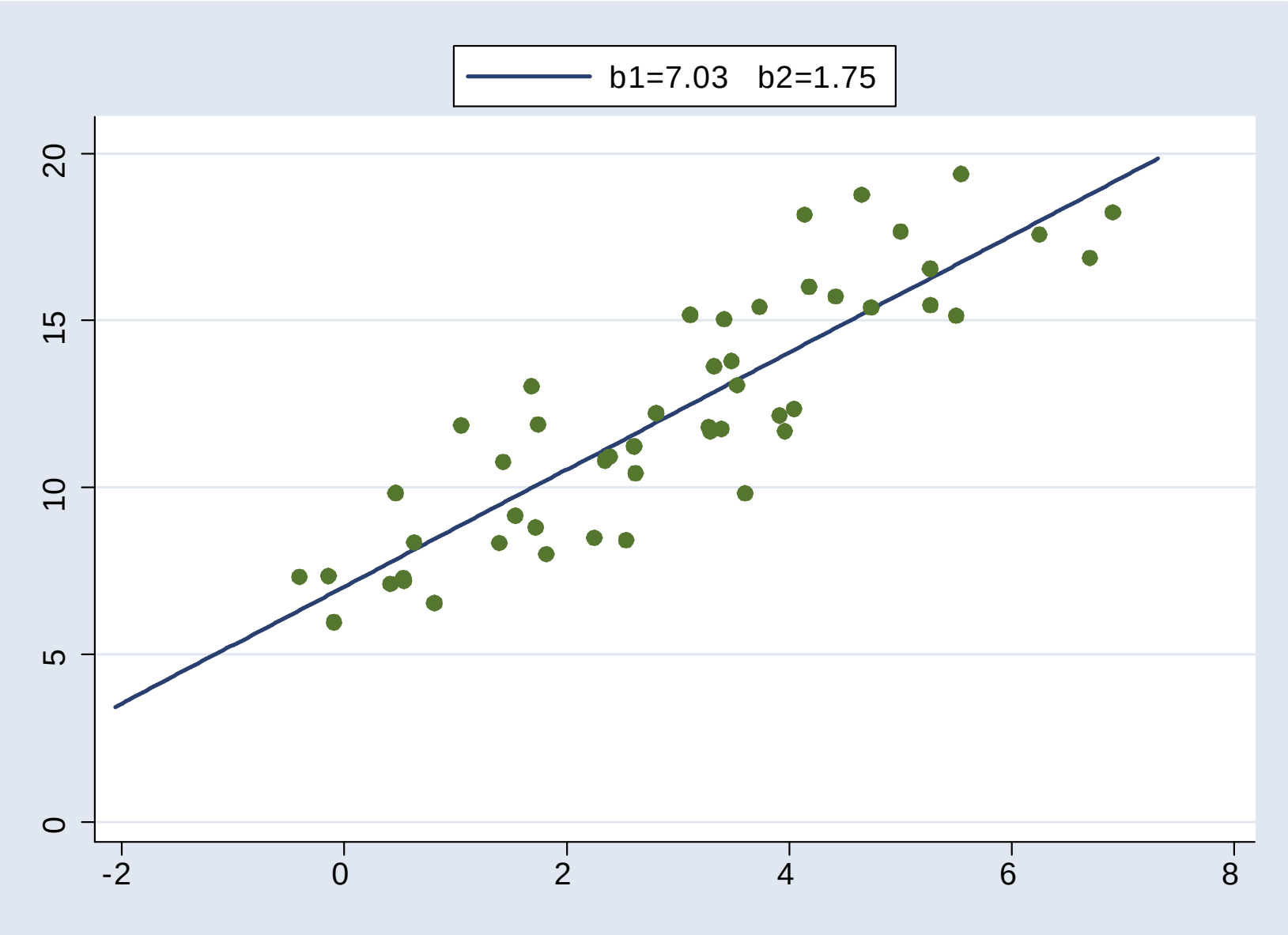
experiance	average wage
0-	2033.0
10-	2287.6
20-	2314.3
25-	2554.6

- correlation experiance, age $\rho = 0.89$

experiance, age and wage

	age				
experiance	**18-**	**30-**	**40-**	**50-**	**Total**
0-	1832.8	2580.2	2115.3	2085.4	2033.0
10-	1872.1	2255.3	2478.5	2095.3	2287.6
20-		2196.5	2372.3	2075.3	2314.3
25-			2182.7	2888.8	2554.6
Total	1835.6	2321.3	2306.2	2784.1	2315.9

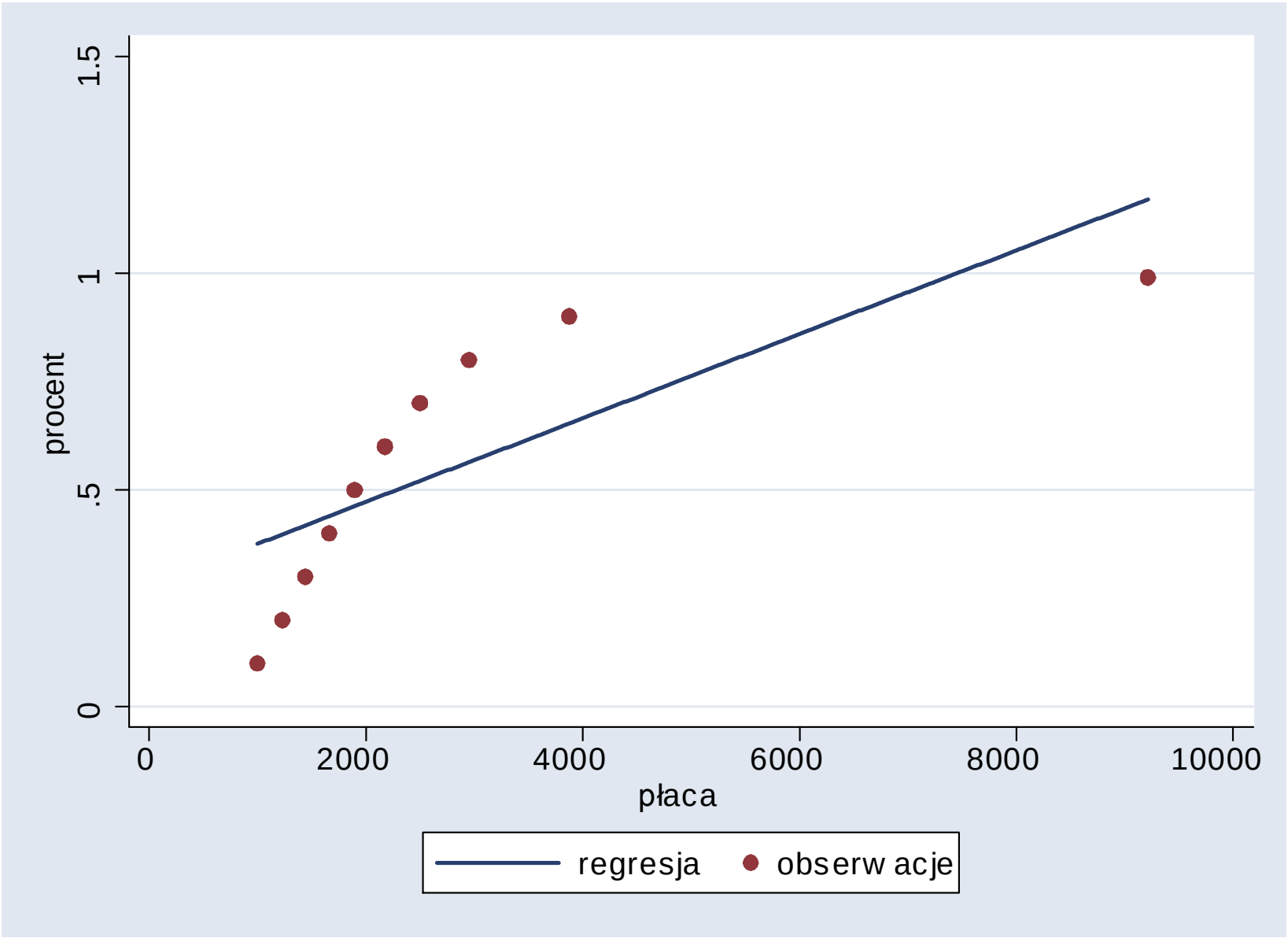
Dependence E(y) on x



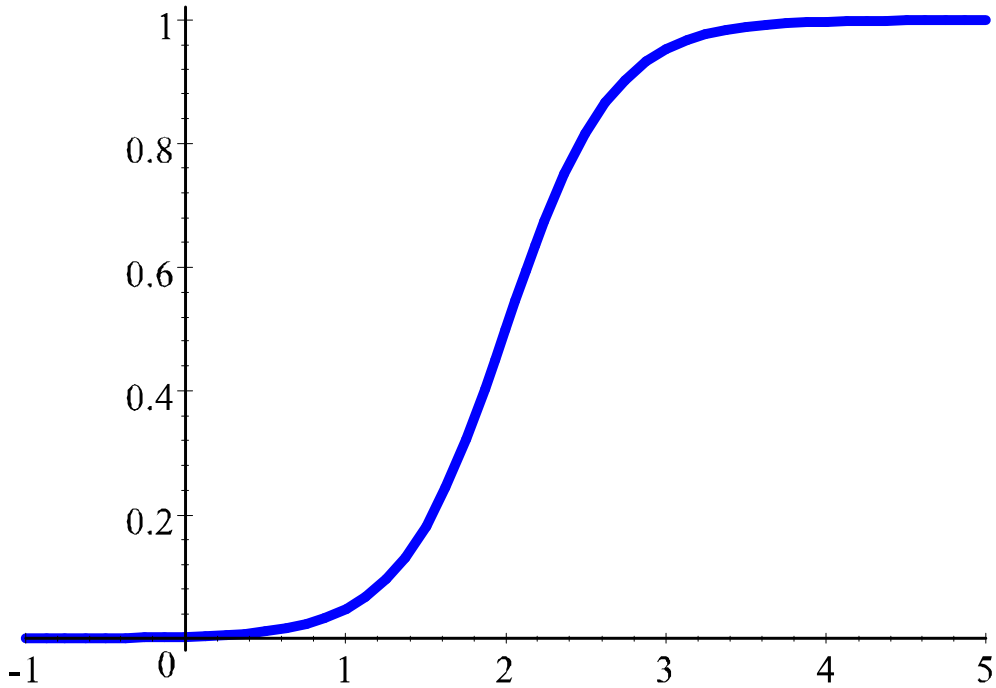
Models which can be transformed to linear models

wage<	percent	wage<	percent
998.5	0.1	2173.7	0.6
1229.6	0.2	2498.1	0.7
1440.1	0.3	2950.6	0.8
1661.0	0.4	3874.7	0.9
1893.9	0.5	9211.0	0.99

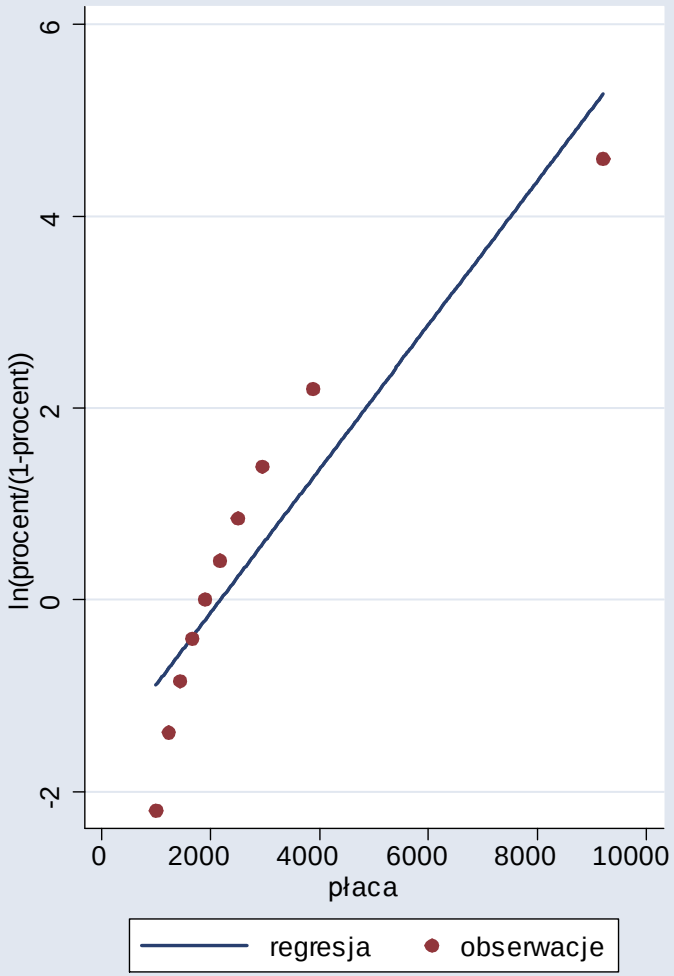
Quantiles and wages

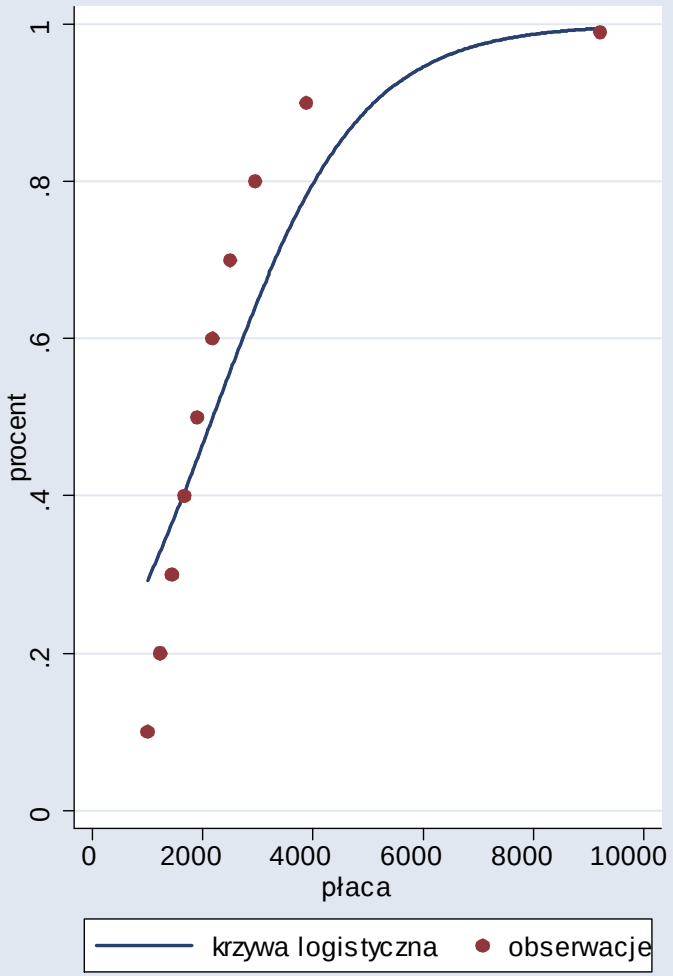


Logistic curve

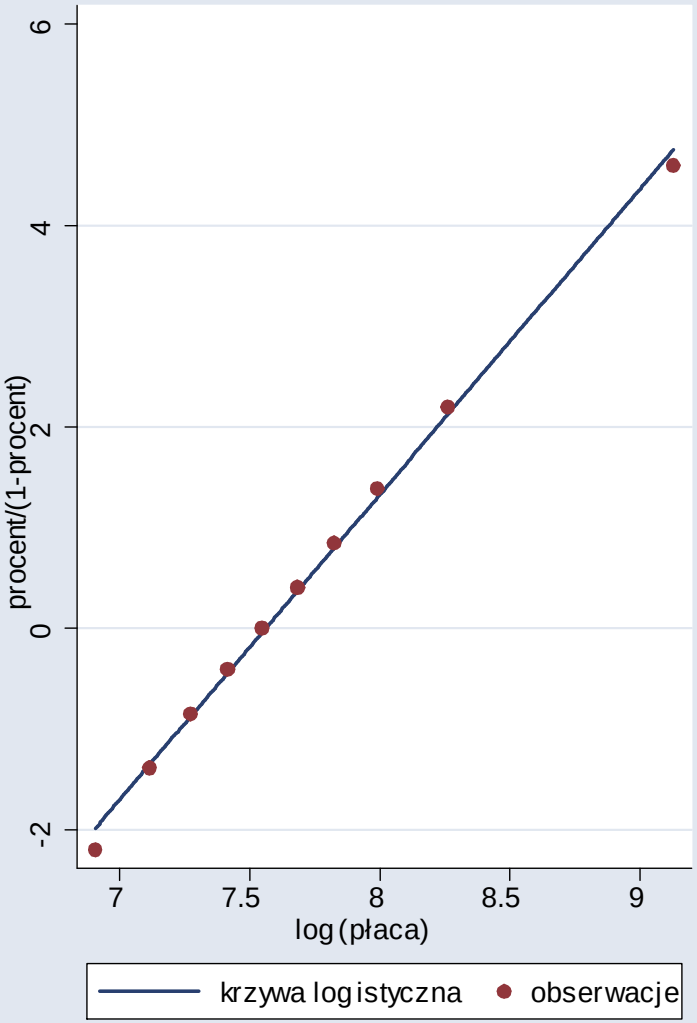


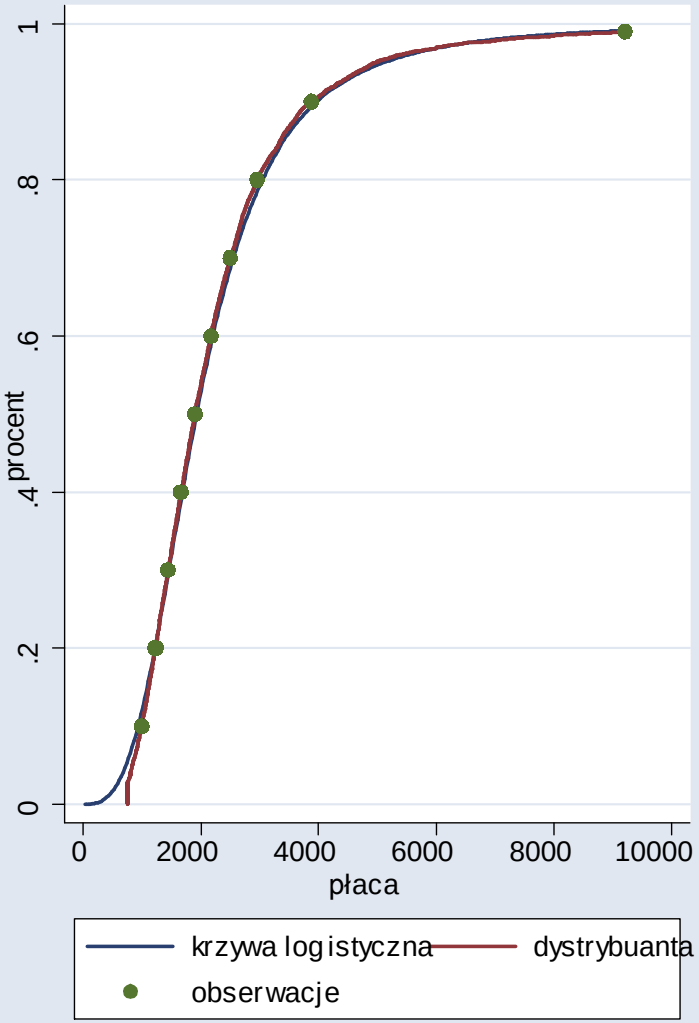
Logistic curve and wages





Logistc curve and logartihms of wages

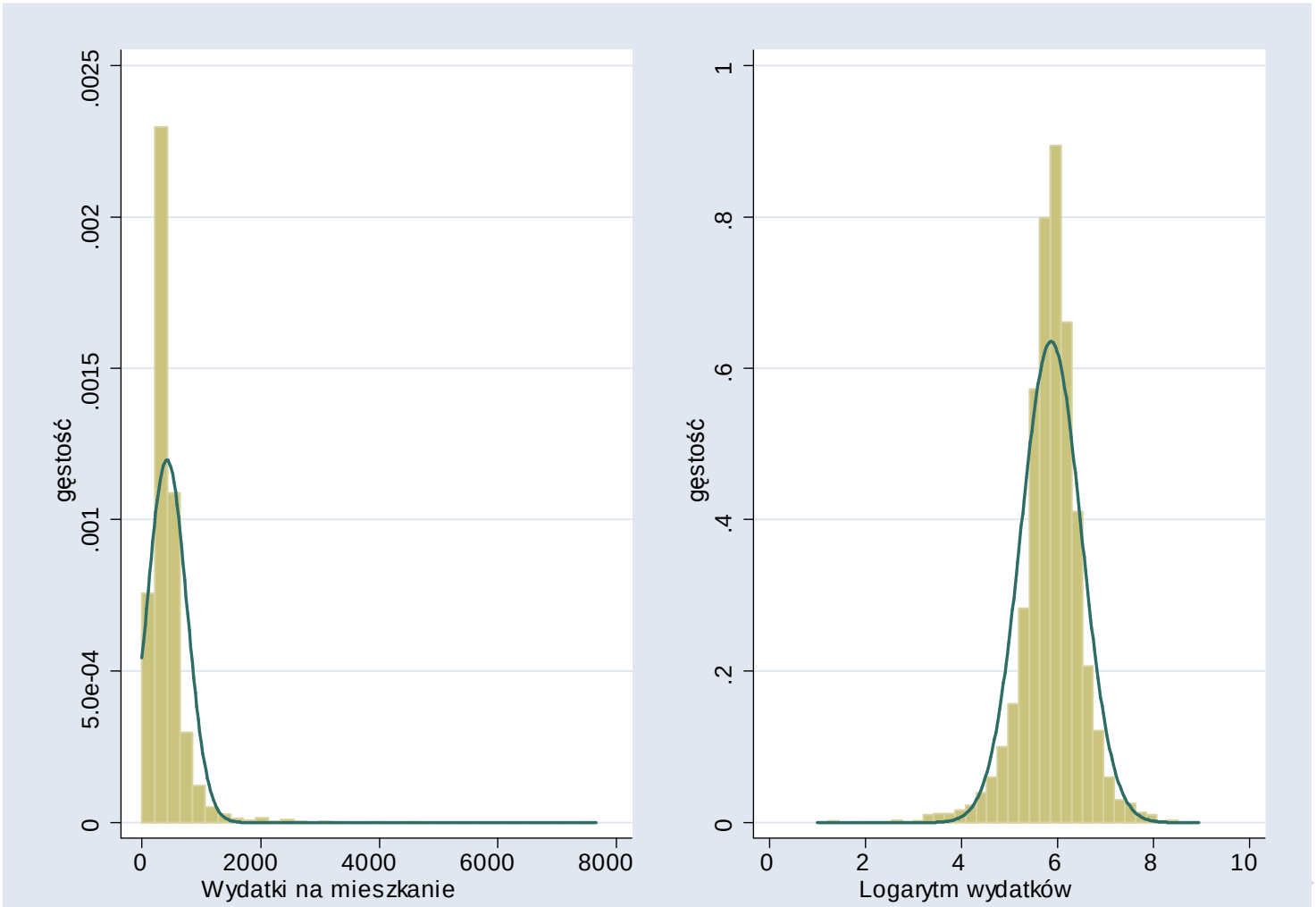




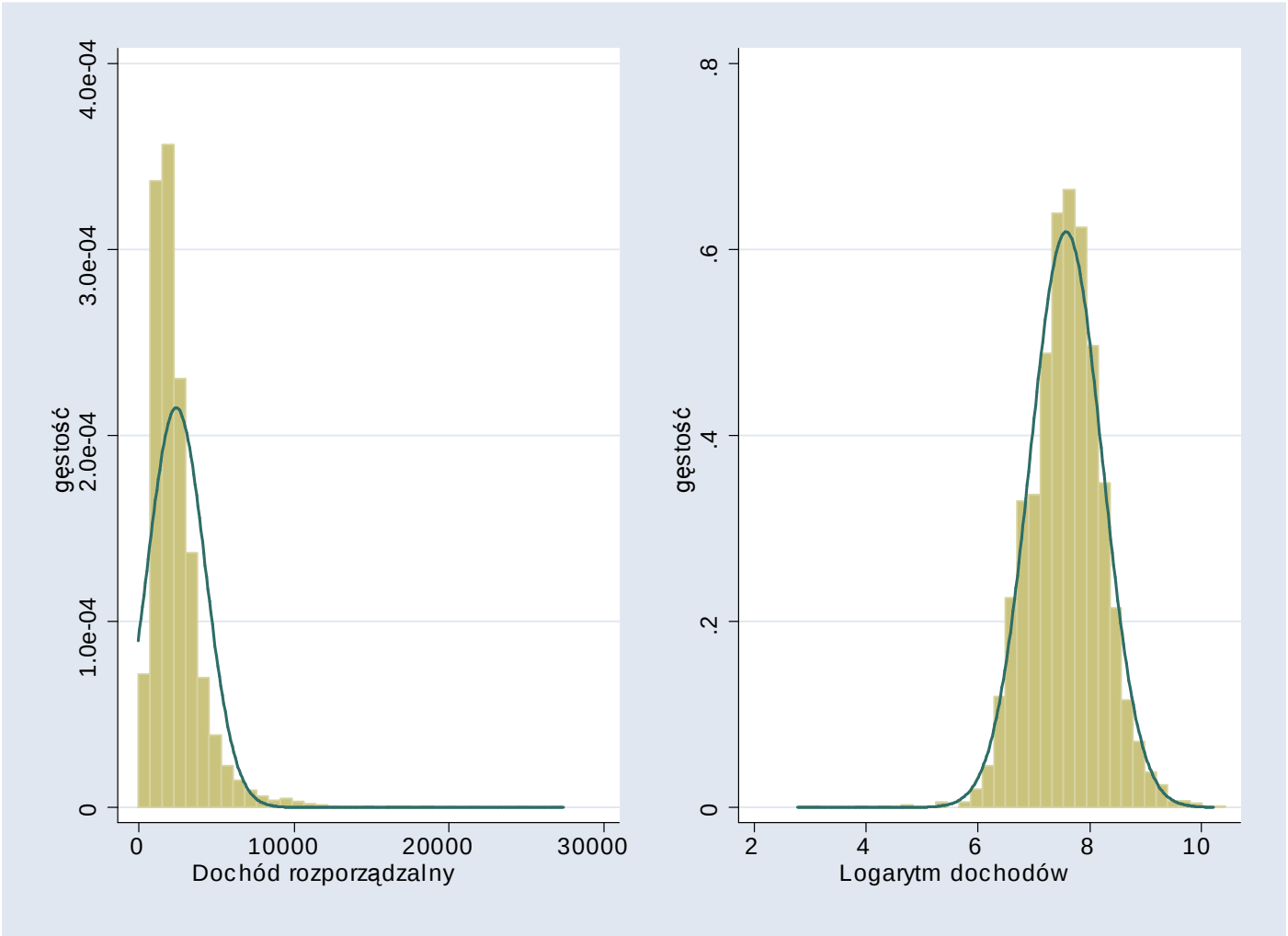
Loglinear model

Example

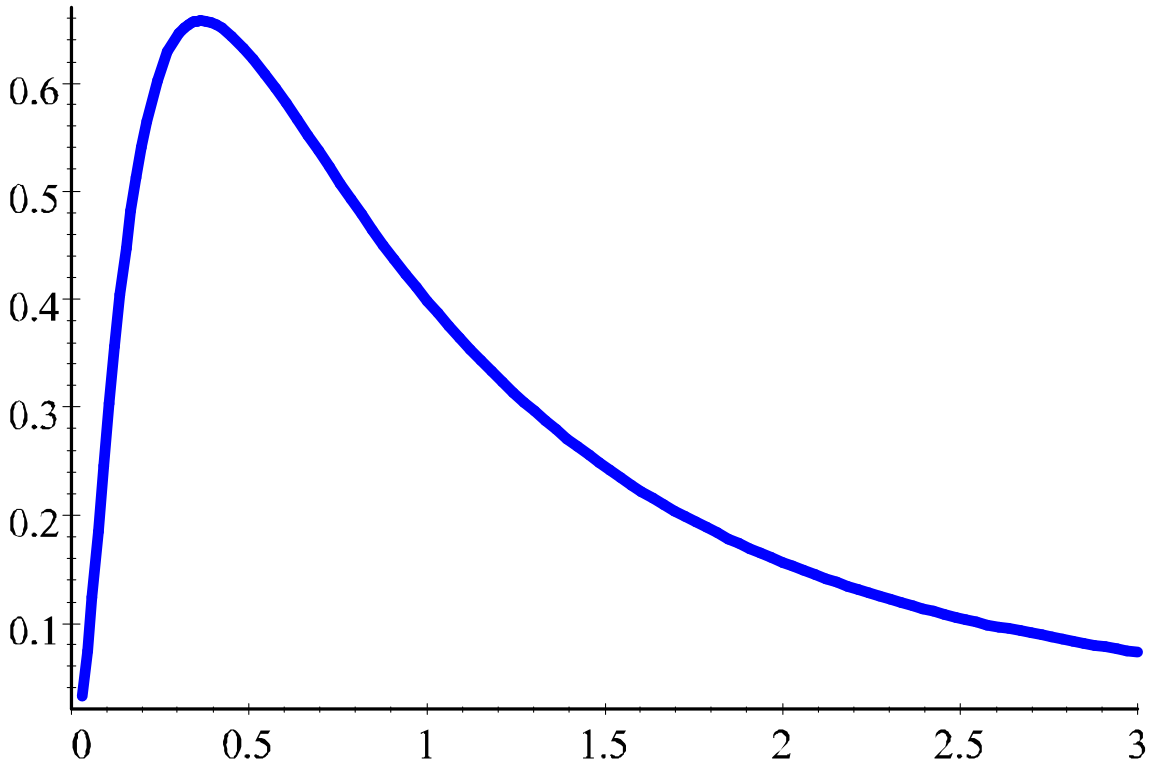
Expenditure for accodmodation of workers' households



Incomes of households



Lognormal distribution



Regression results: levels

expend	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
income	.0690596	.002556	27.02	0.000	.0640485	.0740707
_cons	252.4565	7.759037	32.54	0.000	237.2446	267.6683

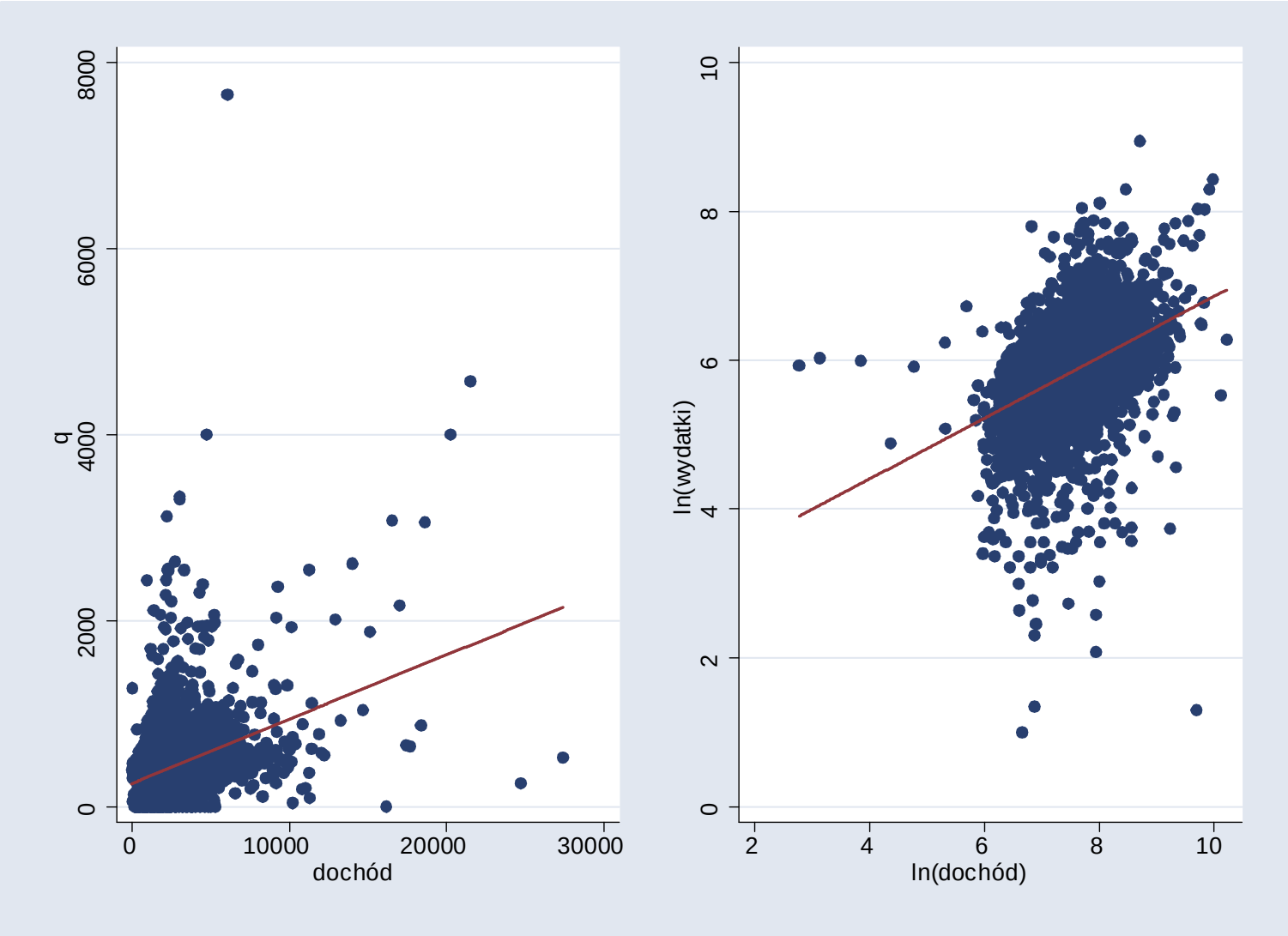
R-squared = 0.1482

Regression results: logarithms

ln(expend)	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln(income)	.4087146	.0139339	29.33	0.000	.3813966	.4360326
_cons	2.768599	.106037	26.11	0.000	2.560709	2.976488

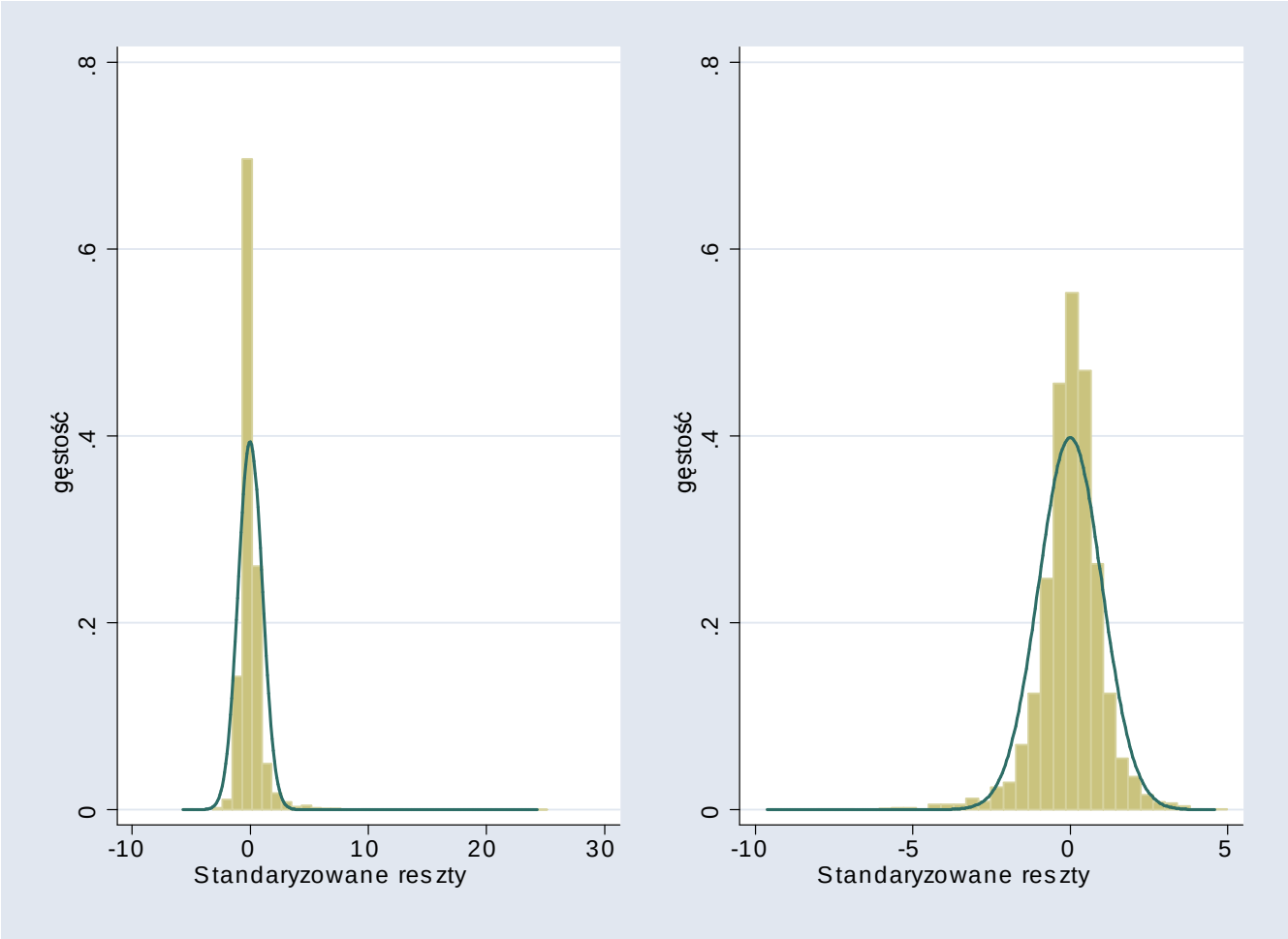
R-squared = 0.1731

Regression results



- average income2402

Residuals


gęstość
0
.2
.4
.6
.8
-10
0
10
20
30
Standaryzowane reszty
gęstość
0
.2
.4
.6
.8
-10
-5
0
5
Standaryzowane reszty

Model Boxa-Coxa

```
------------------------------------------------------------------------------
      expend |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      /lambda |   .1880643   .0125386    15.00   0.000      .1634892    .2126395
------------------------------------------------------------------------------


Estimates of scale-variant parameters
----------------------------
             |      Coef.
-------------+--------------
Notrans      |
       _cons |    5.78114
-------------+--------------
Trans        |
      dochod |   .2969767
-------------+--------------
```

Regression results

Example

Dependence of wage on gender

```
    gender |        Mean
-----------+-----------
      male |   2561.2638
    female |   2058.7708
-----------+-----------
     Total |   2315.9231
------------------------------------------------------------------------------
        wage |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     _Isex_2 |   -502.493   43.79052   -11.47   0.000    -588.3368   -416.6492
       _cons |   2561.264   30.59848    83.71   0.000     2501.281    2621.247
------------------------------------------------------------------------------

R-squared     =  0.0198
```

Wage and gender

Example

Logarithm of wage and gender

averages

```
     gender |       Mean
------------+------------
       male |    7.662596
     female |    7.493119
------------+------------
      Total |    7.579849
```

- Regression results

```
------------------------------------------------------------------------------
  log(wage) |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
    _Isex_2 |  -.1694763   .0132715   -12.77   0.000    -.1954928   -.1434598
      _cons |   7.662596   .0092734   826.30   0.000     7.644417    7.680775
```

Regression results - additional variable age

log(wage)	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_Isex_2	-.1716849	.0129384	-13.27	0.000	-.1970485	-.1463214
age	.0119115	.0006451	18.46	0.000	.0106468	.0131762
_cons	7.184871	.027408	262.14	0.000	7.131142	7.238599

R-squared = 0.0730

Discrete variables

Variable education:
1 higher
2 secondary+professional courses
3 secondary professional
4 secondary
5 primary+professional courses
6 primary
7 incomplete primary

Wage and education - base lavel: higher education

log(wage)	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_Ieduc~2	-.4008724	.0261286	-15.34	0.000	-.452093	-.3496517
_Ieduc~3	-.4266668	.0157973	-27.01	0.000	-.4576347	-.395699
_Ieduc~4	-.4052833	.0243945	-16.61	0.000	-.4531045	-.3574621
_Ieduc~5	-.6489889	.0160198	-40.51	0.000	-.680393	-.6175848
_Ieduc~6	-.7337858	.0215632	-34.03	0.000	-.7760569	-.6915148
_Ieduc~7	-1.007576	.1375718	-7.32	0.000	-1.277262	-.7378902
_Isex_2	-.2667667	.0117669	-22.67	0.000	-.2898338	-.2436996
age	.0129616	.0005681	22.82	0.000	.011848	.0140752
_cons	7.595186	.0262509	289.33	0.000	7.543725	7.646646

R-squared = 0.2975

Wage and education - base level incomplete primary education

log(wage)	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_Ieduc~1	1.007576	.1375718	7.32	0.000	.7378902	1.277262
_Ieduc~2	.6067038	.1391635	4.36	0.000	.3338975	.8795101
_Ieduc~3	.5809093	.1375684	4.22	0.000	.3112301	.8505886
_Ieduc~4	.6022929	.1388327	4.34	0.000	.330135	.8744507
_Ieduc~5	.3585872	.1375649	2.61	0.009	.0889147	.6282597
_Ieduc~6	.2737903	.1382333	1.98	0.048	.0028075	.5447732
_Isex_2	-.2667667	.0117669	-22.67	0.000	-.2898338	-.2436996
age	.0129616	.0005681	22.82	0.000	.011848	.0140752
_cons	6.58761	.139919	47.08	0.000	6.313322	6.861897

R-squared = 0.2975

Dependence wage on place of living (mistaken regression)

log(wage)	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_Isex_2	-.1716113	.0129379	-13.26	0.000	-.1969738	-.1462488
woj	.0009596	.0007385	1.30	0.194	-.0004881	.0024072
age	.0119054	.0006451	18.45	0.000	.0106407	.01317
_cons	7.169336	.0299006	239.77	0.000	7.110721	7.227951

R-squared = 0.0733

Wage and place of living: contrasts in deviations

log(wage)	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_woj_2	-.0258665	.0268517	-0.96	0.335	-.0785046	.0267717
_woj_3	-.0749633	.0280217	-2.68	0.007	-.129895	-.0200316
_woj_4	-.0001867	.0368011	-0.01	0.996	-.0723291	.0719557
_woj_5	-.0717755	.0238393	-3.01	0.003	-.1185085	-.0250425
_woj_6	-.012634	.0218834	-0.58	0.564	-.0555327	.0302647
_woj_7	.2557709	.0166333	15.38	0.000	.2231642	.2883777
_woj_8	-.0027719	.0366859	-0.08	0.940	-.0746884	.0691446
_woj_9	-.0500334	.0272721	-1.83	0.067	-.1034957	.003429
_woj_10	-.1031224	.0345293	-2.99	0.003	-.1708112	-.0354337

Wage and place of living: contrasts in deviations cont.

_woj_11	.0841202	.0265058	3.17	0.002	.0321601	.1360804
_woj_12	.0839597	.0168495	4.98	0.000	.0509291	.1169903
_woj_13	-.0096191	.0372951	-0.26	0.796	-.0827298	.0634915
_woj_14	-.0930655	.0341943	-2.72	0.007	-.1600977	-.0260334
_woj_15	-.0062165	.0229601	-0.27	0.787	-.0512258	.0387928
_woj_16	.0280367	.034522	0.81	0.417	-.0396379	.0957113
_Isex_2	-.1706226	.0126903	-13.45	0.000	-.1954997	-.1457455
age	.0121618	.0006334	19.20	0.000	.0109201	.0134035
_cons	7.135958	.0272595	261.78	0.000	7.082521	7.189396

R-squared = 0.1132

Variable voivodships

1 Dolnośląskie
2 Kujawsko-pomorskie
3 Lubelskie
4 Lubuskie
5 Łódzkie
6 Małopolskie
7 Mazowieckie
8 Opolskie
9 Podkarpackie
10 Podlaskie
11 Pomorskie
12 Śląskie
13 Świętokrzyskie
14 Warminsko-mazurskie
15 Wielkopolskie
16 Zachodniopomorskie

$$\gamma_1 = -\sum_{i=2}^{S} \gamma_s = -0.002$$

Gender and educations: contrasts in differences

log(wage)	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_educ~1	.4008724	.0261286	15.34	0.000	.3496517	.452093
_educ~2	.0257945	.026151	0.99	0.324	-.02547	.0770589
_educ~3	-.0213835	.0243845	-0.88	0.381	-.0691852	.0264181
_educ~4	.2437056	.0246712	9.88	0.000	.195342	.2920693
_educ~5	.0847969	.0214363	3.96	0.000	.0427747	.1268191
_educ~6	.2737903	.1382333	1.98	0.048	.0028075	.5447732
_Isex_2	-.2667667	.0117669	-22.67	0.000	-.2898338	-.2436996
age	.0129616	.0005681	22.82	0.000	.011848	.0140752
_cons	7.07759	.0318973	221.89	0.000	7.01506	7.140119

R-squared = 0.2975

Interactions

Wage: interactions between gender and education

lpłaca	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_Ieduc_3_1	.6518608	.0206535	31.56	0.000	.6113731	.6923485
_Ieduc_3_2	.1766364	.0180894	9.76	0.000	.1411753	.2120976
_Isex_2	-.3560174	.0198582	-17.93	0.000	-.394946	-.3170887
_IeduXse~1_2	.0747255	.0302043	2.47	0.013	.0155151	.133936
_IeduXse~2_2	.1710516	.0270627	6.32	0.000	.1179998	.2241034
age	.0125822	.0005636	22.33	0.000	.0114775	.013687
_cons	6.966938	.0254847	273.38	0.000	6.91698	7.016897

R-squared = 0.2994

Wage: interactions between eductation and overtime

log(wage)	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_Ieduc_3_1	2.386109	.2045847	11.66	0.000	1.985056	2.787162
_Ieduc_3_2	1.277253	.2771414	4.61	0.000	.7339648	1.820541
overtime	1.711744	.1825266	9.38	0.000	1.353932	2.069557
_IeduXover~1	-1.699581	.1994527	-8.52	0.000	-2.090574	-1.308588
_IeduXover~2	-1.023487	.2733854	-3.74	0.000	-1.559412	-.4875617
_Isex_2	-.255085	.0120629	-21.15	0.000	-.2787321	-.2314378
_cons	5.709825	.185873	30.72	0.000	5.345453	6.074197

R-squared = 0.2521

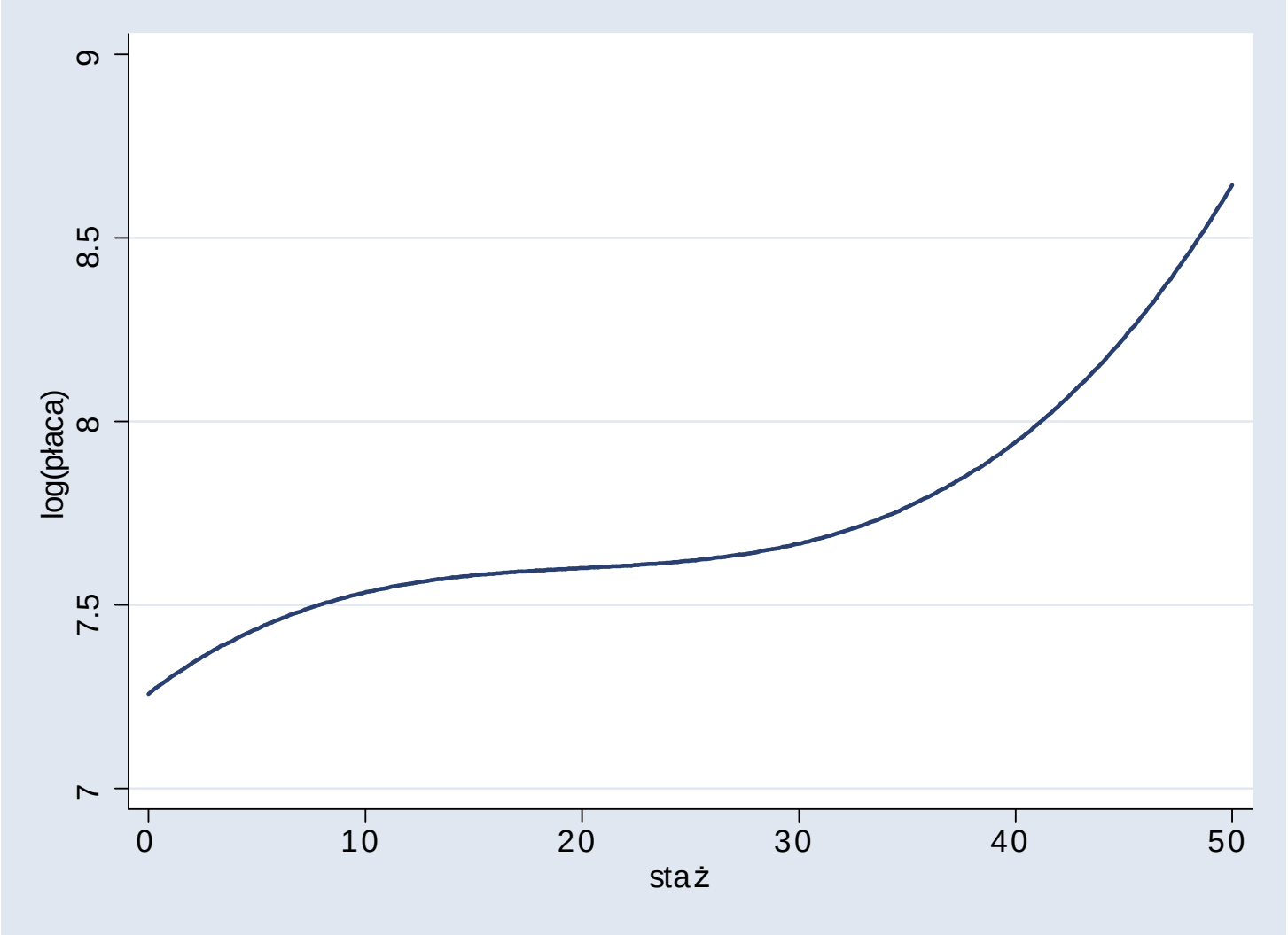
Aproximating nonlinear dependence

Wage: polynomial model dependence of wages on experiance

log(wage)	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
experiance_p1	.0452246	.0050749	8.91	0.000	.0352762	.0551731
experiance_p2	-.0021066	.000289	-7.29	0.000	-.0026731	-.0015401
experiance_p3	.0000351	4.72e-06	7.44	0.000	.0000259	.0000444
_cons	7.257356	.0243597	297.92	0.000	7.209603	7.305109

R-squared = 0.0557

Wage: polynomial model for influence of experiance



Wage: step model for the experiance influence

$$\text{gexperiance1} = \mathbb{I}\left(\text{experiance} \leq 10\right)$$

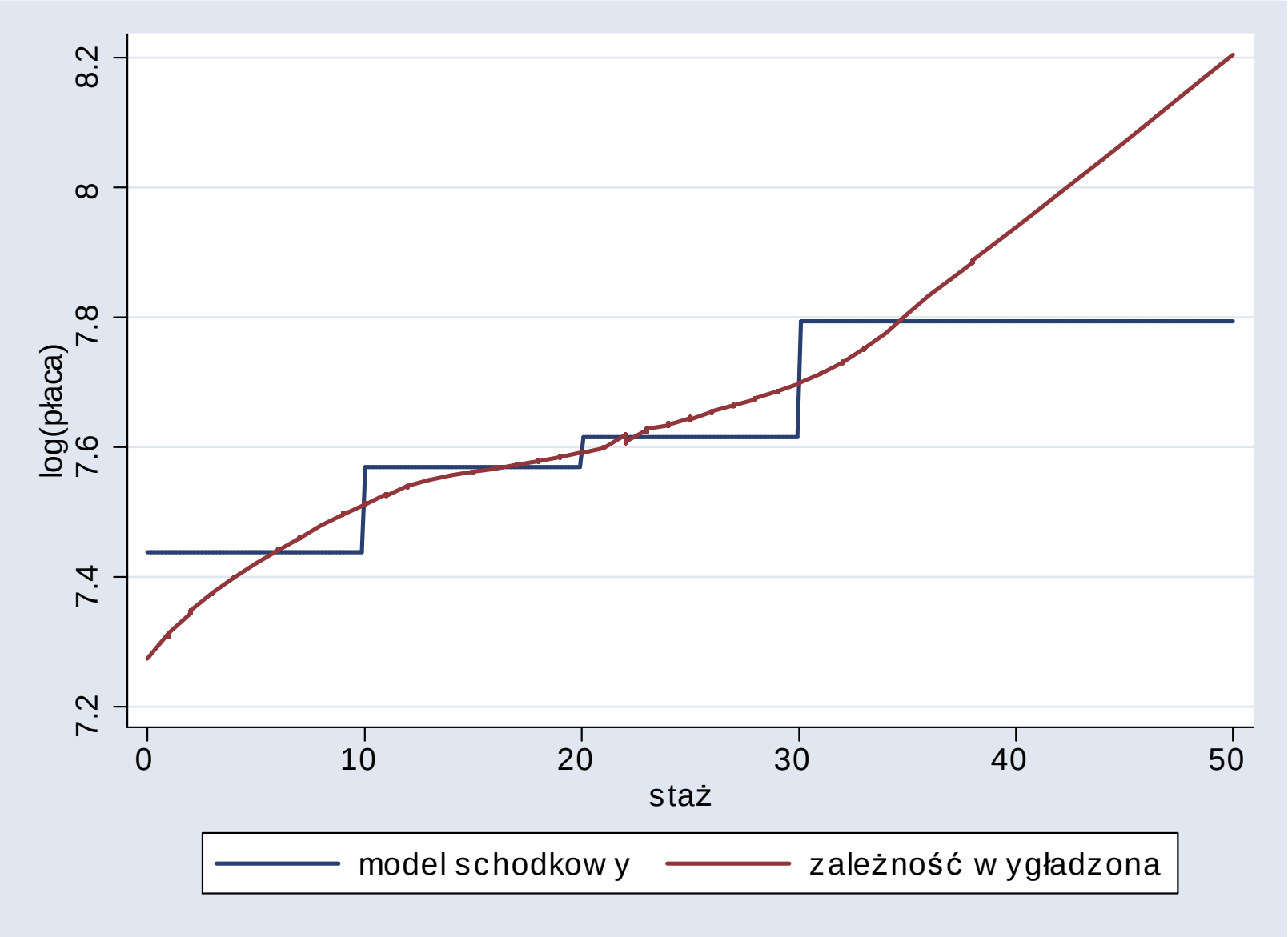
$$\text{gexperiance2} = \mathbb{I}(10 < \text{experiance} \leq 20)$$

$$\text{gexperiance3} = \mathbb{I}(30 < \text{experiance} \leq 30)$$

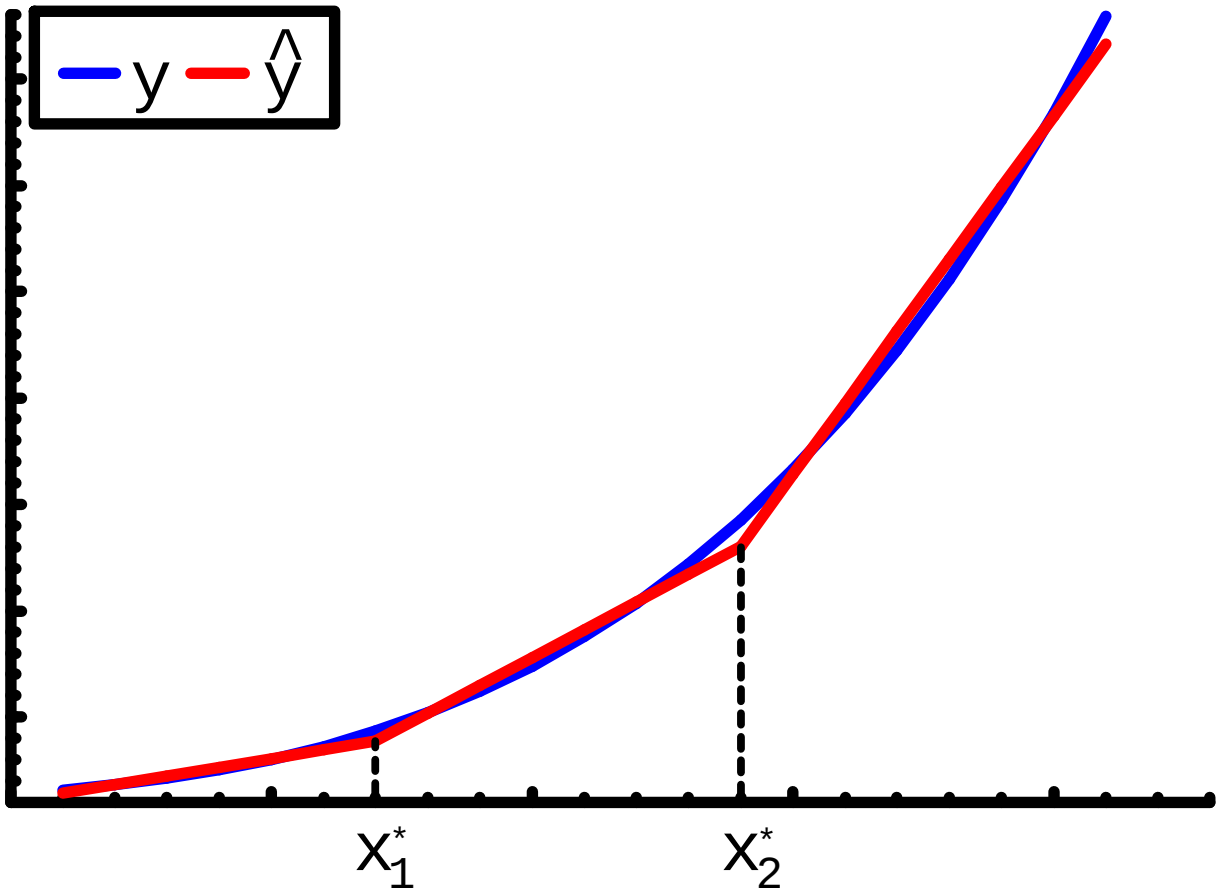
$$\text{gexperiance4} = \mathbb{I}(\text{exepriance} > 30)$$

log(wage)	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gexperiance1	7.438424	.0126625	587.44	0.000	7.413601	7.463246
gexperiance2	7.5699	.0124174	609.62	0.000	7.545558	7.594243
gexperiance3	7.616095	.0118061	645.10	0.000	7.592951	7.639239
gexperiance4	7.792963	.0176188	442.31	0.000	7.758424	7.827502

Wage: step model for influence of experiance



Spline model



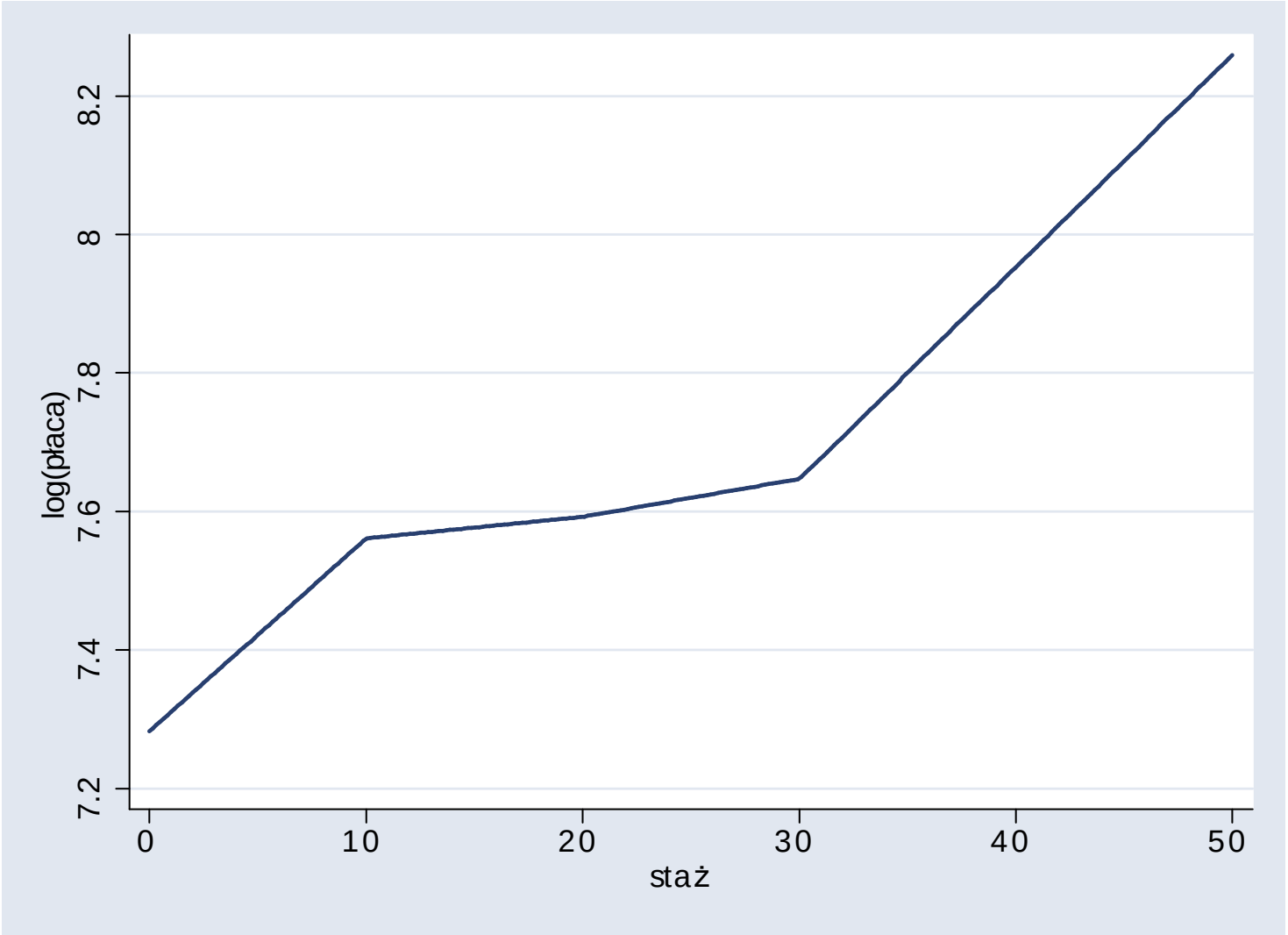
- Wage: spline model for infuence of experiance

Wage: spline model for infuence of experiance: regression

log(wage)	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
oexperiance1	.0278691	.0033877	8.23	0.000	.0212281	.03451
oexperiance1	-.0247743	.00542	-4.57	0.000	-.0353994	-.0141493
oexperiance1	.002366	.0046174	0.51	0.608	-.0066855	.0114176
oexperiance1	.0251516	.005707	4.41	0.000	.013964	.0363392
_cons	7.28248	.0234367	310.73	0.000	7.236536	7.328424

R-squared = 0.0553

Wage: spline model for infuence of experiance



Wage: comparison of models