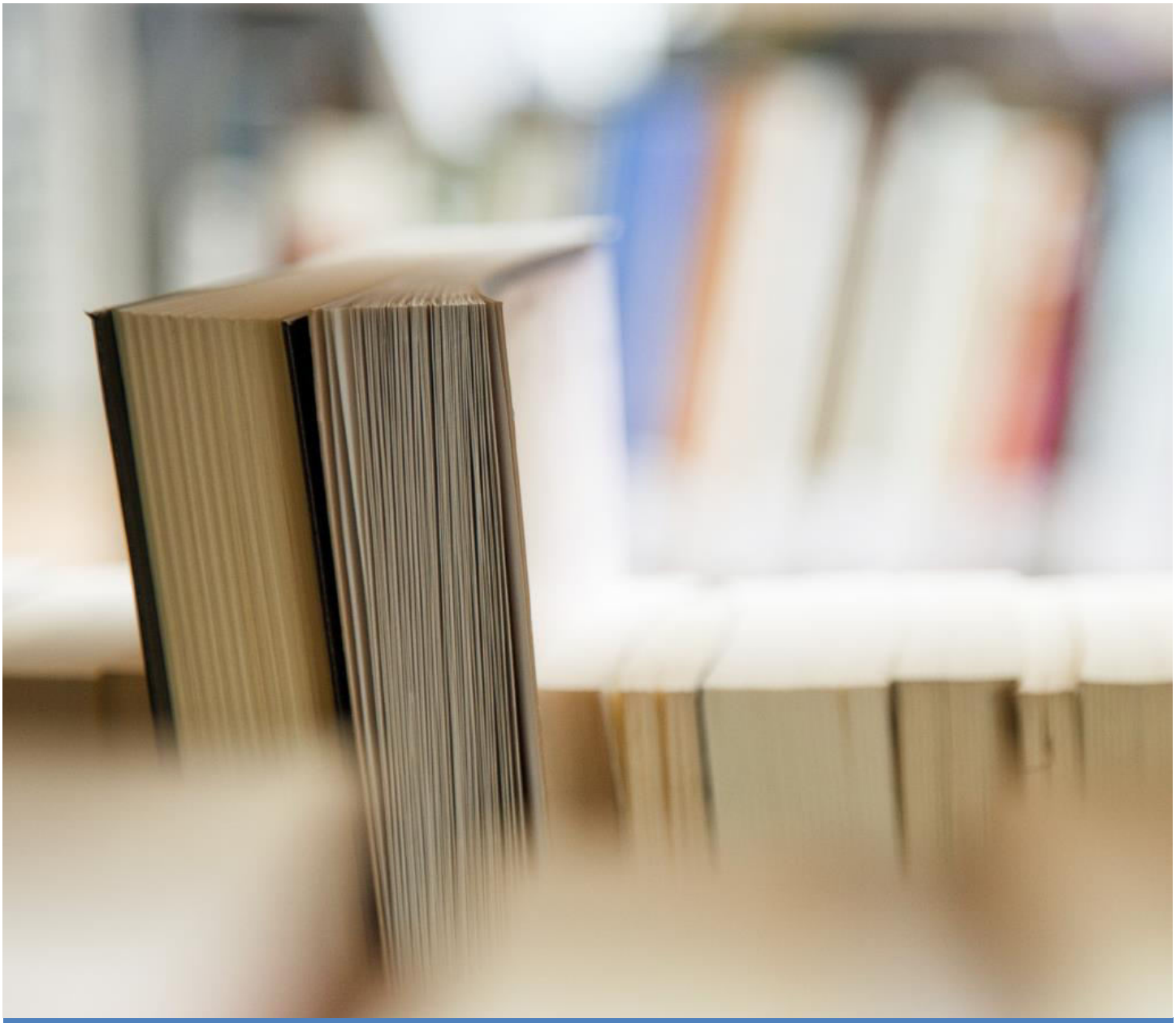

Modul Praktikum Mata Kuliah Statistik II
Regresi Sederhana dan Berganda - Stata

Muliati, SE., MSc.

Regresi Sederhana dan Berganda (1)

MULIATI, SE., MSC

FAKULTAS EKONOMI & BISNIS

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Analisis Regresi

Alat ukur untuk mengetahui hubungan antar variabel

Regress → ramalan atau taksiran (Sir Francis Galton, 1887)

Lebih akurat dibandingkan dengan korelasional.

Regresi dapat memenentukan kemiringan/ tingkat perubahan suatu var thd var lainnya

Analisis Regresi: Hubungan linier antar dua variabel

Apakah pendidikan berpengaruh terhadap upah? → korelasi tidak bisa dipakai → regresi

Pendidikan → variabel independen: variabel yang mempengaruhi: variabel bebas

Upah → variabel dependen: variabel yang dipengaruhi: variabel tidak bebas

Hubungan kausal? Belum tentu...

Sebab Akibat vs Korelasi vs Regresi

Regresi vs Sebab Akibat

- “a statistical relationship, however strong and however suggestive, can never establish causal connection: our ideas of causation must come from outside statistics” (Gujarati, 1995)

Regresi vs Korelasi

- Correlation analysis: seeks to measure the strenght of linear assoction between two variables
- regression analysisi: seeks to estimate or predict the average value of one variable on the basis of fixed values of other variables

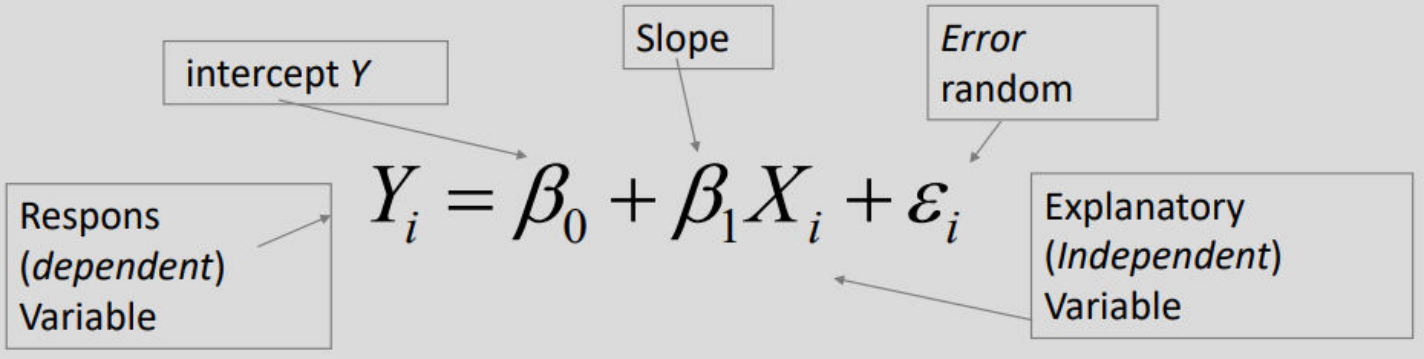
Korelasi vs Regresi

- Analisis regresi dapat dilakukan dengan terlebih dahulu memastikan bahwa antar 2 variabel memiliki keterkaitan (korelasi)
- Semakin tinggi korelasi semakin baik dalam melakukan peramalan
- osi: signifikansi antara variabel Y dan X mutlak diperlukan

Persamaan Regresi

Relation between two variables in linear function of parameter

Population Regression Model :



Sample Regresssion Model : $Y_i = b_0 + b_1 X_i + e_i$

Terminology

Y	X	e
• Dependent variable • Explained variable • Outcome • Response • Regressand • Output • Predicted • Predictand • endogenous	• Explanatory • Independent • Predictor • Regressor • Stimulus/control • Exogenous	• Disturbance • Residual • Residual error

Metode Ordinary Least Square (OLS) – Metode Kuadrat Terkecil

LEAST SQUARES PRINCIPLE A mathematical procedure that uses the data to position a line with the objective of minimizing the sum of the squares of the vertical distances between the actual *Y* values and the predicted values of *Y*.

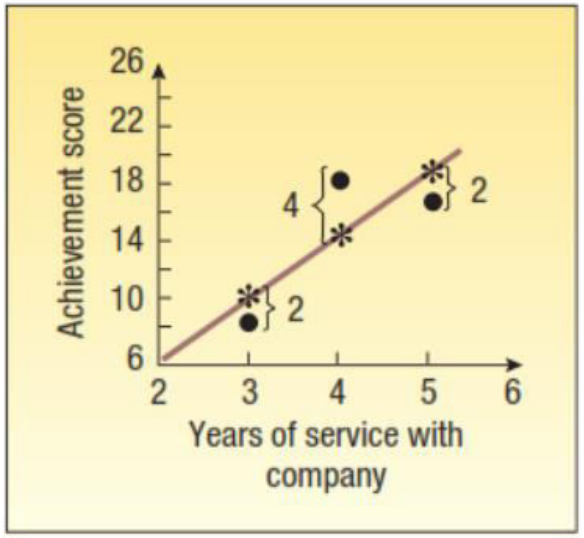


CHART 13–9 The Least Squares Line

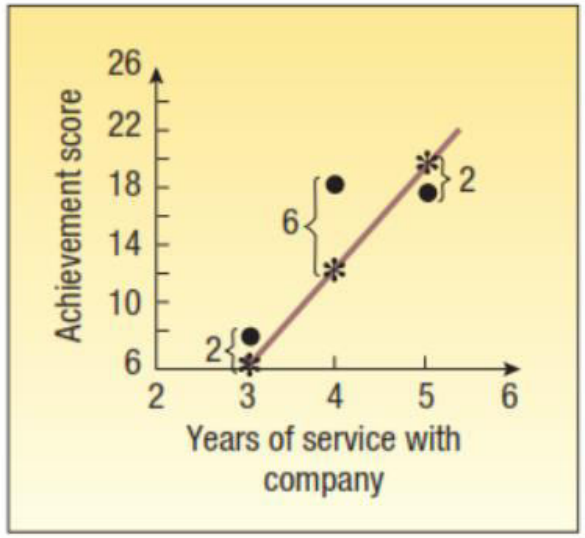


CHART 13–10 Line Drawn with a Straight Edge

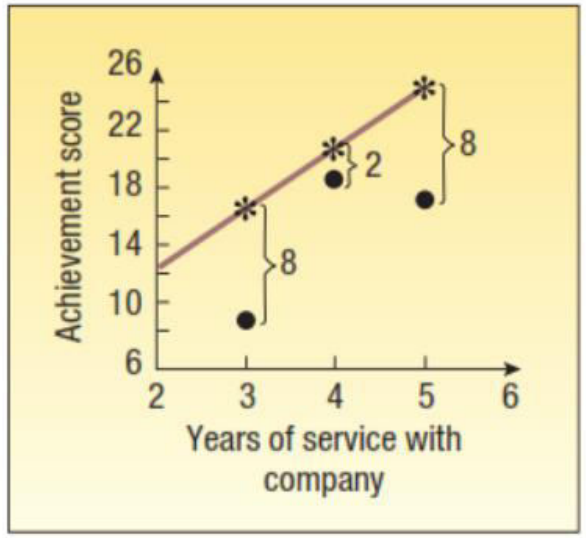


CHART 13–11 Different Line Drawn with a Straight Edge

$$Y = a + bX$$

$$Y = a + b_1X_1 + b_2X_2 + b_nX_n$$

Ide: **meminimumkan jumlah kuadrat dari error**

a = intersep/konstanta

b = koefisien regresi/slope

Persamaan regresi linier di atas dapat pula dituliskan dalam bentuk:

$$Y = \frac{\sum xy}{\sum x^2} x$$

Mencari nilai a dan b

Rumus 1:

$$a = \frac{(\sum Y)(\sum X^2) - (\sum Y)(\sum XY)}{(n)(\sum X^2) - (\sum X)^2}$$

$$b = \frac{(n)(\sum XY) - (\sum X)(\sum Y)}{(n)(\sum X^2) - (\sum X)^2}$$

Pendekatan matriks

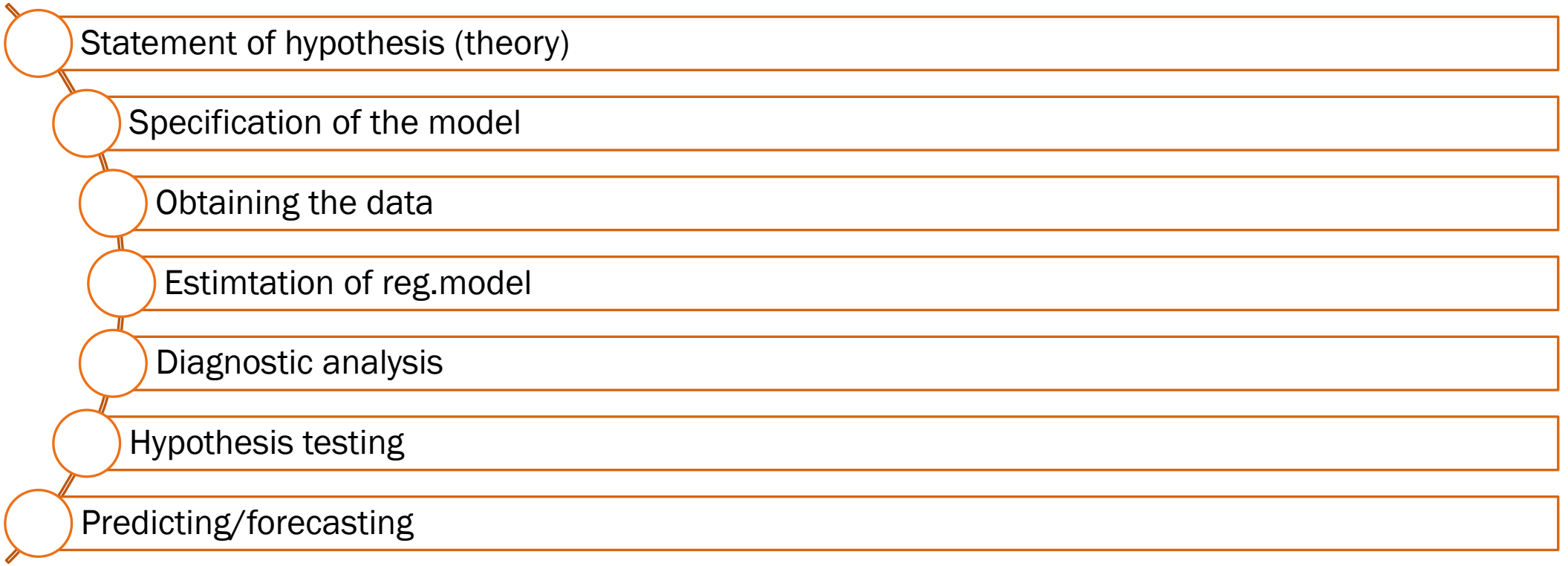
$$\begin{bmatrix} n & \sum X \\ \sum X & \sum X^2 \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} \sum Y \\ \sum XY \end{bmatrix} \qquad a = \frac{\det A_1}{\det A} \qquad b = \frac{\det A_2}{\det A}$$

$\det A = (n)(\sum X^2) - (\sum X)(X)$

$\det A_1 = (\sum Y)(\sum X^2) - (\sum Y)(\sum XY)$

$\det A_2 = (n)(\sum XY) - (\sum X)(\sum Y)$

Proses memodelkan regresi



OLS: Contoh

Model: pendidikan berpengaruh terhadap upah

$$wage = \beta_0 + \beta_1 educ + e$$

Wage adalah upah per jam dalam satuan dollar

Educ adalah tahun tempuh pendidikan

Error term adalah variabel lain yang tidak diperhitungkan dalam model seperti lama kerja di tempat kerja saat ini, kecerdasan, dst.

Goodness of Fit

Standard Error Estimate (SEE) = ukuran sebaran atau dispersi dari nilai observasi pada garis regresi, salah satunya digunakan untuk menghitung confidence interval.

$$s_{y.x} = \sqrt{\frac{\sum(y-\hat{y})^2}{n-2}}$$

Coefficient of determination R^2 = ukuran seberapa baik garis regresi fit (cocok) terhadap data

Goodness of Fit

Seberapa baik variabel independen menjelaskan variabel dependen?

Ukuran variasi:

$$SST = \sum_{i=1}^{n}(y_i - \bar{y})^2 \quad SSE = \sum_{i=1}^{n}(\hat{y}_i - \bar{y})^2 \; SSR = \sum_{i=1}^{n}(\hat{u}_i)^2$$

Total sum of square: total variasi pada variabel dependen

Explained sum of square: variasi yg dapat dijelaskan oleh model

Residual sum of square: variasi yg tidak dapat dijelaskan oleh model

Goodness of Fit

Decomposition of Total Variation:

$$\text{SST} = \text{SSE} + \text{SSR}$$

Ukuran goodness of fit R^2

$$R^2 = \frac{SSE}{SST} = 1 - \frac{SSR}{SST}$$

Praktik

1. Buka file data-latihan_metolit.xlxs

2. Lakukan regresi sederhana dengan variabel dependen adalah wage, variabel educ sebagai variabel independen

3. Perhatikan nilai R^2

4. Perhatikan nilai parameter yang dihasilkan

5. Generate variabel baru dengan transformasi variabel ke dalam bentuk log,

6. Regresi ulang dengan variabel baru

$$\widehat{wage} = -2.28 + 0.82\, educ$$

```
. reg wage educ
```

Source	SS	df	MS
Model	920.075218	1	920.075218
Residual	8541.21251	245	34.8620919
Total	9461.28772	246	38.4605192

Number of obs	= 247
F(1, 245)	= 26.39
Prob > F	= 0.0000
R-squared	= 0.0972
Adj R-squared	= 0.0936
Root MSE	= 5.9044

wage	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
educ	.8186293	.1593501	5.14	0.000	.5047584	1.1325
_cons	-2.278408	2.161863	-1.05	0.293	-6.536616	1.9798

Praktik

1. intercept -2.28 → jika seseorang tidak memiliki pendidikan maka upah per jam yang diterima adalah -$2.28 ??

2. Slope variabel pendidikan: semakin tinggi pendidikan maka semakin tinggi pula upah per jam. Semakin tinggi pendidikan, upah per jam individu tersebut akan naik sebesar 0.82 cent

3. Jika pendidikan bertambah 4 tahun maka upah per jam akan meningkat $1 dari upah sebelumnya. $\widehat{wage} = -2.28 + 0.82(4) = \$1$

Interpretasi model

Model	Dependent Variable	Independent Variable	Interpretation of β_1
level-level	y	x	$\Delta y = \beta_1 \Delta x$
level-log	y	$\log(x)$	$\Delta y = (\beta_1/100)\%\Delta x$
log-level	$\log(y)$	x	$\%\Delta y = (100\beta_1)\Delta x$
log-log	$\log(y)$	$\log(x)$	$\%\Delta y = \beta_1 \%\Delta x$

$$\widehat{(lwage)} = -0.8 + 1.08\, educ$$

```
. reg lwage leduc
```

Source	SS	df	MS
Model	10.0433448	1	10.0433448
Residual	74.0817752	245	.302374593
Total	84.12512	246	.341972033

Number of obs	= 247
F(1, 245)	= 33.21
Prob > F	= 0.0000
R-squared	= 0.1194
Adj R-squared	= 0.1158
Root MSE	= .54989

lwage	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
leduc	1.084537	.1881819	5.76	0.000	.7138761	1.455197
_cons	-.8147705	.4859706	-1.68	0.095	-1.771984	.1424429

Terimakasih

Regresi Sederhana dan Berganda (2)

MULIATI, SE., MSC

FAKULTAS EKONOMI & BISNIS

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Testing Hypothesis

H0: barang ini bagus
H1: barang ini tidak bagus

2 kemungkinan kesalahan:
type 1 & type 2 error

Type 1 error → kita menolak H0 padahal H0 benar

Type 2 error → kita menerima H0 padahal H0 salah

α

Masalah:

Kita tidak tahu error yang mana yang kita lakukan ☹

Tetapi kita bisa menghitung “probabilita” kita melakukan error tersebut ☺

$\alpha = P(Reject\ H_0 | H_0)$

- probabilita menolak H0 padahal H0 benar”

Alpha adalah level signifikansi yang digunakan: persentase probabilita kita melakukan kesalahan dengan menolak H0 padahal H0 benar

Analisis Regresi Berganda

$$Y = a + b_1X_1 + b_2X_2 + b_nX_n + e$$

Ide: **meminimumkan jumlah kuadrat dari error**

a = intersep/konstanta

b = koefisien regresi/slope

**Disarankan untuk menggunakan software statistik karena perhitungannya kompleks*

OLS: Contoh

Model: pendidikan berpengaruh terhadap upah

$$wage = \beta_0 + \beta_1 educ + \beta_2 hours + \beta_3 tenure + e$$

Wage adalah upah per jam dalam satuan dollar

Educ adalah tahun tempuh pendidikan

Hours adalah jam kerja per minggu

Tenure adalah lama kerja dalam satuan tahun di perusahaan terakhir

Error term adalah variabel lain yang tidak diperhitungkan dalam model seperti kecerdasan individu, dll.

Interpretasi model

Model	Dependent Variable	Independent Variable	Interpretation of β_1
level-level	y	x	$\Delta y = \beta_1 \Delta x$
level-log	y	$\log(x)$	$\Delta y = (\beta_1/100)\%\Delta x$
log-level	$\log(y)$	x	$\%\Delta y = (100\beta_1)\Delta x$
log-log	$\log(y)$	$\log(x)$	$\%\Delta y = \beta_1 \%\Delta x$

Test – variabel individual: t-test

Test statistik yang digunakan adalah t distribution dengan n-(k+1) degree of freedom

Hypothesis → $H_0: \beta_j = 0, \quad H_1: \beta_j \neq 0$

t-statistic → $t_{\widehat{\beta_j}} = \frac{\widehat{\beta_j}}{se\widehat{\beta}_j}$

One tailed → $H_1: \beta_j > 0, H_1: \beta_j < 0$

Two tailed → $H_1: \beta_j \neq 0$

Test – variabel individual: confidence interval

Confidence Interval → $\widehat{\beta_j} \pm c.se\ \widehat{\beta_j}$

$\widehat{\beta_j}$ koefisien beta

c persentil pada data

se standar error

Test – variabel individual: p-value

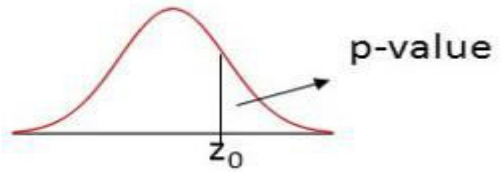
Hypothesis →

$H_0: \beta_j = 0,$

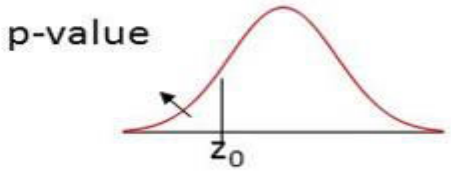
$H_1: \beta_j \neq 0$

- Determine the value of the test statistics, $z_0 = \frac{\bar{x} - \mu_0}{\sigma / \sqrt{n}}$
- For One-Tailed Test:

p-value= $P(z > z_0)$ if $H_A: \mu > \mu_0$



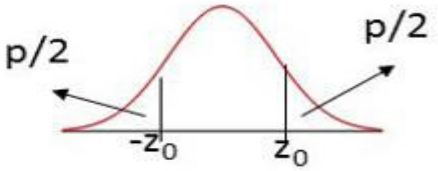
p-value= $P(z < z_0)$ if $H_A: \mu < \mu_0$



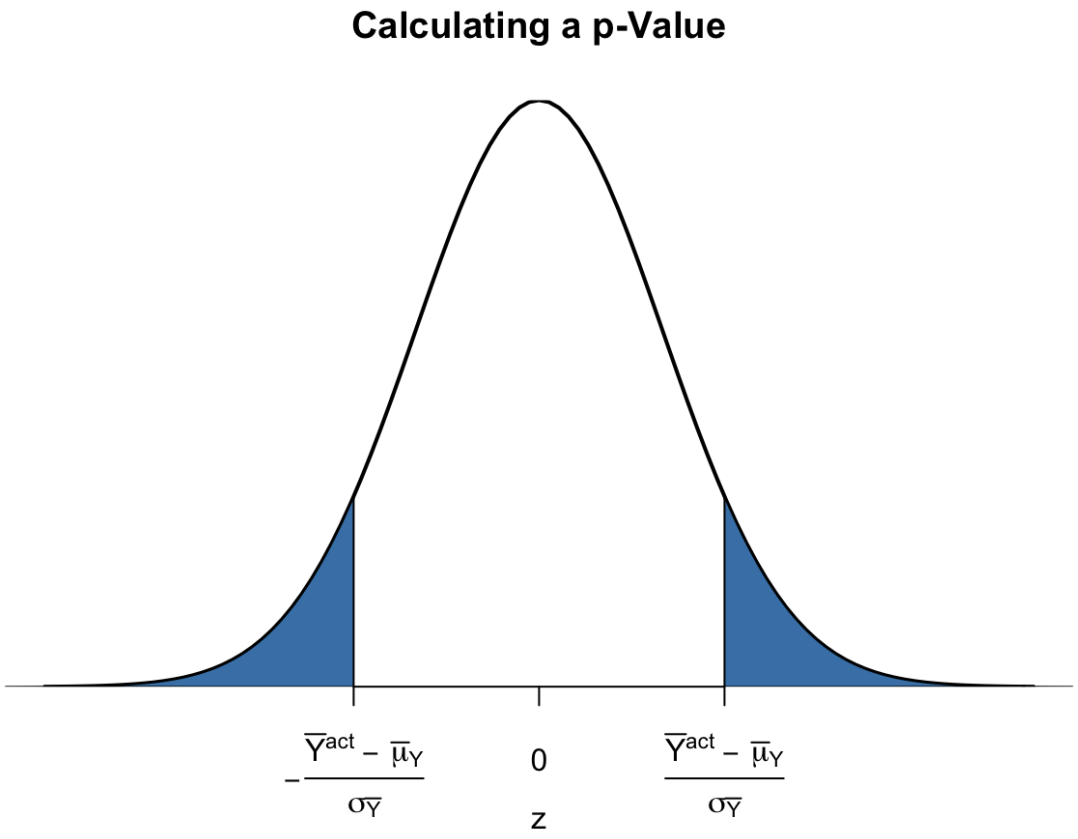
- For Two-Tailed Test

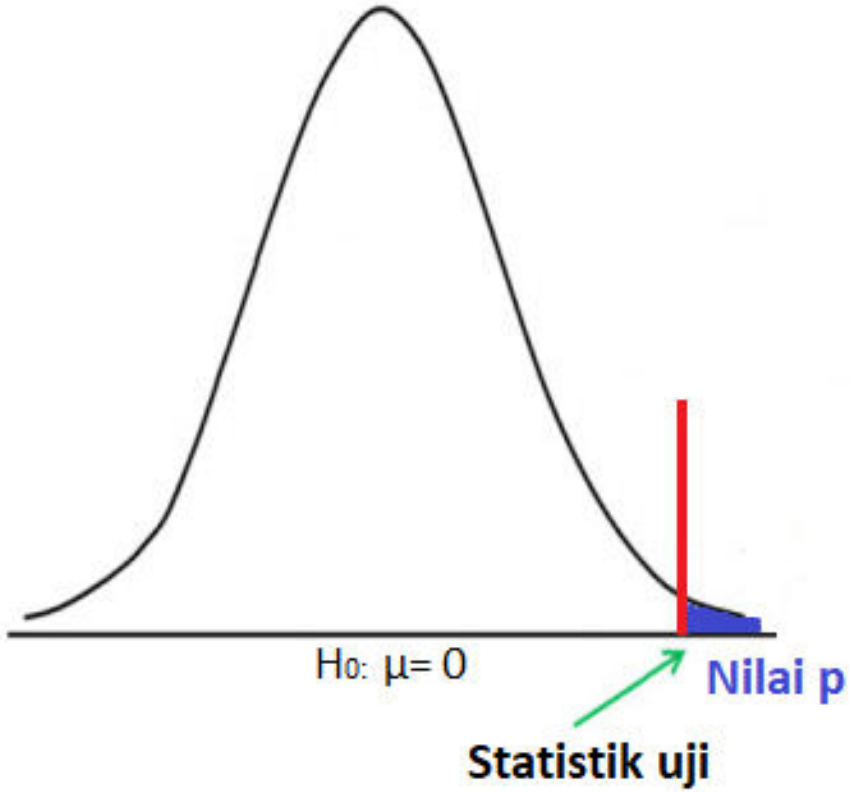
p=p-value = $2.P(z>z_0)$

p=p-value = $2.P(z<-z_0)$



Daerah penerimaan dan penolakan H0





Test – model: F test & Goodness of fit

$$F = \frac{(SSR_r - SSR_{ur})/q}{SSR_{ur}/(n-k-1)}$$

q = degree of freedom

Goodness of fit = R^2

Pemeriksaan Asumsi: Normalitas

1. Data terdistribusi normal → bentuk lonceng
2. Using graph: histogram – density plot
3. Melihat p-value: Shaprio-Wilks Test
4. P-value < 0.05 → not normal
5. Perbaikan: transform data

Multikolinearitas

1. Multikolinearitas (interkorelasi) antar variabel

2. Akibatnya: estimasi yang dihasilkan tidak akurat, sulit menginterpretasikan koefisien.

3. Ciri-ciri: R^2 tinggi, tetapi variabel banyak yang tidak signifikan, ada kemungkinan tanda hubungan terbalik.

4. Deteksi: Variance Inflation Factor (VIF)

$$VIF = \frac{1}{1-R^2}$$

Perbaikan:

1. Removing variable with high collinearity (hati-hati resiko mis-specification)
2. Transform data dengan first difference → data timeseries
3. Menambahkan variabel baru
4. Gunakan/eksplore alternatif prosedur estimasi yang lain

Heterokedastisitas

1. Varians dari error tidak konstan/homogen

2. Akibat: akan merubah standar error yang digunakan untuk menghitung koefisien beta → bisa jadi koefisien beta tidak akurat

3. Mengapa bisa terjadi? Contoh: peningkatan teknik pengumpulan data. Semakin bagus sistem yang digunakan semakin kecil kesalahan yang terjadi → memperkecil kesalahan

4. Uji heterokedastisitas: using graph → qq plot, pp plot, Uji Breusch-Pagan, Uji Cameron-Trivedi

5. Perbaikan: menggunakan robust standard error → koefisien parameter tidak berubah, WLS, GLS

Autokorelasi

1. Korelasi antar error sepanjang periode waktu penelitian → data time series

2. Akibatnya: varians yang dibentuk dari SE menjadi lebih kecil dari yang seharusnya. SE kecil → t stat besar → uji t tidak valid

3. Pemeriksaan: using graph, Durbin-Watson Test, Serial LM Correlation test

Praktik regresi berganda

1. Buka file data-latihan_metolit.xlxs

2. Lakukan regresi berganda dengan variabel dependen adalah lwage, variabel leduc, lhours, dan ltenure sebagai variabel independen

3. Perhatikan nilai R^2, adj R^2, dan Fstat

4. Perhatikan nilai parameter yang dihasilkan: uji t, p-value

5. Perhatikan parameter uji asumsi klasik

$$\widehat{lwage} = -1.52 + 0.96\, leduc + 0.24\, lhours + 0.14\, ltenure + e$$

```
. reg lwage leduc lhours ltenure
```

Source	SS	df	MS
Model	19.9015947	3	6.6338649
Residual	62.589442	238	.262980849
Total	82.4910367	241	.342286459

Number of obs	= 242
F(3, 238)	= 25.23
Prob > F	= 0.0000
R-squared	= 0.2413
Adj R-squared	= 0.2317
Root MSE	= .51282

lwage	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
leduc	.9651933	.1798115	5.37	0.000	.610968	1.319419
lhours	.2409418	.0773121	3.12	0.002	.0886384	.3932453
ltenure	.1398976	.0296074	4.73	0.000	.0815715	.1982237
_cons	-1.523531	.540286	-2.82	0.005	-2.587884	-.4591774

Terimakasih

Syntax Stata untuk Regresi

```
clear all
set more off

#input/import data
#label variable all
#idcode = id responden
#age = umur saat ini
#married = status pernikahan
#educ =   pendidikan formal
#industry = sektor kerja
#wage =   upah per jam dollar
#hours = jam kerja per minggu
#tenure = lama kerja dalam tahun

label variable idcode "id responden"
label variable age "umur saat ini"
label variable married "status pernikahan"
label variable educ "pendidikan formal"
label variable industry "sektor kerja"
label variable wage "upah per jam kerja"
label variable hours "jam kerja per minggu"
label variable tenure "lama kerja dalam tahun"

#regresi sederhana
reg wage educ

#membuat dataset untuk variabel baru
gen lwage=log(wage)
gen leduc=log(educ)

#regresi berganda
reg lwage leduc
reg lwage leduc lhours ltenure

#membuat dataset untuk variabel residual
predict resid, residual

#checking assumption
#multikolinearitas
estat vif

#heterokedastisitas (cameron & trivedi test, breusch-pagan test)
estat imtest
estat hettest
```

```
#normality of the residuals
hist resid, normal
sktest resid

#autokorelasi
estat bgodfrey
```

Data-Mentah Latihan Regresi

idcode	age	married	educ	industry	wage	hours	tenure
1	37	single	12	Transport/Comm/Utility	11.74	48	5.3
2	37	single	12	Manufacturing	6.40	40	5.3
3	42	single	12	Manufacturing	5.02	40	1.3
4	43	married	17	Professional Services	9.03	42	1.8
5	42	married	12	Manufacturing	8.08	48	17.8
6	39	married	12	Professional Services	4.63	30	2.3
7	37	single	12	Transport/Comm/Utility	10.49	40	19.0
8	40	married	18	Professional Services	17.21	45	14.2
9	40	married	14	Professional Services	13.08	8	5.5
10	40	married	15	Professional Services	7.75	50	2.3
11	39	married	16	Professional Services	16.80	16	8.4
12	40	married	15	Professional Services	15.48	40	13.8
13	40	married	15	Wholesale/Retail Trade	5.23	40	7.8
14	40	single	15	Professional Services	10.16	40	5.6
15	39	married	15	Professional Services	9.66	4	4.7
16	41	married	15	Professional Services	9.06	32	3.0
17	42	married	15	Professional Services	8.05	45	8.1
18	41	married	14	Professional Services	11.10	24	3.4
19	42	married	14	Professional Services	9.58	40	5.4
20	37	single	12	Business/Repair Svc	4.18	40	0.9
21	44	single	16	Professional Services	9.79	40	7.9
22	41	married	18	Public Administration	28.46	35	3.5
23	35	married	12	Transport/Comm/Utility	10.19	38	17.3
24	44	married	18	Professional Services	3.05	25	2.9
25	35	single	12	Transport/Comm/Utility	3.53	40	0.8
26	35	single	15	Finance/Ins/Real Estate	5.85	40	0.3
27	36	single	16	Professional Services	35.73	45	6.4
28	38	married	12	Professional Services	4.43	18	3.3
29	40	single	12	Professional Services	5.03	55	0.8
30	42	married	12	Wholesale/Retail Trade	5.78	40	7.3
31	38	married	10	Wholesale/Retail Trade	5.11	40	5.9
32	44	single	15	Professional Services	25.16	18	2.1

idcode	age	married	educ	industry	wage	hours	tenure
33	38	married	12	Professional Services	4.40	30	3.3
34	39	married	13	Wholesale/Retail Trade	4.71	9	9.8
35	40	married	15	Professional Services	8.05	24	3.2
36	36	married	13	Transport/Comm/Utility	16.74	38	16.1
37	34	married	12	Manufacturing	5.72	38	2.5
38	36	married	12	Professional Services	7.46	40	1.1
39	36	single	14	Manufacturing	6.79	40	0.5
40	39	single	11	Manufacturing	12.50	40	9.3
41	40	married	12	Finance/Ins/Real Estate	17.70	35	9.1
42	45	married	14	Professional Services	12.08	8	0.0
43	38	single	11	Manufacturing	9.41	40	1.5
44	44	single	17	Entertainment/Rec Svc	13.17	44	1.3
45	36	married	18	Professional Services	11.06	35	0.0
46	41	married	17	Professional Services	3.74	18	2.8
47	41	married	16	Wholesale/Retail Trade	4.03	8	5.6
48	38	single	12	Public Administration	10.84	40	17.4
49	43	single	8	Manufacturing	4.35	40	1.1
50	45	married	12	Professional Services	4.71	20	2.6
51	39	married	12	Transport/Comm/Utility	9.73	38	20.7
52	41	single	6	Business/Repair Svc	2.90	37	0.8
53	39	single	12	Professional Services	10.06	40	19.8
54	36	married	12	Finance/Ins/Real Estate	8.52	40	19.0
55	43	single	12	Professional Services	8.49	37	10.2
56	43	married	12	Manufacturing	5.60	40	0.7
57	41	single	12	Professional Services	4.23	38	0.3
58	36	single	10	Manufacturing	5.62	43	2.7
59	42	married	12	Public Administration	4.65	30	1.5
60	36	married	17	Professional Services	15.48	30	9.8
61	44	single	9	Professional Services	4.83	35	8.5
62	43	single	14	Professional Services	40.20	40	1.2
63	43	married	18	Professional Services	15.48	40	5.8
64	37	married	15	Professional Services	10.03	40	0.6
65	43	married	10	Ag/Forestry/Fisheries	3.62	40	0.3
66	40	married	12	Ag/Forestry/Fisheries	9.30	20	3.1
67	37	married	18	Professional Services	10.22	50	4.8
68	36	married	11	Finance/Ins/Real Estate	10.01	37	17.3
69	38	married	14	Professional Services	4.23	4	1.1
70	37	married	13	Construction	4.83	25	7.5
71	41	married	17	Professional Services	7.75	40	3.8
72	36	single	16	Professional Services	9.85	37	14.8
73	44	married	15	Professional Services	10.87	30	3.4
74	43	single	12	Personal Services	3.22	35	2.9

idcode	age	married	educ	industry	wage	hours	tenure
75	38	single	12	Public Administration	8.16	40	3.5
76	43	single	12	Manufacturing	8.45	40	13.3
77	41	married	12	Professional Services	8.29	40	12.1
78	41	married	12	Manufacturing	9.68	40	8.4
79	36	married	12	Ag/Forestry/Fisheries	4.53	40	2.2
80	36	single	14	Wholesale/Retail Trade	3.34	30	0.3
81	41	married	11	Finance/Ins/Real Estate	8.45	24	3.2
82	38	married	10	Wholesale/Retail Trade	6.04	40	4.0
83	37	married	14	Professional Services	10.32	18	1.3
84	38	single	18	Professional Services	11.61	50	2.1
85	37	single	11	Manufacturing	5.02	40	10.9
86	43	single	10	Manufacturing	6.44	40	14.4
87	36	single	16	Wholesale/Retail Trade	5.03	40	3.8
88	35	married	12	Professional Services	4.83	38	2.1
89	35	single	13	Professional Services	11.07	40	8.9
90	40	married	16	Manufacturing	8.32	35	1.8
91	37	single	16	Entertainment/Rec Svc	13.08	40	8.8
92	38	married	13	Professional Services	5.63	40	4.7
93	35	single	16	Manufacturing	12.56	45	15.8
94	34	married	16	Public Administration	6.68	40	6.7
95	42	single	15	Manufacturing	5.64	40	1.3
96	42	married	16	Finance/Ins/Real Estate	4.03	15	0.3
97	42	married	16	Business/Repair Svc	18.07	30	9.8
98	36	married	16	Professional Services	5.81	40	13.9
99	36	married	18	Professional Services	24.66	20	3.8
100	36	single	17	Professional Services	7.21	40	1.8
101	39	married	12	Professional Services	4.69	24	8.8
102	35	married	18	Public Administration	12.70	40	8.6
103	36	single	13	Finance/Ins/Real Estate	9.57	40	11.3
104	36	married	15	Professional Services	6.19	40	1.0
105	44	married	18	Professional Services	7.68	50	3.9
106	39	single	12	Professional Services	9.81	40	9.8
107	45	married	14	Transport/Comm/Utility	4.03	40	24.8
108	38	married	16	Professional Services	11.61	40	2.8
109	38	single	12	Professional Services	6.96	40	2.5
110	41	married	12	Professional Services	4.26	40	2.8
111	44	single	14	Professional Services	4.51	40	1.3
112	44	single	14	Professional Services	9.23	40	0.8
113	40	married	16	Professional Services	3.32	14	1.8
114	38	married	16	Professional Services	8.05	40	10.7
115	36	single	11	Wholesale/Retail Trade	5.11	40	11.3
116	42	married	12	Business/Repair Svc	3.55	20	0.3

idcode	age	married	educ	industry	wage	hours	tenure
117	38	married	10	Manufacturing	1.00	16	1.0
118	35	married	12	Wholesale/Retail Trade	7.32	22	16.2
119	35	married	16	Wholesale/Retail Trade	9.89	55	6.3
120	38	married	13	Wholesale/Retail Trade	5.89	50	2.6
121	41	married	12	Professional Services	4.86	15	0.8
122	44	married	12	Construction	2.80	46	0.8
123	42	single	12	Professional Services	3.05	40	4.6
124	34	married	12	Wholesale/Retail Trade	5.64	30	1.8
125	44	married	12	Professional Services	8.81	32	11.4
126	37	married	16	Finance/Ins/Real Estate	23.24	40	2.3
127	41	single	16	Finance/Ins/Real Estate	12.22	38	6.8
128	38	single	18	Professional Services	12.97	40	6.5
129	40	married	16	Professional Services	15.79	40	15.5
130	37	married	14	Professional Services	6.96	40	13.4
131	35	single	12	Wholesale/Retail Trade	4.39	22	2.3
132	37	married	18	Professional Services	11.15	50	0.8
133	36	married	15	Professional Services	9.66	16	0.7
134	38	single	16	Finance/Ins/Real Estate	29.73	50	1.5
135	45	married	12	Professional Services	4.49	18	2.7
136	41	single	14	Wholesale/Retail Trade	6.69	16	0.8
137	44	married	12	Wholesale/Retail Trade	5.85	25	0.9
138	34	single	12	Transport/Comm/Utility	4.61	60	3.3
139	38	single	9	Business/Repair Svc	4.03	30	
140	42	single	14	Professional Services	12.18	40	2.5
141	43	single	16	Professional Services	4.75	40	0.7
142	37	single	15	Manufacturing	8.05	40	12.4
143	36	single	9	Manufacturing	7.45	40	4.8
144	35	married	16	Professional Services	8.52	40	11.5
145	41	married	14	Professional Services	7.25	18	1.3
146	41	married	14	Wholesale/Retail Trade	11.97	40	6.2
147	45	married	12	Professional Services	8.81	32	5.1
148	36	married	14	Finance/Ins/Real Estate	11.07	40	17.0
149	39	married	14	Professional Services	9.68	40	2.4
150	35	married	13	Finance/Ins/Real Estate	3.54	20	14.2
151	36	single	12	Wholesale/Retail Trade	4.42	35	2.5
152	43	married	16	Business/Repair Svc	7.32	40	9.8
153	45	married	12	Finance/Ins/Real Estate	8.05	40	17.4
154	44	married	14	Professional Services	10.84	40	6.0
155	37	married	12	Manufacturing	38.71	40	10.8
156	41	single	12	Manufacturing	9.90	36	9.3
157	37	married	13	Professional Services	10.35	35	8.1
158	41	single	12	Manufacturing	11.51	42	17.5

idcode	age	married	educ	industry	wage	hours	tenure
159	38	married	16	Finance/Ins/Real Estate	23.82	65	3.8
160	43	single	13	Wholesale/Retail Trade	7.55	40	20.2
161	42	single	12	Public Administration	7.96	35	1.6
162	41	married	13	Professional Services	4.83	25	
163	40	married	14	Professional Services	5.47	15	0.1
164	43	married	8	Manufacturing	8.05	40	2.8
165	36	single	16	Manufacturing	6.55	40	13.8
166	37	married	14	Professional Services	3.26	32	1.9
167	37	married	13	Manufacturing	4.83	20	0.8
168	35	married	16	Wholesale/Retail Trade	8.41	40	6.4
169	37	married	16	Manufacturing	16.53	40	0.0
170	36	married	12	Manufacturing	6.18	40	9.3
171	40	single	12	Public Administration	5.73	40	10.5
172	36	married	12	Manufacturing	6.28	40	0.5
173	37	married	18	Professional Services	1.03	15	4.6
174	36	married	14	Professional Services	5.96	26	1.7
175	43	single	14	Professional Services	10.19	42	2.5
176	36	married	16	Finance/Ins/Real Estate	5.52	39	5.5
177	35	single	15	Professional Services	5.79	50	3.3
178	34	married	12	Personal Services	3.34	20	0.2
179	36	married	12	Manufacturing	6.28	40	2.3
180	36	single	11	Personal Services	1.72	35	7.2
181	42	single	12	Personal Services	3.49	30	5.2
182	34	single	12	Manufacturing	3.64	40	1.0
183	40	married	12	Wholesale/Retail Trade	2.68	30	0.4
184	43	married	13	Professional Services	7.75	40	3.1
185	36	single	16	Public Administration	11.41	38	8.3
186	37	married	12	Manufacturing	7.04	55	6.8
187	43	married	13	Finance/Ins/Real Estate	6.66	40	1.8
188	34	single	12	Personal Services	3.05	30	1.2
189	37	married	12	Public Administration	7.85	40	18.3
190	37	married	11	Finance/Ins/Real Estate	8.15	38	2.8
191	42	married	9	Personal Services	7.25	16	0.1
192	37	married	13	Wholesale/Retail Trade	5.64	20	1.8
193	39	married	12	Professional Services	11.05	37	4.0
194	38	single	16	Wholesale/Retail Trade	11.63	45	4.2
195	45	married	14	Professional Services	8.62	42	6.9
196	39	married	14	Professional Services	11.25	20	10.8
197	40	single	10	Wholesale/Retail Trade	5.24	43	5.8
198	39	married	13	Personal Services	9.20	7	2.0
199	36	married	12	Wholesale/Retail Trade	3.76	30	0.3
200	38	married	14	Finance/Ins/Real Estate	35.73	45	2.3

idcode	age	married	educ	industry	wage	hours	tenure
201	38	single	8	Professional Services	5.85	30	9.7
202	42	married	13	Ag/Forestry/Fisheries	3.10	3	1.5
203	41	single	14	Public Administration	7.24	40	8.3
204	35	single	11	Public Administration	6.77	48	9.9
205	35	married	12	Wholesale/Retail Trade	2.86	20	1.6
206	42	married	12	Wholesale/Retail Trade	3.10	30	2.3
207	38	married	12	Professional Services	6.59	32	1.8
208	37	married	12	Professional Services	8.29	38	7.3
209	42	married	12	Wholesale/Retail Trade	5.03	40	3.0
210	35	married	17	Professional Services	3.62	40	0.1
211	38	single	18	Professional Services	11.07	40	6.8
212	36	single	12	Personal Services	6.65	22	2.1
213	43	married	16	Wholesale/Retail Trade	12.38	25	1.0
214	39	married	12	Transport/Comm/Utility	7.25	50	3.9
215	38	married	16	Professional Services	8.60	45	13.7
216	40	married	12	Professional Services	12.85	40	11.8
217	38	single	10	Construction	4.11	40	0.3
218	43	married	16	Professional Services	10.32	60	14.4
219	36	married	14	Professional Services	6.03	18	18.6
220	39	married	12	Professional Services	38.71	40	5.8
221	35	married	12	Public Administration	7.53	40	7.5
222	35	married	12	Professional Services	3.57	40	6.9
223	43	married	12	Wholesale/Retail Trade	6.81	40	16.9
224	36	married	12	Professional Services	6.34	40	5.7
225	39	single	7	Manufacturing	5.90	40	1.0
226	41	married	14	Professional Services	5.45	40	6.9
227	38	married	12	Professional Services	5.29	20	1.0
228	38	married	12	Public Administration	7.27	35	3.2
229	40	single	16	Finance/Ins/Real Estate	1.55	50	1.2
230	35	married	16	Professional Services	5.61	40	3.8
231	45	single	12	Wholesale/Retail Trade	3.55	12	0.6
232	42	married	9	Wholesale/Retail Trade	3.45	35	4.2
233	38	single	13	Finance/Ins/Real Estate	22.52	55	13.4
234	41	single	6	Personal Services	4.43	40	1.3
235	38	married	12	Professional Services	4.78	35	1.6
236	43	single	12	Construction	6.28	30	0.3
237	36	married	16	Professional Services	9.66	24	3.1
238	36	married	12	Business/Repair Svc	12.58	40	1.3
239	42	single	12	Professional Services	4.18	40	1.4
240	44	married	12	Wholesale/Retail Trade	8.37	37	1.4
241	36	single	16	Manufacturing	20.79	35	10.3
242	35	single	14	Professional Services	7.99	38	6.3

idcode	age	married	educ	industry	wage	hours	tenure
243	36	single	11	Personal Services	2.52	24	3.0
244	42	single	12	Public Administration	11.06	35	3.6
245	43	single	12	Professional Services	9.68	40	1.3
246	45	married	16	Professional Services	8.90	40	2.1
247	40	married	12	Finance/Ins/Real Estate	4.21	35	1.6