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Lampiran 1. Reduce Form Analisis Data Penelitian

Analisis model struktural dalam penelitian ini menggunakan *analysis panel data*. persamaan model regresi data panel dalam penelitian ini adalah sebagai berikut :

$Y_1 = f(X_1, X_2)$ (4.1)

$Y_2 = f(X_1, X_2, Y_1)$ (4.2)

$Y_3 = f(X_1, X_2, Y_1, Y_2)$ (4.3)

Dimana:

X_1 = Kemajuan teknologi yang diproksikan indeks akses dan infrastuktur teknologi informasi dan komunikasi dengan satuan persen (%).

X_2 = *Knowledge-based economy* yang diproksikan indeks penggunaan teknologi informasi dan komunikasi dengan satuan persen (%).

Y_1 = *Human capital* yang diproksikan indeks pendidikan dengan satuan persen (%).

Y_2 = Investasi swasta yang diproksikan dengan pembentukan modal tetap domestik bruto dengan satuan juta rupiah.

Y_3 = Penyerapan tenaga kerja yang diproksikan dengan jumlah orang bekerja dengan satuan jiwa.

Persamaan (4.1), (4.2), dan (4.3) di atas dapat ditulis kembali menjadi :

$Y_{1it} = \alpha_0 + \alpha_1 X_{1it} + \alpha_2 X_{2it} + \mu_1$ (4.1.a)

$Y_{2it} = \beta_0 + \beta_1 \hat{Y}_{1it} + \beta_2 X_{1it} + \beta_3 X_{2it} + \mu_2$ (4.2.a)

$Y_{3it} = \pi_0 + \pi_1 \hat{Y}_{2it} + \pi_2 X_{1it} + \pi_3 X_{2it} + \mu_3$ (4.3.a)

Persamaan di atas dapat ditulis kembali menjadi:

$Y_{1it} = \alpha_0 + \alpha_1 X_{1it} + \alpha_2 X_{2it} + \mu_1$

$LnY_{2it} = \beta_0 + \beta_1 \hat{Y}_{1it} + \beta_2 X_{1it} + \beta_3 X_{2it} + \mu_2$

$LnY_{3it} = \pi_0 + \pi_1 Ln\hat{Y}_{2it} + \pi_2 X_{1it} + \pi_3 X_{2it} + \mu_3$

Untuk mengestimasi persamaan di atas, tidak dapat dilakukan dengan OLS (*Ordinary Least Square*) sebelum dilakukan indetifikasi koefisien dengan memindahkan semua variabel endogen kesebelah kiri dan variabel eksogen ke sebelah kanan, sebagai berikut:

$Y_{1it} = \alpha_0 + \alpha_1 X_{1it} + \alpha_2 X_{2it} + \mu_1$

$-\beta_1 Y_{1it} + Ln\hat{Y}_{2it} = \beta_0 + \beta_2 X_{1i} + \beta_3 X_{2i} + \mu_2$

$-\pi_1 Y_{1i} - \pi_2 Ln\hat{Y}_{3it}$

Sehingga diperoleh *reduced form* sebagai berikut:

Model Human Capital

$Y_{1it} = \alpha_0 + \alpha_1 X_{1it} + \alpha_2 X_{2it} + \mu_2$

Pengaruh Langsung

α_0 = Konstanta *human capital*

α_1 = Pengaruh langsung kemajuan teknologi terhadap *human capital*

α_2 = Pengaruh langsung *knowledge-based economy* terhadap *human capital*

Model Investasi

$LnY_{2it} = \beta_0 + \beta_1 \hat{Y}_{1it} + \beta_2 X_{1it} + \beta_3 X_{2it} + \mu_2$

$Y_{2it} = \beta_0 + \beta_1(\alpha_0 + \alpha_1 X_{1it} + \alpha_2 X_{2it} + \mu_1) + \beta_2 X_{1it} + \beta_3 X_{2it} + \mu_2$

$Y_{2it} = \beta_0 + \beta_1\alpha_0 + \beta_1\alpha_1 X_{1it} + \beta_1\alpha_2 X_{2it} + \beta_1\mu_1 + \beta_2 X_{1it} + \beta_3 X_{2it} + \mu_2$

$Y_{2it} = (\beta_0 + \beta_1\alpha_0) + (\beta_1\alpha_1 X_{1it} + \beta_2 X_{1it}) + (\beta_1\alpha_2 X_{2it} + \beta_3 X_{2it}) + (\beta_1\mu_i + \mu_2)$

$Y_{2it} = (\beta_0 + \beta_1\alpha_0) + (\beta_1\alpha_1 + \beta_2)X_{1i} + (\beta_1\alpha_2 + \beta_3)X_{2i} + (\beta_1\mu_1 + \mu_2)$

Pengaruh Langsung

β_0 = Konstanta investasi swasta

β_1 = Pengaruh langsung kemajuan teknologi terhadap investasi swasta

β_2 = Pengaruh langsung *knowledge-based economy* terhadap investasi swasta

Model Penyerapan Tenaga Kerja

$LnY_{3it} = \pi_0 + \pi_1 Ln\hat{Y}_{2it} + \pi_2X_{1it} + \pi_3X_{2it} + \mu_3$

$Y_{3i} = \pi_0 + \pi_1(\alpha_0 + \alpha_1X_{1it} + \alpha_2X_{2it} + \mu_1) + \pi_2(\beta_0 + \beta_1\alpha_0 + \beta_1\alpha_1X_{1it} + \beta_1\alpha_2X_{2it} + \beta_1\mu_1 + \beta_2X_{1it} + \beta_3X_{2it} + \mu_2) + \pi_3X_{1i} + \pi_4X_{2i} + \mu_3$

$Y_{3i} = \pi_0 + \pi_1\alpha_0 + \pi_1\alpha_1X_{1it} + \pi_1\alpha_2X_{2it} + \pi_1\mu_1 + \pi_2\beta_0 + \pi_2\beta_1\alpha_0 + \pi_2\beta_1\alpha_1X_{1it} + \pi_2\beta_1\alpha_2X_{2it} + \pi_2\beta_1\mu_1 + \pi_2\beta_2X_{1it} + \pi_2\beta_3X_{2it} + \pi_2\mu_2 + \pi_3X_{1i} + \pi_4X_{2i} + \mu_3$

$Y_{3i} = (\pi_0 + \pi_1\alpha_0 + \pi_2\beta_0 + \pi_2\beta_1\alpha_0) + (\pi_1\alpha_1X_{1it} + \pi_2\beta_1\alpha_1X_{1it} + \pi_2\beta_2X_{1it} + \pi_3X_{1i}) + (\pi_1\alpha_2X_{2it} + \pi_2\beta_1\alpha_2X_{2it} + \pi_2\beta_3X_{2it} + \pi_4X_{2i}) + (\pi_1\mu_1 + \pi_2\beta_1\mu_1 + \pi_2\mu_2 + \mu_3)$

$Y_{3i} = (\pi_0 + \pi_1\alpha_0 + \pi_2\beta_0 + \pi_2\beta_1\alpha_0) + (\pi_1\alpha_1 + \pi_2\beta_1\alpha_1 + \pi_2\beta_2 + \pi_3)X_{1it} + (\pi_1\alpha_2 + \pi_2\beta_1\alpha_2 + \pi_2\beta_3 + \pi_4)X_{2it} + (\pi_1\mu_1 + \pi_2\beta_1\mu_1 + \pi_2\mu_2 + \mu$

$\mathbf{Y_3 = \pi_0 + \pi_1X_{1it} + \pi_2X_{2it} + \mu_3}$

Pengaruh Langsung

$\pi_0 + \pi_1\alpha_0 + \pi_2\beta_0 + \pi_2\beta_1\alpha_0$ = Konstanta penyerapan tenaga kerja

π_1 = Pengaruh langsung investasi terhadap penyerapan tenaga kerja

π_2 = Pengaruh langsung *human capital* terhadap penyerapan tenaga kerja

π_3 = Pengaruh langsung kemajuan teknologi terhadap penyerapan tenaga kerja

π_4 = Pengaruh langsung *knowledge-based economy* terhadap penyerapan tenaga kerja

Lampiran 2. Tabulasi Data Penelitian

Judul: Dampak Kemajuan Teknologi dan Knowledge-Based Economy Terhadap Penyerapan Tenaga Kerja di Indonesia

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Aceh	2012	4,26	0,93	38.752.317,22	69,23	1.808.357
Provinsi Aceh	2013	4,43	1,62	38.965.802,34	69,31	1.842.671
Provinsi Aceh	2014	4,44	1,63	43.172.721,87	69,35	1.931.823
Provinsi Aceh	2015	4,38	2,16	46.067.931,65	69,50	1.966.018
Provinsi Aceh	2016	4,62	2,59	51.310.356,08	69,51	2.087.045
Provinsi Aceh	2017	4,86	3,02	51.403.318,45	69,52	2.138.512
Provinsi Aceh	2018	5,03	3,33	55.567.625,91	69,64	2.203.717
Provinsi Aceh	2019	5,33	3,54	60.700.295,51	69,87	2.219.698
Provinsi Aceh	2020	5,54	4,25	63.352.008,69	69,93	2.359.905
Provinsi Aceh	2021	5,68	4,78	65.451.336,93	69,96	2.361.300
Provinsi Aceh	2022	5,57	5,05	66.540.377,70	69,99	2.380.999
Provinsi Sumatera Utara	2012	4,59	3,29	131.490.567,53	67,81	5.880.885
Provinsi Sumatera Utara	2013	4,67	2,14	150.091.474,78	67,94	6.081.301
Provinsi Sumatera Utara	2014	4,68	2,02	164.701.339,98	68,04	5.881.371
Provinsi Sumatera Utara	2015	4,71	2,46	182.367.638,03	68,29	5.962.304
Provinsi Sumatera Utara	2016	4,93	2,92	198.592.880,92	68,33	5.991.229
Provinsi Sumatera Utara	2017	5,15	3,38	213.362.357,91	68,37	6.365.989
Provinsi Sumatera Utara	2018	5,53	3,72	233.019.084,31	68,61	6.728.431
Provinsi Sumatera Utara	2019	5,64	4,21	246.657.703,24	68,95	6.681.224
Provinsi Sumatera Utara	2020	5,72	4,72	248.510.594,37	69,10	6.842.252

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Sumatera Utara	2021	5,81	5,38	262.803.331,88	69,23	7.035.850
Provinsi Sumatera Utara	2022	5,97	5,61	270.409.991,00	69,97	7.180.768
Provinsi Sumatera Barat	2012	5,14	1,14	40.213.555,29	68,00	2.085.483
Provinsi Sumatera Barat	2013	5,04	2,49	43.708.931,99	68,21	2.061.109
Provinsi Sumatera Barat	2014	5,17	2,21	49.684.323,60	68,32	2.180.336
Provinsi Sumatera Barat	2015	5,25	2,79	54.928.423,84	68,66	2.184.599
Provinsi Sumatera Barat	2016	5,39	3,285	59.605.598,31	68,73	2.347.911
Provinsi Sumatera Barat	2017	5,52	3,78	64.020.922,70	68,78	2.344.972
Provinsi Sumatera Barat	2018	5,65	3,96	68.701.548,85	69,01	2.410.450
Provinsi Sumatera Barat	2019	5,78	4,11	74.051.314,07	69,31	2.460.554
Provinsi Sumatera Barat	2020	5,98	4,57	72.587.050,51	69,47	2.581.524
Provinsi Sumatera Barat	2021	6,07	5,43	75.355.454,18	69,59	2.581.444
Provinsi Sumatera Barat	2022	6,11	5,61	75.489.654,00	69,70	2.780.545
Provinsi Riau	2012	4,94	1,20	134.200.405,03	70,49	2.399.851
Provinsi Riau	2013	5,09	2,46	147.933.949,92	70,67	2.479.493
Provinsi Riau	2014	5,31	2,43	173.219.855,23	70,76	2.518.485
Provinsi Riau	2015	5,38	2,69	198.061.291,74	70,93	2.554.296
Provinsi Riau	2016	5,44	3,43	221.468.183,21	70,97	2.765.946
Provinsi Riau	2017	5,5	4,16	234.381.077,76	70,99	2.781.021
Provinsi Riau	2018	5,76	4,32	250.094.679,62	71,19	2.915.597
Provinsi Riau	2019	5,79	4,45	263.854.808,90	71,48	2.996.079
Provinsi Riau	2020	5,99	5,23	261.111.428,89	71,60	3.022.988
Provinsi Riau	2021	6,01	5,61	284.013.183,44	71,67	3.148.947

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Riau	2022	6,07	5,84	285.980.470,00	72,90	3.367.700
Provinsi Jambi	2012	4,74	1,20	27.436.487,78	70,19	1.436.527
Provinsi Jambi	2013	4,98	2,26	32.929.971,32	70,35	1.397.247
Provinsi Jambi	2014	4,97	2,16	34.951.295,17	70,43	1.491.038
Provinsi Jambi	2015	5,15	2,63	35.770.417,65	70,56	1.550.403
Provinsi Jambi	2016	5,18	3,08	38.980.938,87	70,71	1.624.522
Provinsi Jambi	2017	5,21	3,53	41.131.946,78	70,76	1.657.817
Provinsi Jambi	2018	5,44	3,93	43.204.874,07	70,89	1.721.362
Provinsi Jambi	2019	5,71	4,30	45.855.119,48	71,06	1.691.782
Provinsi Jambi	2020	5,86	4,93	46.334.324,54	71,16	1.739.003
Provinsi Jambi	2021	6,01	5,36	51.559.906,12	71,22	1.746.840
Provinsi Jambi	2022	5,93	5,64	52.559.906,12	71,44	1.746.844
Provinsi Sumatera Selatan	2012	4,68	1,01	103.665.102,16	68,67	3.582.099
Provinsi Sumatera Selatan	2013	4,80	2,08	115.563.405,85	68,84	3.524.883
Provinsi Sumatera Selatan	2014	5,04	2,08	125.397.627,11	68,93	3.692.806
Provinsi Sumatera Selatan	2015	5,04	2,30	123.866.816,85	69,14	3.695.866
Provinsi Sumatera Selatan	2016	5,21	2,85	137.226.040,62	69,16	3.998.637
Provinsi Sumatera Selatan	2017	5,38	3,43	146.998.035,08	69,18	3.942.534
Provinsi Sumatera Selatan	2018	5,62	3,65	157.634.550,05	69,41	3.963.870
Provinsi Sumatera Selatan	2019	5,64	3,84	160.152.717,15	69,65	3.968.499
Provinsi Sumatera Selatan	2020	5,82	4,62	163.051.118,84	69,88	4.091.383
Provinsi Sumatera Selatan	2021	5,89	5,39	165.435.566,68	69,98	4.179.708
Provinsi Sumatera Selatan	2022	5,97	5,60	165.435.566,68	69,98	4.179.708

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Bengkulu	2012	4,78	1,08	14.815.247,05	68,16	853.784
Provinsi Bengkulu	2013	4,97	2,18	16.783.325,11	68,33	832.048
Provinsi Bengkulu	2014	5,11	2,30	19.055.492,47	68,37	868.794
Provinsi Bengkulu	2015	5,12	3,03	20.270.722,02	68,50	904.317
Provinsi Bengkulu	2016	5,19	3,29	22.769.190,09	68,56	964.971
Provinsi Bengkulu	2017	5,26	3,55	25.063.445,90	68,59	932.976
Provinsi Bengkulu	2018	5,51	3,65	27.469.461,33	68,84	963.463
Provinsi Bengkulu	2019	5,73	4,13	29.683.673,36	69,21	981.095
Provinsi Bengkulu	2020	5,99	4,58	30.102.402,09	69,35	1.031.881
Provinsi Bengkulu	2021	5,89	5,52	32.798.365,04	69,42	1.021.775
Provinsi Bengkulu	2022	6,01	5,66	32.798.365,04	69,42	1.021.775
Provinsi Lampung	2012	4,4	0,83	60.102.824,76	69,33	3.516.856
Provinsi Lampung	2013	4,41	1,42	64.815.394,91	69,55	3.471.602
Provinsi Lampung	2014	4,58	1,31	71.015.352,71	69,66	3.673.158
Provinsi Lampung	2015	4,49	1,62	76.757.608,94	69,90	3.635.258
Provinsi Lampung	2016	4,67	2,28	85.463.367,11	69,94	3.931.321
Provinsi Lampung	2017	4,86	2,95	96.499.260,17	69,95	3.896.230
Provinsi Lampung	2018	5,02	3,50	109.023.816,56	70,18	4.060.377
Provinsi Lampung	2019	5,28	4,00	119.407.522,46	70,51	4.077.930
Provinsi Lampung	2020	5,55	4,52	116.495.222,60	70,65	4.280.109
Provinsi Lampung	2021	5,69	5,42	125.500.611,57	70,73	4.284.320
Provinsi Lampung	2022	5,65	5,61	125.500.611,57	70,73	4.284.320
Provinsi Kepulauan Bangka Belitung	2012	4,91	1,23	9.825.222,08	69,48	585.493

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Kepulauan Bangka Belitung	2013	5,12	2,08	11.172.572,02	69,64	597.613
Provinsi Kepulauan Bangka Belitung	2014	5,14	2,03	12.983.530,57	69,72	604.223
Provinsi Kepulauan Bangka Belitung	2015	5,28	2,82	14.336.036,11	69,88	623.949
Provinsi Kepulauan Bangka Belitung	2016	5,28	3,38	16.341.297,38	69,92	686.830
Provinsi Kepulauan Bangka Belitung	2017	5,27	3,94	18.379.221,07	69,95	672.618
Provinsi Kepulauan Bangka Belitung	2018	5,57	4,12	20.295.324,68	70,18	701.366
Provinsi Kepulauan Bangka Belitung	2019	5,85	4,65	22.135.265,07	70,50	715.927
Provinsi Kepulauan Bangka Belitung	2020	5,97	5,25	20.856.557,92	70,64	699.881
Provinsi Kepulauan Bangka Belitung	2021	6,05	5,58	22.074.293,66	70,73	701.441
Provinsi Kepulauan Bangka Belitung	2022	6,04	5,87	22.074.293,66	70,73	701.441
Provinsi Kepulauan Riau	2012	6,6	2,66	59.910.152,59	68,85	801.510
Provinsi Kepulauan Riau	2013	6,85	5,87	66.677.020,53	69,05	806.073
Provinsi Kepulauan Riau	2014	6,87	5,41	76.074.334,33	69,15	819.656
Provinsi Kepulauan Riau	2015	6,57	6,10	84.770.997,35	69,41	836.670
Provinsi Kepulauan Riau	2016	6,52	5,65	92.458.730,63	69,45	859.813
Provinsi Kepulauan Riau	2017	6,48	5,20	97.338.838,56	69,48	896.931
Provinsi Kepulauan Riau	2018	6,81	5,46	109.110.815,68	69,64	901.019
Provinsi Kepulauan Riau	2019	7,03	5,91	117.023.503,82	69,80	935.682
Provinsi Kepulauan Riau	2020	6,91	6,16	111.287.306,02	69,96	1.016.600
Provinsi Kepulauan Riau	2021	6,81	6,54	118.231.840,57	70,12	1.087.419
Provinsi Kepulauan Riau	2022	6,97	6,64	118.231.840,57	70,12	1.087.419
Provinsi DKI Jakarta	2012	9,05	10,10	640.384.045,50	72,03	4.823.858
Provinsi DKI Jakarta	2013	9,08	9,44	683.692.105,41	72,19	4.668.239

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi DKI Jakarta	2013	9,08	9,44	683.692.105,41	72,19	4.668.239
Provinsi DKI Jakarta	2014	9,28	10,34	756.764.981,16	72,27	4.634.369
Provinsi DKI Jakarta	2015	9,96	9,61	812.951.791,75	72,43	4.724.029
Provinsi DKI Jakarta	2016	8,91	7,96	832.112.566,79	72,49	4.861.832
Provinsi DKI Jakarta	2017	7,84	6,31	919.547.242,23	72,55	4.509.171
Provinsi DKI Jakarta	2018	7,91	6,73	1.020.160.480,00	72,67	4.726.779
Provinsi DKI Jakarta	2019	8,03	6,99	1.050.637.012,27	72,79	4.836.977
Provinsi DKI Jakarta	2020	8,16	7,19	969.348.077,59	72,91	4.659.251
Provinsi DKI Jakarta	2021	8,27	7,59	1.001.134.889,87	73,01	4.737.415
Provinsi DKI Jakarta	2022	8,27	7,54	1.001.134.889,87	73,01	4.737.415
Provinsi Jawa Barat	2012	5,34	2,30	294.079.169,93	71,82	18.615.753
Provinsi Jawa Barat	2013	5,43	2,96	301.400.003,83	72,09	18.731.943
Provinsi Jawa Barat	2014	5,68	3,08	346.009.578,17	72,23	19.230.943
Provinsi Jawa Barat	2015	5,65	3,61	382.975.600,09	72,41	18.791.482
Provinsi Jawa Barat	2016	5,83	4,14	412.295.910,96	72,44	19.202.038
Provinsi Jawa Barat	2017	6,02	4,68	449.337.046,79	72,47	20.551.575
Provinsi Jawa Barat	2018	6,33	5,00	495.827.138,48	72,66	20.779.888
Provinsi Jawa Barat	2019	6,52	5,34	531.364.616,36	72,85	21.902.958
Provinsi Jawa Barat	2020	6,65	5,53	489.180.230,19	73,04	21.674.854
Provinsi Jawa Barat	2021	6,51	5,86	545.297.644,40	73,23	22.313.481
Provinsi Jawa Barat	2022	6,54	5,97	545.297.644,40	73,23	22.313.481
Provinsi Jawa Tengah	2012	4,84	2,00	227.585.695,26	73,09	16.531.395
Provinsi Jawa Tengah	2013	5,05	2,11	242.163.565,82	73,28	16.469.960

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Jawa Tengah	2014	5,13	2,01	274.558.464,44	73,88	16.550.682
Provinsi Jawa Tengah	2015	5,22	2,48	308.702.422,26	73,96	16.435.142
Provinsi Jawa Tengah	2016	5,42	3,34	333.977.417,78	74,02	16.511.136
Provinsi Jawa Tengah	2017	5,62	4,19	366.766.466,19	74,08	17.186.674
Provinsi Jawa Tengah	2018	5,97	4,26	413.749.152,51	74,18	17.245.548
Provinsi Jawa Tengah	2019	6,18	4,83	448.351.588,67	74,23	17.441.153
Provinsi Jawa Tengah	2020	6,31	5,28	417.815.396,91	74,37	17.536.935
Provinsi Jawa Tengah	2021	6,17	5,56	451.241.159,12	74,47	17.835.770
Provinsi Jawa Tengah	2022	5,99	5,75	451.241.159,12	74,47	17.835.770
Provinsi DI Yogyakarta	2012	6,54	2,21	21.148.870,99	74,36	1.906.145
Provinsi DI Yogyakarta	2013	6,71	4,87	24.250.704,41	74,45	1.886.071
Provinsi DI Yogyakarta	2014	6,87	4,28	27.744.794,37	74,50	1.956.043
Provinsi DI Yogyakarta	2015	7,17	4,86	30.798.881,34	74,68	1.891.218
Provinsi DI Yogyakarta	2016	7,05	4,93	33.428.977,85	74,71	2.042.400
Provinsi DI Yogyakarta	2017	6,93	5,01	37.111.435,81	74,74	2.053.168
Provinsi DI Yogyakarta	2018	7,48	5,44	43.189.678,19	74,82	2.118.392
Provinsi DI Yogyakarta	2019	7,86	5,67	49.576.127,59	74,92	2.134.750
Provinsi DI Yogyakarta	2020	8,02	5,91	44.319.423,28	74,99	2.126.316
Provinsi DI Yogyakarta	2021	7,86	6,16	49.030.849,37	75,04	2.228.523
Provinsi DI Yogyakarta	2022	8,01	6,23	49.030.849,37	75,04	2.228.523
Provinsi Jawa Timur	2012	4,91	1,97	344.806.173,70	70,14	19.338.902
Provinsi Jawa Timur	2013	5,08	2,54	380.563.756,11	70,34	19.553.910
Provinsi Jawa Timur	2014	5,17	2,51	422.772.356,91	70,45	19.306.508

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Jawa Timur	2015	5,31	3,23	464.468.787,15	70,68	19.367.777
Provinsi Jawa Timur	2016	5,51	3,78	518.192.256,56	70,74	19.114.563
Provinsi Jawa Timur	2017	5,7	4,34	568.965.370,07	70,80	20.099.220
Provinsi Jawa Timur	2018	5,8	4,38	620.630.330,75	70,97	20.449.949
Provinsi Jawa Timur	2019	6,01	4,86	669.990.878,00	71,18	20.655.632
Provinsi Jawa Timur	2020	6,08	5,32	647.892.958,53	71,30	20.962.967
Provinsi Jawa Timur	2021	6,12	5,55	665.428.309,16	71,38	21.037.750
Provinsi Jawa Timur	2022	6,08	5,73	666.428.949,43	72,75	22.407.765
Provinsi Banten	2012	5,82	2,10	106.514.886,67	68,86	4.662.368
Provinsi Banten	2013	5,82	3,18	107.508.901,39	69,04	4.687.626
Provinsi Banten	2014	6,08	3,44	124.100.206,57	69,13	4.853.992
Provinsi Banten	2015	6,01	4,05	139.899.780,29	69,43	4.825.460
Provinsi Banten	2016	6,085	4,38	153.741.868,64	69,46	5.088.497
Provinsi Banten	2017	6,16	4,71	173.238.150,40	69,49	5.077.400
Provinsi Banten	2018	6,5	5,11	192.969.560,43	69,64	5.332.496
Provinsi Banten	2019	6,38	5,43	215.058.258,34	69,84	5.562.846
Provinsi Banten	2020	6,51	5,52	217.134.781,62	69,96	5.552.172
Provinsi Banten	2021	6,47	5,87	235.747.656,03	70,02	5.698.344
Provinsi Banten	2022	6,71	6,01	235.747.656,03	70,02	5.698.344
Provinsi Bali	2012	6,49	1,71	42.347.510,74	70,94	2.252.475
Provinsi Bali	2013	6,56	3,79	44.931.662,75	71,11	2.242.076
Provinsi Bali	2014	6,77	3,69	48.647.550,30	71,20	2.272.632
Provinsi Bali	2015	6,93	4,50	55.333.041,10	71,35	2.324.805

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Bali	2016	6,93	4,69	60.018.364,72	71,41	2.416.555
Provinsi Bali	2017	6,93	4,89	63.293.058,42	71,46	2.398.307
Provinsi Bali	2018	7,22	5,23	71.936.109,95	71,68	2.490.870
Provinsi Bali	2019	6,94	5,52	74.886.646,74	71,99	2.428.679
Provinsi Bali	2020	7,48	5,77	67.493.631,51	72,13	2.423.419
Provinsi Bali	2021	6,92	6,08	67.166.540,20	72,24	2.441.854
Provinsi Bali	2022	7,06	6,28	67.166.540,20	72,24	2.441.854
Provinsi Nusa Tenggara Barat	2012	3,97	0,65	26.807.455,17	64,43	2.015.699
Provinsi Nusa Tenggara Barat	2013	3,99	1,20	28.720.190,83	64,74	2.032.282
Provinsi Nusa Tenggara Barat	2014	4,23	1,26	31.846.286,81	64,90	2.094.100
Provinsi Nusa Tenggara Barat	2015	4,17	1,61	36.122.920,97	65,38	2.127.503
Provinsi Nusa Tenggara Barat	2016	4,47	2,31	41.117.882,24	65,48	2.367.310
Provinsi Nusa Tenggara Barat	2017	4,78	3,01	43.826.438,41	65,55	2.316.720
Provinsi Nusa Tenggara Barat	2018	5,01	3,09	47.243.911,87	65,87	2.154.124
Provinsi Nusa Tenggara Barat	2019	5,28	3,88	51.936.866,95	66,28	2.387.036
Provinsi Nusa Tenggara Barat	2020	5,48	4,28	49.488.695,84	66,51	2.575.956
Provinsi Nusa Tenggara Barat	2021	5,52	4,97	53.100.498,55	66,69	2.657.395
Provinsi Nusa Tenggara Barat	2022	5,54	5,43	53.100.498,55	66,69	2.657.395
Provinsi Nusa Tenggara Timur	2012	3,5	0,50	18.234.001,14	65,64	2.120.249
Provinsi Nusa Tenggara Timur	2013	3,7	0,85	20.620.336,28	65,82	2.104.507
Provinsi Nusa Tenggara Timur	2014	3,82	0,84	26.660.333,09	65,91	2.174.228
Provinsi Nusa Tenggara Timur	2015	3,82	1,03	30.996.063,22	65,96	2.219.291
Provinsi Nusa Tenggara Timur	2016	4,22	1,66	39.722.903,21	66,04	2.277.068

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Nusa Tenggara Timur	2017	4,63	2,30	43.583.433,18	66,07	2.320.061
Provinsi Nusa Tenggara Timur	2018	4,44	2,24	47.465.920,18	66,38	2.411.533
Provinsi Nusa Tenggara Timur	2019	4,89	2,67	51.267.385,36	66,85	2.394.673
Provinsi Nusa Tenggara Timur	2020	5,15	3,19	47.585.998,72	67,01	2.725.955
Provinsi Nusa Tenggara Timur	2021	5,42	4,15	51.636.350,37	67,15	2.808.620
Provinsi Nusa Tenggara Timur	2022	5,45	4,46	51.636.350,37	67,15	2.808.620
Provinsi Kalimantan Barat	2012	5,56	0,84	36.905.997,04	69,46	2.196.455
Provinsi Kalimantan Barat	2013	4,51	1,75	40.462.608,05	69,66	2.172.337
Provinsi Kalimantan Barat	2014	4,66	1,82	45.058.458,30	69,76	2.226.510
Provinsi Kalimantan Barat	2015	4,67	2,31	51.054.673,39	69,87	2.235.887
Provinsi Kalimantan Barat	2016	4,83	2,81	55.024.133,38	69,90	2.287.823
Provinsi Kalimantan Barat	2017	5,01	3,29	59.823.307,02	69,92	2.303.198
Provinsi Kalimantan Barat	2018	5,19	3,44	63.616.316,32	70,18	2.346.881
Provinsi Kalimantan Barat	2019	5,47	3,71	68.609.564,44	70,56	2.369.015
Provinsi Kalimantan Barat	2020	5,44	4,54	66.424.476,59	70,69	2.458.296
Provinsi Kalimantan Barat	2021	5,75	5,16	69.934.892,41	67,15	2.482.453
Provinsi Kalimantan Barat	2022	5,59	5,62	69.934.892,41	67,15	2.482.453
Provinsi Kalimantan Tengah	2012	4,83	1,17	33.535.424,72	69,18	1.112.252
Provinsi Kalimantan Tengah	2013	4,99	2,22	37.036.272,09	69,29	1.124.017
Provinsi Kalimantan Tengah	2014	5,06	2,18	41.297.382,52	69,39	1.154.489
Provinsi Kalimantan Tengah	2015	5,17	2,87	45.543.415,59	69,54	1.214.681
Provinsi Kalimantan Tengah	2016	5,18	3,48	50.403.171,63	69,57	1.248.189
Provinsi Kalimantan Tengah	2017	5,18	4,09	54.684.327,53	69,59	1.222.707

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Kalimantan Tengah	2018	5,45	4,06	60.380.014,20	69,64	1.301.002
Provinsi Kalimantan Tengah	2019	5,64	4,55	64.656.828,96	69,69	1.327.885
Provinsi Kalimantan Tengah	2020	5,74	5,25	64.867.404,67	69,74	1.318.133
Provinsi Kalimantan Tengah	2021	5,71	5,61	69.573.862,52	70,76	1.346.437
Provinsi Kalimantan Tengah	2022	5,75	5,82	69.573.862,52	70,76	1.346.437
Provinsi Kalimantan Selatan	2012	5,4	4,86	24.093.430,40	67,11	1.833.892
Provinsi Kalimantan Selatan	2013	5,48	2,76	26.324.827,73	67,35	1.830.813
Provinsi Kalimantan Selatan	2014	5,45	2,63	29.206.515,16	67,47	1.867.462
Provinsi Kalimantan Selatan	2015	5,48	3,25	32.181.400,62	67,80	1.889.502
Provinsi Kalimantan Selatan	2016	5,43	3,79	34.303.442,53	67,92	1.965.088
Provinsi Kalimantan Selatan	2017	5,39	4,33	36.562.050,82	68,02	1.975.161
Provinsi Kalimantan Selatan	2018	5,82	4,53	40.801.486,30	68,23	2.021.666
Provinsi Kalimantan Selatan	2019	5,77	4,91	44.993.767,32	68,49	2.036.736
Provinsi Kalimantan Selatan	2020	5,99	5,39	44.894.250,62	68,66	2.083.319
Provinsi Kalimantan Selatan	2021	6,02	5,81	46.446.565,71	68,83	2.109.427
Provinsi Kalimantan Selatan	2022	5,93	5,94	46.446.565,71	68,83	2.109.427
Provinsi Kalimantan Timur	2012	6,52	2,05	124.671.825,84	73,32	1.607.526
Provinsi Kalimantan Timur	2013	6,54	3,91	129.083.647,03	73,52	1.603.915
Provinsi Kalimantan Timur	2014	6,72	4,09	139.830.347,87	73,62	1.677.466
Provinsi Kalimantan Timur	2015	7,01	5,05	145.766.483,58	73,65	1.423.957
Provinsi Kalimantan Timur	2016	6,88	5,05	144.654.383,71	73,68	1.581.239
Provinsi Kalimantan Timur	2017	6,76	4,98	154.503.229,59	73,70	1.540.675
Provinsi Kalimantan Timur	2018	6,77	5,37	173.474.785,92	73,96	1.618.285

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Kalimantan Timur	2019	6,87	5,52	188.079.936,88	74,22	1.704.808
Provinsi Kalimantan Timur	2020	6,54	6,01	188.195.890,10	74,33	1.692.796
Provinsi Kalimantan Timur	2021	6,46	6,28	209.950.999,30	74,61	1.720.361
Provinsi Kalimantan Timur	2022	6,67	6,49	209.950.999,30	74,61	1.720.361
Provinsi Sulawesi Utara	2012	5,22	1,43	23.053.649,05	70,70	973.035
Provinsi Sulawesi Utara	2013	5,39	2,76	24.452.333,47	70,86	965.457
Provinsi Sulawesi Utara	2014	5,29	2,91	26.227.489,05	70,94	980.756
Provinsi Sulawesi Utara	2015	5,46	3,55	31.036.593,75	70,99	1.000.032
Provinsi Sulawesi Utara	2016	5,5	4,08	34.528.455,17	71,02	1.110.564
Provinsi Sulawesi Utara	2017	5,54	4,62	38.421.806,05	71,04	1.040.826
Provinsi Sulawesi Utara	2018	5,73	4,55	42.542.436,24	71,26	1.095.145
Provinsi Sulawesi Utara	2019	5,69	4,58	47.493.106,27	71,58	1.131.521
Provinsi Sulawesi Utara	2020	5,95	5,15	46.738.339,74	71,69	1.134.802
Provinsi Sulawesi Utara	2021	6,07	5,63	51.327.923,17	71,76	1.126.797
Provinsi Sulawesi Utara	2022	5,85	5,71	51.327.923,17	71,76	1.126.797
Provinsi Sulawesi Tengah	2012	4,23	0,83	26.616.844,47	66,70	1.224.095
Provinsi Sulawesi Tengah	2013	4,50	1,43	31.553.283,28	67,02	1.239.122
Provinsi Sulawesi Tengah	2014	4,51	1,36	40.129.382,78	67,18	1.293.226
Provinsi Sulawesi Tengah	2015	4,63	1,76	46.686.129,71	67,26	1.327.418
Provinsi Sulawesi Tengah	2016	4,82	2,56	51.785.964,92	67,31	1.459.803
Provinsi Sulawesi Tengah	2017	5,02	3,37	55.057.654,15	67,32	1.374.214
Provinsi Sulawesi Tengah	2018	4,97	3,20	58.369.023,29	67,78	1.451.491
Provinsi Sulawesi Tengah	2019	5,38	3,45	72.146.416,85	68,23	1.439.759

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Sulawesi Tengah	2020	5,59	4,43	67.252.766,08	68,69	1.516.347
Provinsi Sulawesi Tengah	2021	5,66	4,95	108.577.219,77	68,83	1.524.730
Provinsi Sulawesi Tengah	2022	5,57	5,24	108.577.219,77	68,83	1.524.730
Provinsi Sulawesi Selatan	2012	4,92	2,13	82.677.067,85	69,31	3.421.101
Provinsi Sulawesi Selatan	2013	4,91	1,78	94.883.695,03	69,50	3.376.549
Provinsi Sulawesi Selatan	2014	5,13	1,86	110.225.835,85	69,60	3.527.036
Provinsi Sulawesi Selatan	2015	5,20	2,63	125.989.169,84	69,80	3.485.492
Provinsi Sulawesi Selatan	2016	5,34	3,34	141.414.703,54	69,82	3.694.712
Provinsi Sulawesi Selatan	2017	5,48	4,05	157.246.493,31	69,84	3.598.663
Provinsi Sulawesi Selatan	2018	5,66	4,07	171.943.698,35	70,08	3.774.924
Provinsi Sulawesi Selatan	2019	5,68	4,28	188.411.404,02	70,43	3.830.096
Provinsi Sulawesi Selatan	2020	5,93	4,92	198.727.767,26	70,57	4.006.620
Provinsi Sulawesi Selatan	2021	5,94	5,45	210.907.683,46	70,66	4.160.433
Provinsi Sulawesi Selatan	2022	6,05	5,62	210.907.683,46	70,66	4.160.433
Provinsi Sulawesi Tenggara	2012	4,42	0,80	23.518.165,68	70,06	994.521
Provinsi Sulawesi Tenggara	2013	4,56	1,26	25.473.913,52	70,28	997.231
Provinsi Sulawesi Tenggara	2014	4,73	1,39	31.296.240,66	70,39	1.037.419
Provinsi Sulawesi Tenggara	2015	4,71	1,74	33.949.623,61	70,44	1.074.916
Provinsi Sulawesi Tenggara	2016	4,91	2,63	37.496.698,26	70,46	1.219.548
Provinsi Sulawesi Tenggara	2017	5,12	3,52	42.677.469,25	70,47	1.160.974
Provinsi Sulawesi Tenggara	2018	5,33	3,58	46.902.411,48	70,72	1.207.488
Provinsi Sulawesi Tenggara	2019	5,64	4,04	51.116.812,71	70,97	1.217.983
Provinsi Sulawesi Tenggara	2020	5,76	4,91	50.524.405,89	71,22	1.289.232

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Sulawesi Tenggara	2021	5,69	5,39	55.416.044,97	71,27	1.327.069
Provinsi Sulawesi Tenggara	2022	5,63	5,54	55.416.044,97	71,27	1.327.069
Provinsi Gorontalo	2012	4,31	1,06	6.143.810,40	66,76	455.322
Provinsi Gorontalo	2013	4,32	1,69	6.901.687,27	66,92	458.930
Provinsi Gorontalo	2014	4,53	1,40	7.923.718,67	67,00	479.137
Provinsi Gorontalo	2015	4,56	1,47	8.976.606,57	67,12	493.687
Provinsi Gorontalo	2016	4,78	2,61	9.715.696,60	67,13	546.668
Provinsi Gorontalo	2017	5,01	3,74	10.308.809,08	67,14	524.316
Provinsi Gorontalo	2018	5,22	3,84	11.043.472,61	67,45	555.533
Provinsi Gorontalo	2019	5,45	4,07	11.653.266,98	67,93	562.087
Provinsi Gorontalo	2020	5,62	4,87	11.691.591,30	68,07	568.563
Provinsi Gorontalo	2021	5,69	5,42	12.383.790,94	68,19	579.009
Provinsi Gorontalo	2022	5,55	5,57	12.383.790,94	68,19	579.009
Provinsi Sulawesi Barat	2012	3,78	0,56	6.239.370,42	63,04	572.081
Provinsi Sulawesi Barat	2013	3,9	1,94	7.152.158,73	63,32	545.438
Provinsi Sulawesi Barat	2014	4,13	1,95	8.471.141,76	64,04	595.797
Provinsi Sulawesi Barat	2015	4,02	0,99	9.563.597,36	64,22	595.905
Provinsi Sulawesi Barat	2016	4,38	1,79	10.827.339,13	64,31	624.182
Provinsi Sulawesi Barat	2017	4,75	2,59	11.913.912,43	64,34	595.004
Provinsi Sulawesi Barat	2018	4,87	2,74	12.829.038,51	64,58	619.395
Provinsi Sulawesi Barat	2019	5,08	3,02	13.773.886,63	64,82	641.613
Provinsi Sulawesi Barat	2020	5,29	3,72	12.699.029,99	65,06	672.986
Provinsi Sulawesi Barat	2021	5,61	4,85	14.130.052,47	65,25	686.544

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Sulawesi Barat	2022	5,48	5,38	14.130.052,47	65,25	686.544
Provinsi Maluku	2012	4,11	0,83	7.176.103,25	64,77	613.357
Provinsi Maluku	2013	4,27	1,31	7.996.873,24	64,93	602.429
Provinsi Maluku	2014	4,43	1,17	8.922.857,30	65,01	601.651
Provinsi Maluku	2015	4,58	1,73	9.654.063,24	65,31	655.063
Provinsi Maluku	2016	4,85	2,44	11.000.818,97	65,35	690.786
Provinsi Maluku	2017	5,13	3,16	12.270.579,83	65,40	642.061
Provinsi Maluku	2018	5,07	2,71	14.022.769,53	65,59	700.143
Provinsi Maluku	2019	5,25	2,79	15.473.279,84	65,82	715.811
Provinsi Maluku	2020	5,71	3,97	15.565.053,41	65,98	775.701
Provinsi Maluku	2021	5,92	4,73	16.269.134,95	66,09	800.755
Provinsi Maluku	2022	5,72	5,17	16.269.134,95	66,09	800.755
Provinsi Maluku Utara	2012	3,93	0,46	5.134.204,65	67,05	450.184
Provinsi Maluku Utara	2013	4,02	0,81	5.573.409,47	67,24	454.978
Provinsi Maluku Utara	2014	4,17	1,08	6.210.616,55	67,34	456.017
Provinsi Maluku Utara	2015	4,13	1,58	7.245.510,45	67,44	482.543
Provinsi Maluku Utara	2016	4,5	2,01	8.355.625,86	67,51	503.479
Provinsi Maluku Utara	2017	4,87	2,45	9.959.837,17	67,54	488.715
Provinsi Maluku Utara	2018	4,7	2,71	9.995.033,99	67,80	515.615
Provinsi Maluku Utara	2019	4,79	2,79	18.183.594,89	68,18	522.423
Provinsi Maluku Utara	2020	5,14	3,51	23.792.193,13	68,33	552.502
Provinsi Maluku Utara	2021	5,36	3,92	27.328.859,78	68,45	568.698
Provinsi Maluku Utara	2022	5,36	4,48	27.328.859,78	68,45	568.698

Provinsi	Tahun	X1	X2	Y1	Y2	Y3
Provinsi Papua Barat	2012	4,66	1,15	8.267.423,70	64,88	347.559
Provinsi Papua Barat	2013	4,51	1,94	10.193.499,10	65,05	359.527
Provinsi Papua Barat	2014	4,63	1,93	11.134.357,39	65,14	378.436
Provinsi Papua Barat	2015	4,75	2,39	13.116.110,54	65,19	380.226
Provinsi Papua Barat	2016	4,98	3,04	13.991.265,30	65,30	402.360
Provinsi Papua Barat	2017	5,21	3,70	14.997.305,48	65,32	402.526
Provinsi Papua Barat	2018	5,46	4,04	16.237.108,60	65,55	417.544
Provinsi Papua Barat	2019	5,6	4,17	18.366.131,87	65,90	433.401
Provinsi Papua Barat	2020	5,45	4,58	18.213.388,47	66,02	459.350
Provinsi Papua Barat	2021	5,43	4,95	18.895.969,21	66,14	483.681
Provinsi Papua Barat	2022	5,41	5,17	18.895.969,21	66,14	483.681
Provinsi Papua	2012	3,52	3,12	32.070.896,79	64,60	1.485.799
Provinsi Papua	2013	3,53	0,80	36.340.091,40	64,76	1.559.675
Provinsi Papua	2014	3,5	0,79	41.549.468,18	64,84	1.617.437
Provinsi Papua	2015	3,62	1,04	46.796.438,84	65,09	1.672.480
Provinsi Papua	2016	3,89	1,65	51.749.803,24	65,12	1.664.485
Provinsi Papua	2017	4,17	2,27	56.543.197,71	65,14	1.699.071
Provinsi Papua	2018	3,76	2,15	63.838.747,27	65,36	1.777.207
Provinsi Papua	2019	3,82	2,10	69.997.329,63	65,65	1.775.030
Provinsi Papua	2020	3,68	2,23	69.306.443,60	65,79	1.691.745
Provinsi Papua	2021	3,71	2,24	77.284.992,49	65,93	1.887.781
Provinsi Papua	2022	3,38	2,18	77.284.992,49	65,93	1.887.781

Lampiran 3. Hasil Analisis Data Penelitian Menggunakan RStudio

Olah Data Disertasi

Sri Wahyuni

Analisis 3SLS pada Data Panel

Input Data dari file CSV

```
datasri <- read.csv("~/Documents/1Ilham Hamid/Sri Wahyuni/datasri
.csv")
```

Ubah format data dari data.frame menjadi Data Panel

```
library(plm)
pdata <- pdata.frame(datasri, index=c('propinsi', 'tahun'), drop.
index=TRUE, row.names=TRUE)
```

Pooled

Regresi Data Tahap 1

```
library(knitr)
library(broom)
#stage1 <- lm(invest ~ infra + kemajuan teknologi + I(knowledge b
ased economi), data = pdata)
stage1 <- plm(log(invest) ~ kemajuan teknologi + knowledge based
economi , data= pdata, effect ="individual", model = "pooling")
invest_hat <-predict(stage1)
kable(tidy(stage1), digits=3, caption="Pooled model")
```

Pooled model

term	estimate	std.error	statistic	p.value
(Intercept)	15.222	0.397	38.332	0.000
Kemajuan Teknologi	0.402	0.103	3.922	0.000
Knowledge Based Economy	0.136	0.059	2.299	0.022

```
summary(stage1)

Pooling Model

Call:
plm(formula = log(invest) ~ kemajuan teknologi + knowledge based
economi, data = pdata, effect = "individual",
    model = "pooling")

Balanced Panel: n = 33, T = 11, N = 363
```

```
Residuals:
     Min.   1st Qu.    Median   3rd Qu.      Max.
-1.918300 -0.784452 -0.018047  0.792756  2.218141

Coefficients:
                         Estimate Std. Error t-value  Pr(>|t|)
(Intercept)             15.22174    0.39710 38.3323 < 2.2e-16 ***
kemajuan teknologi       0.40237    0.10259  3.9220 0.0001052 ***
knowledge based economy  0.13635    0.05930  2.2993 0.0220624 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    508.08
Residual Sum of Squares: 366.66
R-Squared:      0.27834
Adj. R-Squared: 0.27433
F-statistic: 69.4244 on 2 and 360 DF, p-value: < 2.22e-16
```

Tahap 2

```
stage2 <- plm(human ~ kemajuan teknologi + knowledge based econom
i +invest_hat , data=pdata, effect = "individual", model = "pooli
ng")
human_hat <-predict(stage2)
kable(tidy(stage2), digits=3, caption="Stage 2 - Pooled model")
```

Stage 2 - Pooled model

term	estimate	std.error	statistic	p.value
(Intercept)	57.860	0.743	77.895	0
Kemajuan Teknologi	2.366	0.192	12.328	0
Knowledge Based Economy	-0.399	0.111	-3.593	0

```
summary(stage2)

Pooling Model

Call:
plm(formula = human ~ kemajuan teknologi + knowledge based econom
y + invest_hat, data = pdata,
    effect = "individual", model = "pooling")

Balanced Panel: n = 33, T = 11, N = 363

Residuals:
     Min.   1st Qu.    Median   3rd Qu.      Max.
-5.166907 -1.215628  0.039474  1.549295  4.736175

Coefficients: (1 dropped because of singularities)
```

```
                         Estimate Std. Error t-value  Pr(>|t|)
(Intercept)              57.86030    0.74280 77.8946 < 2.2e-16 ***
kemajuan teknolgi         2.36587    0.19191 12.3283 < 2.2e-16 ***
knowledge based economy  -0.39858    0.11092 -3.5933  0.000372 *
**
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    2496.3
Residual Sum of Squares: 1282.9
R-Squared:      0.48607
Adj. R-Squared: 0.48321
F-statistic: 170.24 on 2 and 360 DF, p-value: < 2.22e-16
```

Tahap 3

```
stage3 <- plm(log(labor) ~ kemajuan teknologi + knowledge based e
conomy + human_hat, data= pdata, effect = "individual", model = "
pooling")
kable(tidy(stage3), digits=3, caption="Stage 3 - Pooled model")
```

Stage 3 - Pooled model

Term	estimate	std.error	statistic	p.value
(Intercept)	13.127	0.377	34.843	0.000
Kemajuan Teknologi	0.253	0.097	2.603	0.010
Knowledge Based Economy	0.004	0.056	0.073	0.942

```
summary(stage3)

Pooling Model

Call:
plm(formula = log(labor) ~ kemajuan teknologi + knowledge based e
conomy + human_hat, data = pdata,
    effect = "individual", model = "pooling")

Balanced Panel: n = 33, T = 11, N = 363

Residuals:
    Min.  1st Qu.   Median  3rd Qu.     Max.
-1.58427 -0.70303 -0.10595  0.49330  2.39907

Coefficients: (1 dropped because of singularities)
                         Estimate Std. Error t-value  Pr(>|t|)
(Intercept)              13.1265388  0.3767343 34.8430 < 2.2e-16 *
**
kemajuan teknologi        0.2533435  0.0973306  2.6029  0.009626 *
*
knowledge based economy  0.0041144  0.0562587  0.0731  0.941741
```

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    355.02
Residual Sum of Squares: 330.01
R-Squared:      0.07044
Adj. R-Squared: 0.065276
F-statistic: 13.6401 on 2 and 360 DF, p-value: 1.9494e-06
```

Analisis Data Panel Fixed Effect

Tahap 1

```
one_sls <- plm(log(invest) ~ kemajuan teknologi + knowledge based
economy , data=pdata, effect = "individual", model = "within")
summary(one_sls)

Oneway (individual) effect Within Model

Call:
plm(formula = log(invest) ~ kemajuan teknologi + knowledge based
economy, data = pdata, effect = "individual", model = "within")

Balanced Panel: n = 33, T = 11, N = 363

Residuals:
     Min.   1st Qu.    Median   3rd Qu.      Max.
-0.648435 -0.070767  0.011886  0.075840  0.577999

Coefficients:
                        Estimate Std. Error t-value  Pr(>|t|)
kemajuan teknologi      0.119909   0.013505  8.8788 < 2.2e-16 ***
knowledge based economy 0.173047   0.040490  4.2738 2.522e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    27.348
Residual Sum of Squares: 8.0735
R-Squared:      0.70478
Adj. R-Squared: 0.67418
F-statistic: 391.527 on 2 and 328 DF, p-value: < 2.22e-16
```

Tahap 2

```
two_sls <- plm(human ~ log(invest) +tik |. -log(invest) + tik + i
nfra , data=pdata, effect = "individual", model = "within")
summary(two_sls)

Oneway (individual) effect Within Model
Instrumental variable estimation

Call:
plm(formula = human ~ log(invest) + know | . - log(invest) + tik
+
```

```
    infra, data = pdata, effect = "individual", model = "within")

Balanced Panel: n = 33, T = 11, N = 363

Residuals:
     Min.   1st Qu.    Median   3rd Qu.      Max.
-2.725664 -0.142451 -0.016119  0.148987  1.378317

Coefficients:
                         Estimate Std. Error z-value Pr(>|z|)
log(invest)               1.6836093  0.5212367  3.2300 0.001238 *
*
kemajuan teknologi        0.0043625  0.0902979  0.0483 0.961467
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    101.84
Residual Sum of Squares: 40.065
R-Squared:      0.61595
Adj. R-Squared: 0.57614
Chisq: 460.596 on 2 DF, p-value: < 2.22e-16
```

Tahap 3

```
three_sls <- plm(log(labor) ~ human+kemajuan teknologi +knowledge
based economy |.- human + log(invest) +tik + infra |. -log(invest
) + kemajuan teknologi + knowledge based economy , data=pdata, ef
fect = "individual", model = "within")
summary(three_sls)

Oneway (individual) effect Within Model
Instrumental variable estimation

Call:
plm(formula = log(labor) ~ human + kemajuan teknologi + knowledge
based economi | . - human +
    log(invest) + kemajuan teknologi + knowledge based economy |
. - log(invest) + tik + infra,
    data = pdata, effect = "individual", model = "within")

Balanced Panel: n = 33, T = 11, N = 363

Residuals:
       Min.     1st Qu.      Median     3rd Qu.        Max.
-0.14008892 -0.02711490  0.00061588  0.02402435  0.33788698

Coefficients:
                        Estimate Std. Error z-value  Pr(>|z|)
human                   0.1263748  0.0164988  7.6596 1.865e-14 **
*
kemajuan teknologi      0.0081699  0.0054174  1.5081    0.1315
knowledge based economy 0.0134648  0.0135215  0.9958    0.3193
```

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    2.154
Residual Sum of Squares: 0.78418
R-Squared:      0.68085
Adj. R-Squared: 0.6467
Chisq: 721.174 on 3 DF, p-value: < 2.22e-16
```

Uji pFTest

```
pFtest(three_sls,stage3)


    F test for individual effects

data:  log(labor) ~ human + kemajuan teknologi + knowledge based
economy | . - human + log(invest) +  ...
F = 4160.2, df1 = 33, df2 = 327, p-value < 2.2e-16
alternative hypothesis: significant effects
```

pFTest itu Uji Chow untuk menguji apakah fix effect atau common effect. Hasilnya p-value dibawa 0,05 yg artinya signifikan, artinya fixed effect model yg terpilih. Selanjutnya uji Hausman dilakukan untuk melihat apakah fixed effect model atau random effect model yg terpilih.

Model Efek Random

Tahap 1

```
rone_sls <- plm(log(invest) ~ kemajuan teknologi + knowledge base
d economy , data=pdata, effect = "individual", model = "random")
summary(rone_sls)

Oneway (individual) effect Random Effect Model
   (Swamy-Arora's transformation)

Call:
plm(formula = log(invest) ~ kemajuan teknologi + knowledge based
economy, data = pdata, effect = "individual",
    model = "random")

Balanced Panel: n = 33, T = 11, N = 363

Effects:
                  var std.dev share
idiosyncratic 0.02461 0.15689 0.025
individual    0.97569 0.98777 0.975
theta: 0.9522

Residuals:
     Min.   1st Qu.    Median   3rd Qu.      Max.
```

```
-0.625386 -0.079610  0.017818  0.091443  0.530570

Coefficients:
                        Estimate Std. Error z-value  Pr(>|z|)
(Intercept)             16.514864   0.249379 66.2240 < 2.2e-16 **
*
kemajuan teknologi        0.118151   0.013495  8.7549 < 2.2e-16 *
**
knowledge based economy   0.180697   0.040302  4.4836 7.339e-06 *
**
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    28.448
Residual Sum of Squares: 8.9479
R-Squared:      0.68546
Adj. R-Squared: 0.68372
Chisq: 784.546 on 2 DF, p-value: < 2.22e-16
```

Tahap 2

```
rtwo_sls <- plm(human ~ log(invest)  | + tik + infra , data=pdata
, effect = "individual", model = "random")
summary(rtwo_sls)

Oneway (individual) effect Random Effect Model
   (Swamy-Arora's transformation)
Instrumental variable estimation
   (Balestra-Varadharajan-Krishnakumar's transformation)

Call:
plm(formula = human ~ log(invest) | +tik + infra, data = pdata,
    effect = "individual", model = "random")

Balanced Panel: n = 33, T = 11, N = 363

Effects:
                 var std.dev share
idiosyncratic 0.1226  0.3501 0.023
individual    5.1955  2.2794 0.977
theta: 0.9537

Residuals:
      Min.    1st Qu.     Median    3rd Qu.       Max.
-2.7119149 -0.1720098 -0.0051939  0.1503265  1.2791959

Coefficients:
             Estimate Std. Error z-value  Pr(>|z|)
(Intercept) 38.628292   1.471076  26.259 < 2.2e-16 ***
log(invest)  1.716833   0.078923  21.753 < 2.2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Total Sum of Squares:    106.96
Residual Sum of Squares: 43.815
R-Squared:      0.60211
Adj. R-Squared: 0.60101
Chisq: 473.208 on 1 DF, p-value: < 2.22e-16
```

Tahap 3

```
rthree_sls <- plm(log(labor) ~ human+tik+infra |.- human + log(in
vest) +tik + infra |. -log(invest) + tik + infra , data=pdata, mo
del = "random")
summary(rthree_sls)
```

```
Oneway (individual) effect Random Effect Model
   (Swamy-Arora's transformation)
Instrumental variable estimation
   (Balestra-Varadharajan-Krishnakumar's transformation)

Call:
plm(formula = log(labor) ~ human + tik + infra | . - human +
    log(invest) + tik + infra | . - log(invest) + tik + infra,
    data = pdata, model = "random")

Balanced Panel: n = 33, T = 11, N = 363

Effects:
                   var  std.dev share
idiosyncratic 0.002398 0.048970 0.001
individual    2.290130 1.513317 0.999
theta: 0.9902

Residuals:
       Min.     1st Qu.      Median     3rd Qu.        Max.
-0.12571528 -0.02851099 -0.00076616  0.02470762  0.34789930

Coefficients:
             Estimate Std. Error z-value  Pr(>|z|)
(Intercept) 5.4564645  1.1179439  4.8808 1.057e-06 ***
human       0.1294156  0.0161944  7.9914 1.334e-15 ***
tik         0.0075507  0.0053192  1.4195    0.1558
infra       0.0125608  0.0133051  0.9441    0.3451
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    2.1875
Residual Sum of Squares: 0.83329
R-Squared:      0.66778
Adj. R-Squared: 0.665
Chisq: 748.897 on 3 DF, p-value: < 2.22e-16
```

Uji Hausman

Terlihat bahwa intercept bernilai signifikan, sehingga dilanjutkan degan menguji Hausman

```
phtest(three_sls, rthree_sls)


    Hausman Test

data:  log(labor) ~ human + tik + infra | . - human + log(invest)
+  ...
chisq = 0.93446, df = 3, p-value = 0.8171
alternative hypothesis: one model is inconsistent
```

Karena p-value lebih besar dari 5%, maka hipotesis null diterima, artinya model random effect yang diterima.