Blood Viscosity Data Set

Viscosity.sav [DataSet2] - SPSS Data Editor

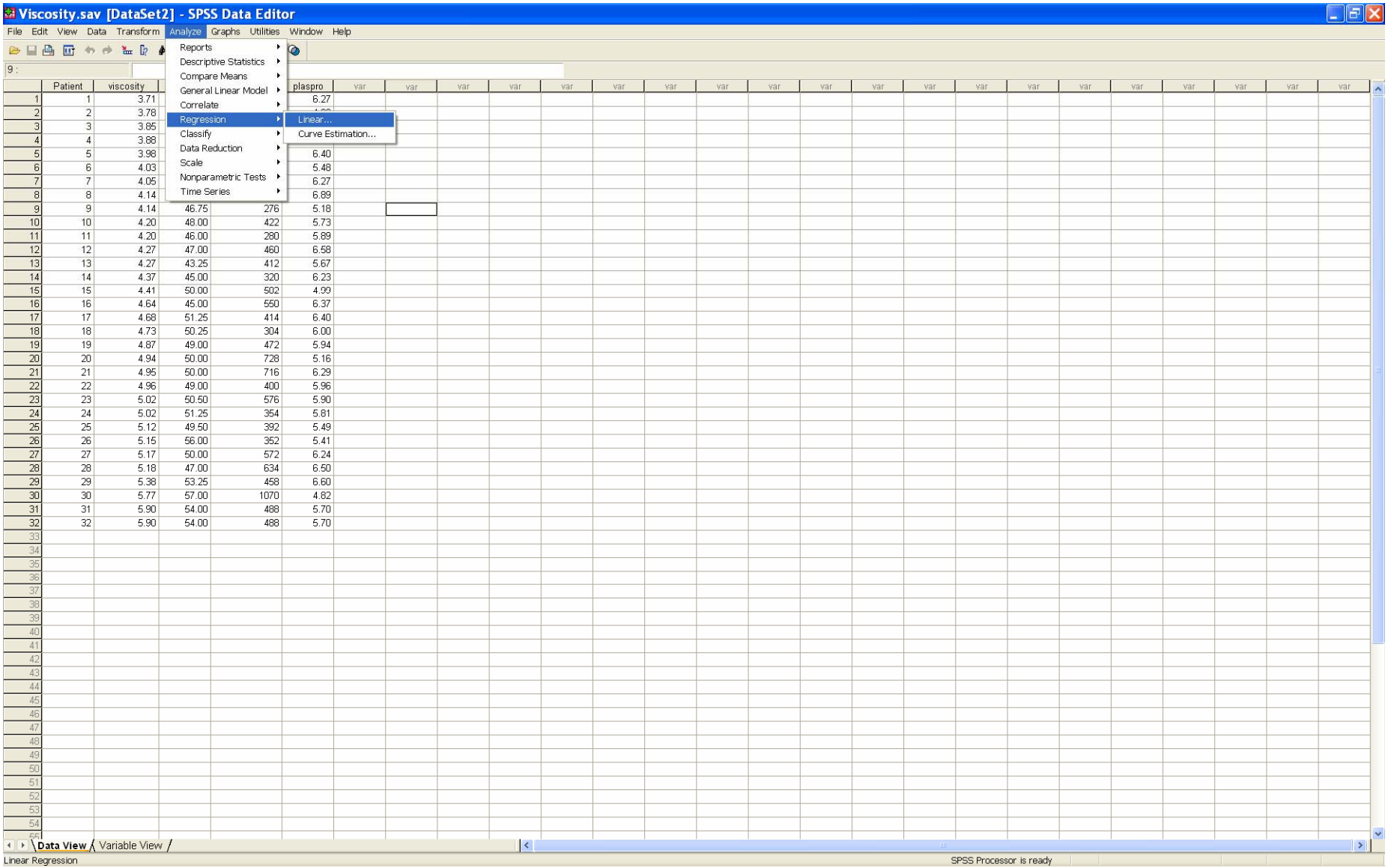
File Edit View Data Transform Analyze Graphs Utilities Window Help

	Patient	viscosity	pcv	plasfib	plaspro
1	1	3.71	40.00	344	6.27
2	2	3.78	40.00	330	4.86
3	3	3.85	42.50	280	5.09
4	4	3.88	42.00	418	6.79
5	5	3.98	45.00	774	6.40
6	6	4.03	42.00	388	5.48
7	7	4.05	42.50	336	6.27
8	8	4.14	47.00	431	6.89
9	9	4.14	46.75	276	5.18
10	10	4.20	48.00	422	5.73
11	11	4.20	46.00	280	5.89
12	12	4.27	47.00	460	6.58
13	13	4.27	43.25	412	5.67
14	14	4.37	45.00	320	6.23
15	15	4.41	50.00	502	4.99
16	16	4.64	45.00	550	6.37
17	17	4.68	51.25	414	6.40
18	18	4.73	50.25	304	6.00
19	19	4.87	49.00	472	5.94
20	20	4.94	50.00	728	5.16
21	21	4.95	50.00	716	6.29
22	22	4.96	49.00	400	5.96
23	23	5.02	50.50	576	5.90
24	24	5.02	51.25	354	5.81
25	25	5.12	49.50	392	5.49
26	26	5.15	56.00	352	5.41
27	27	5.17	50.00	572	6.24
28	28	5.18	47.00	634	6.50
29	29	5.38	53.25	458	6.60
30	30	5.77	57.00	1070	4.82
31	31	5.90	54.00	488	5.70
32	32	5.90	54.00	488	5.70

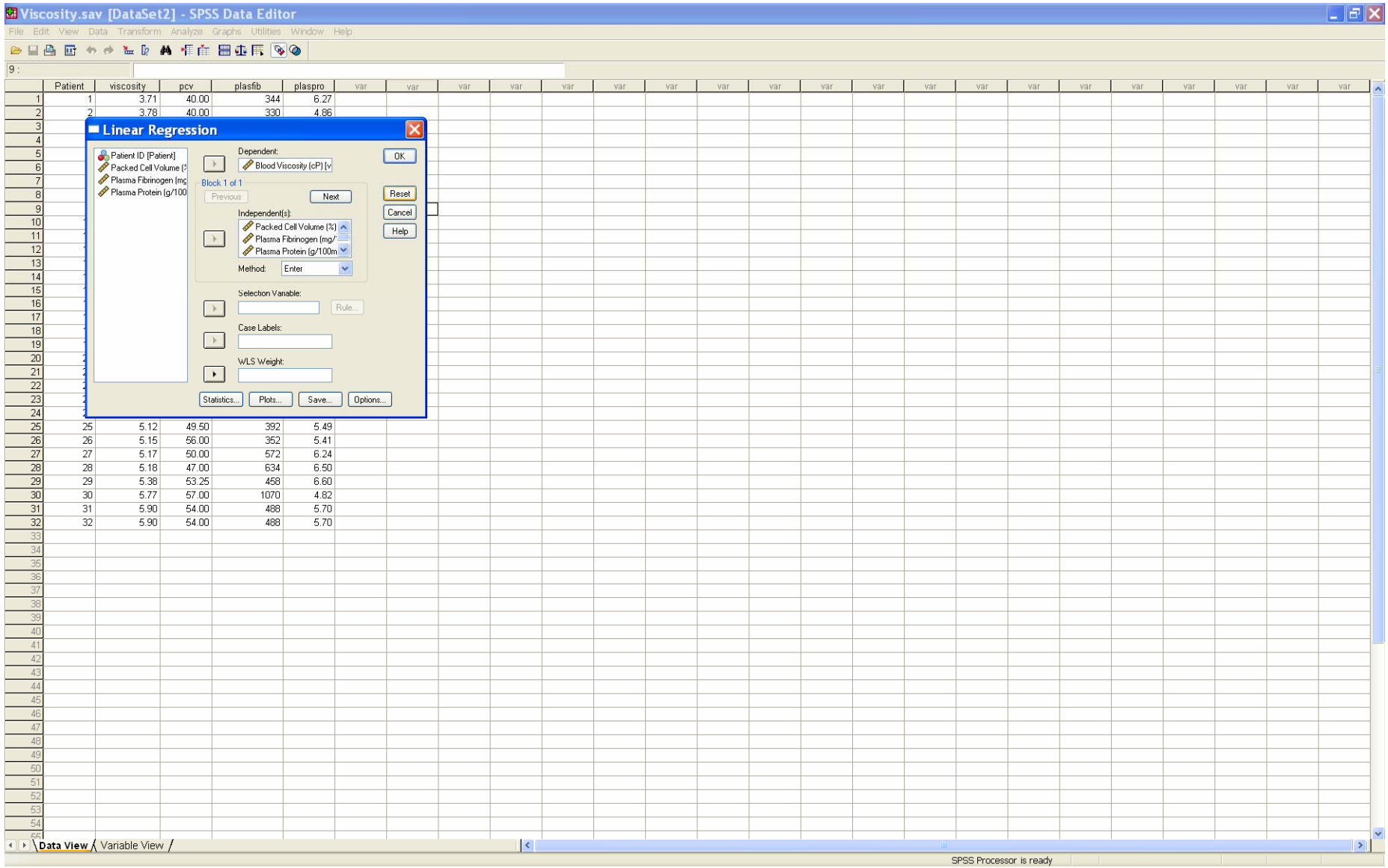
Data View | Variable View

SPSS Processor is ready

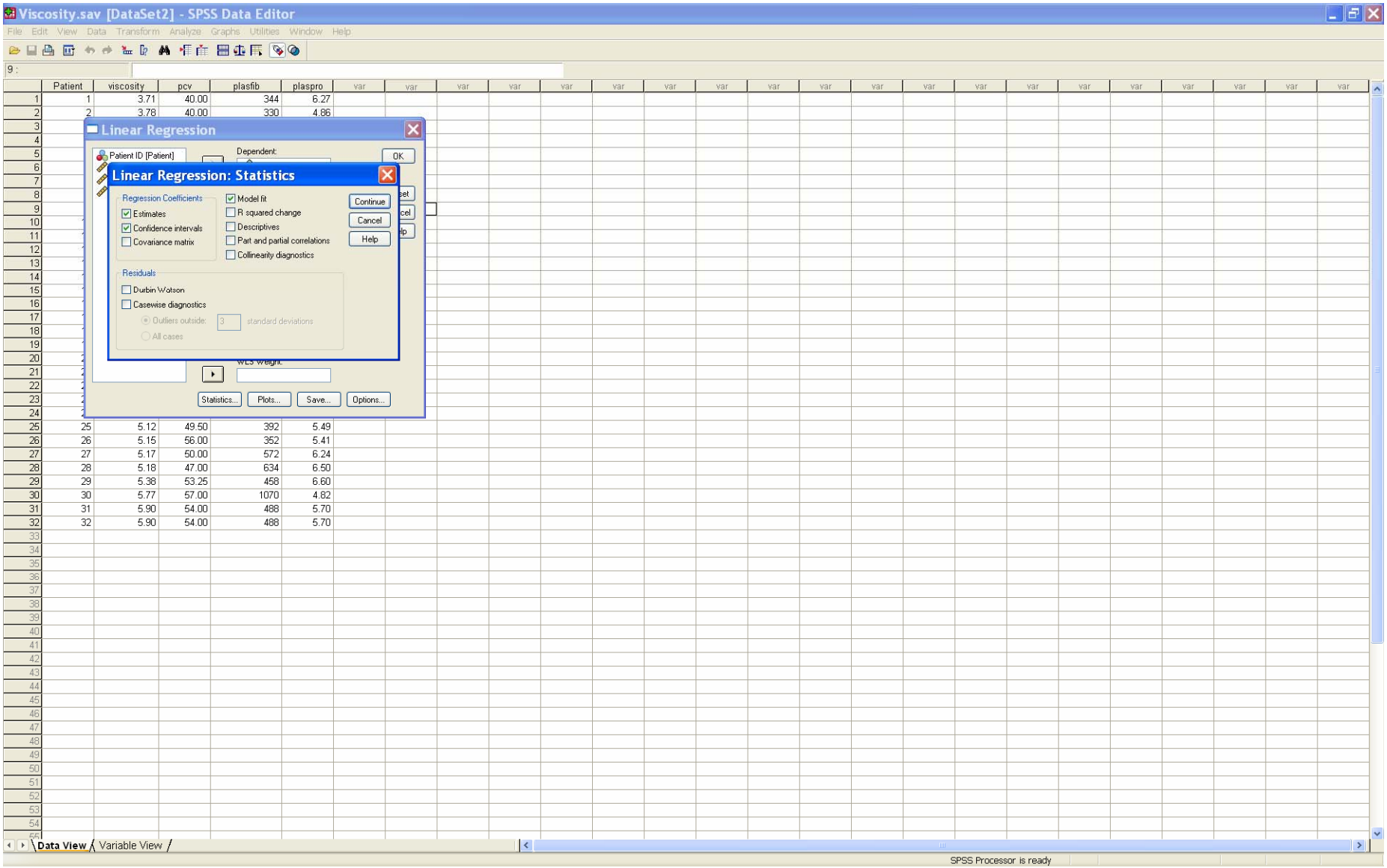
Use the *Analyze*, *Regression*, *Linear* pulldown selections



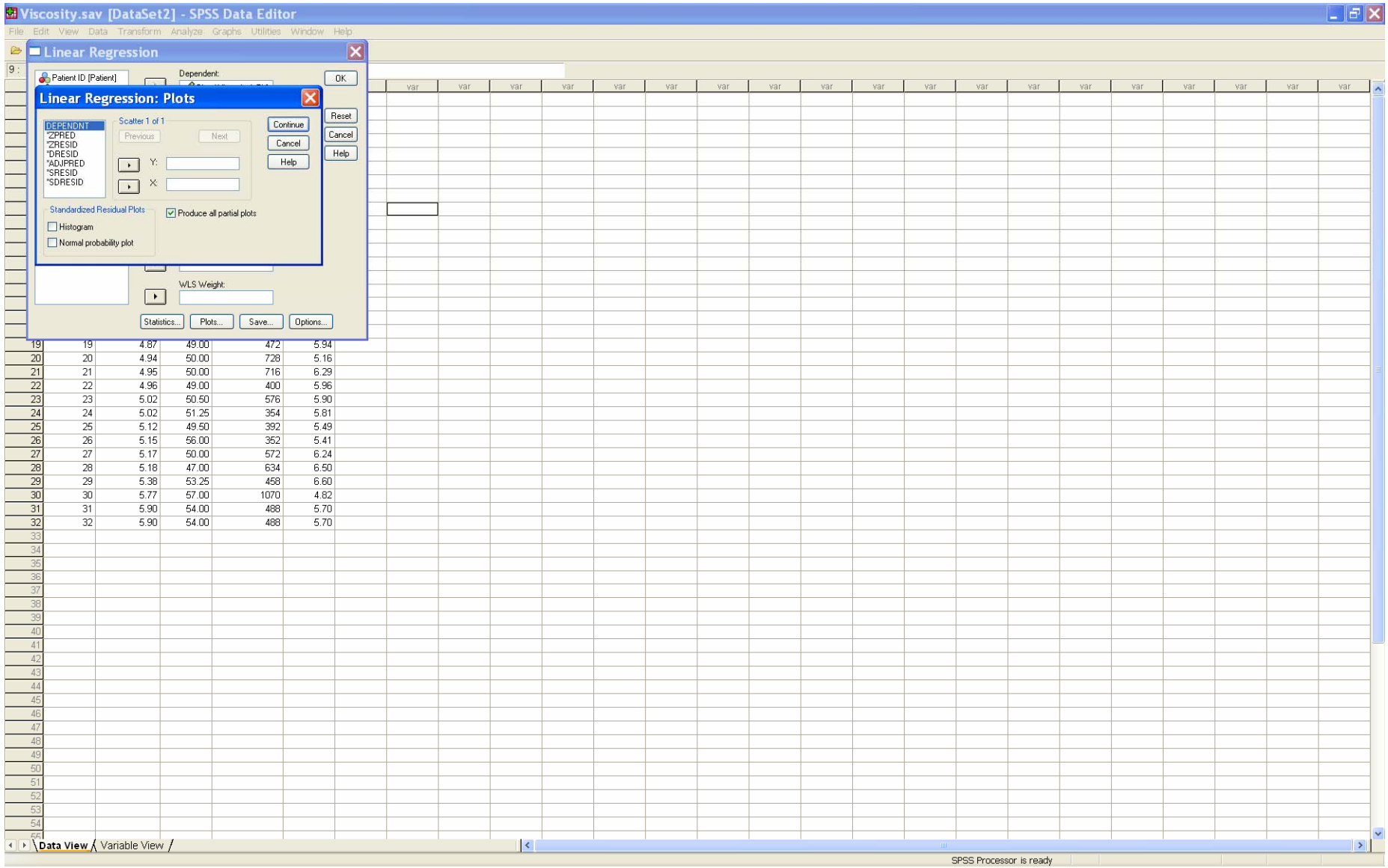
Select the Dependent variable (**viscosity**) and the three independent variables (**pcv**, **plasfib** and **plaspro**)



Click the *Statistics* button: on the *Statistics* dialog, select *Estimates*, *Confidence Intervals* and *Model fit.* Click *Continue*.

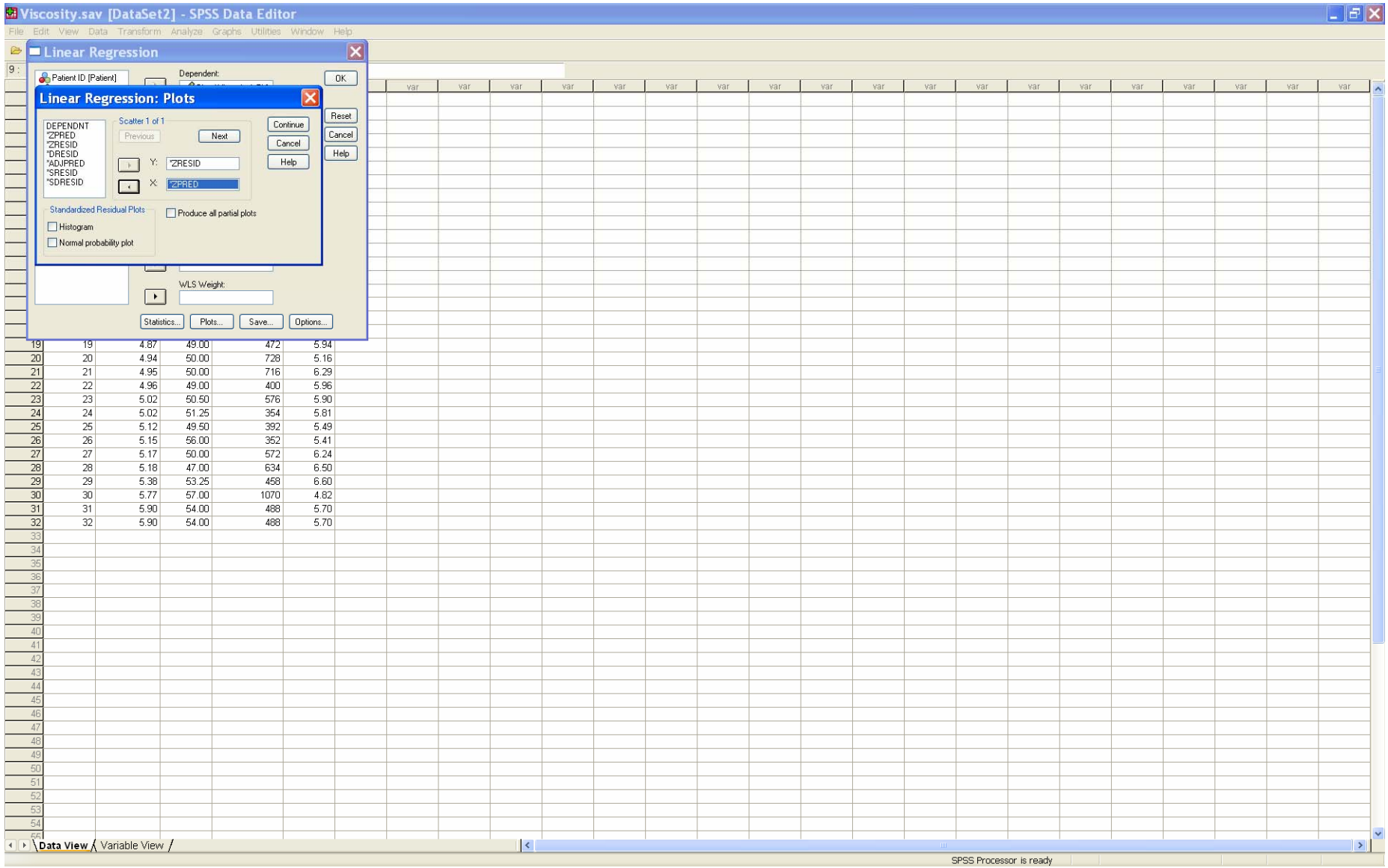


Click the *Plots* button



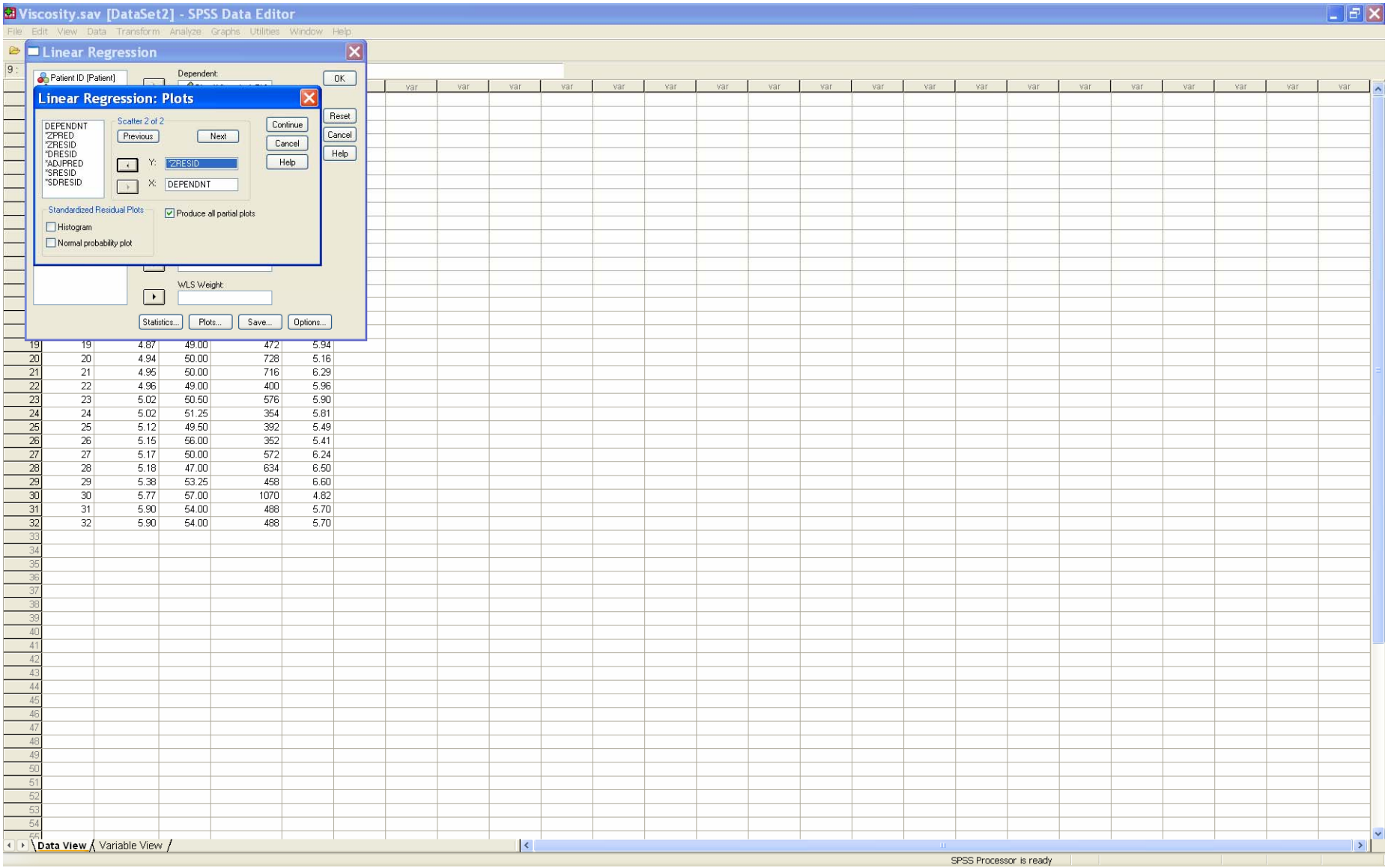
Select ***ZRESID** for the *Y* variable and ***ZPRED** for the *X* variable.

Then click *Next.*

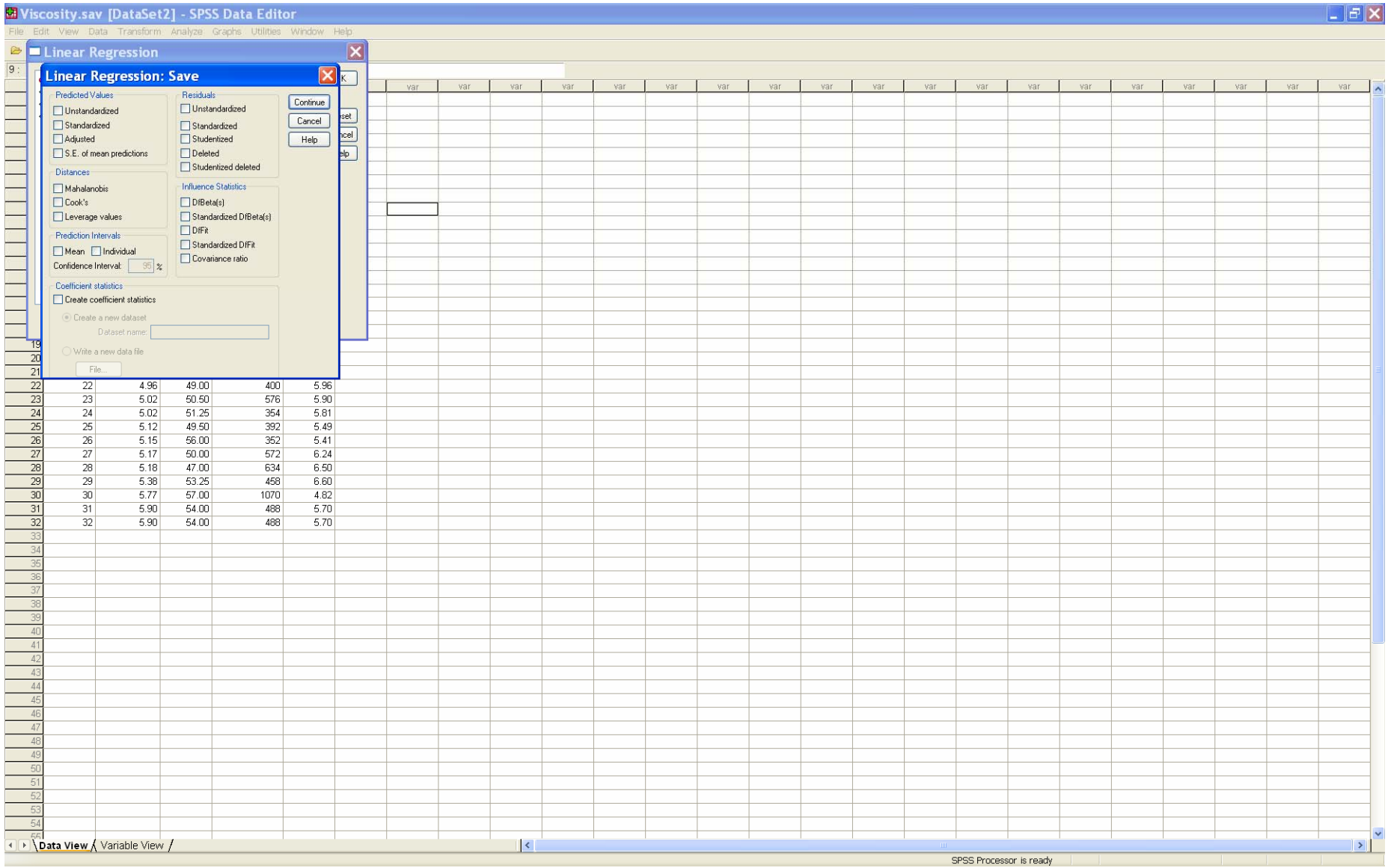


Select ***ZRESID** for the *Y* variable and ***ZPRED** for the *X* variable.

Then click *Produce all partial Plots.* Then *Continue.*

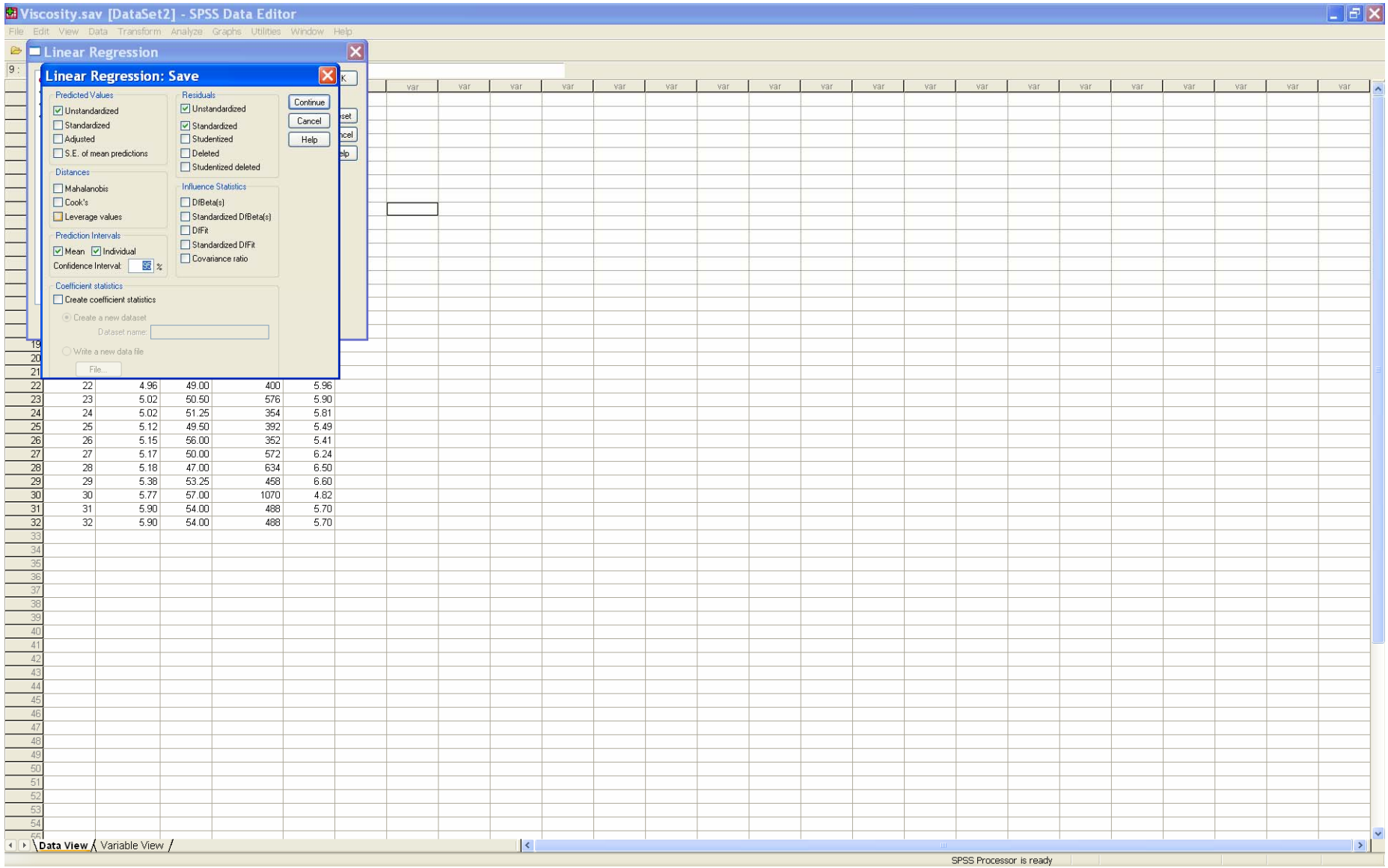


Click the *Save* button, to compute and store the residuals etc.

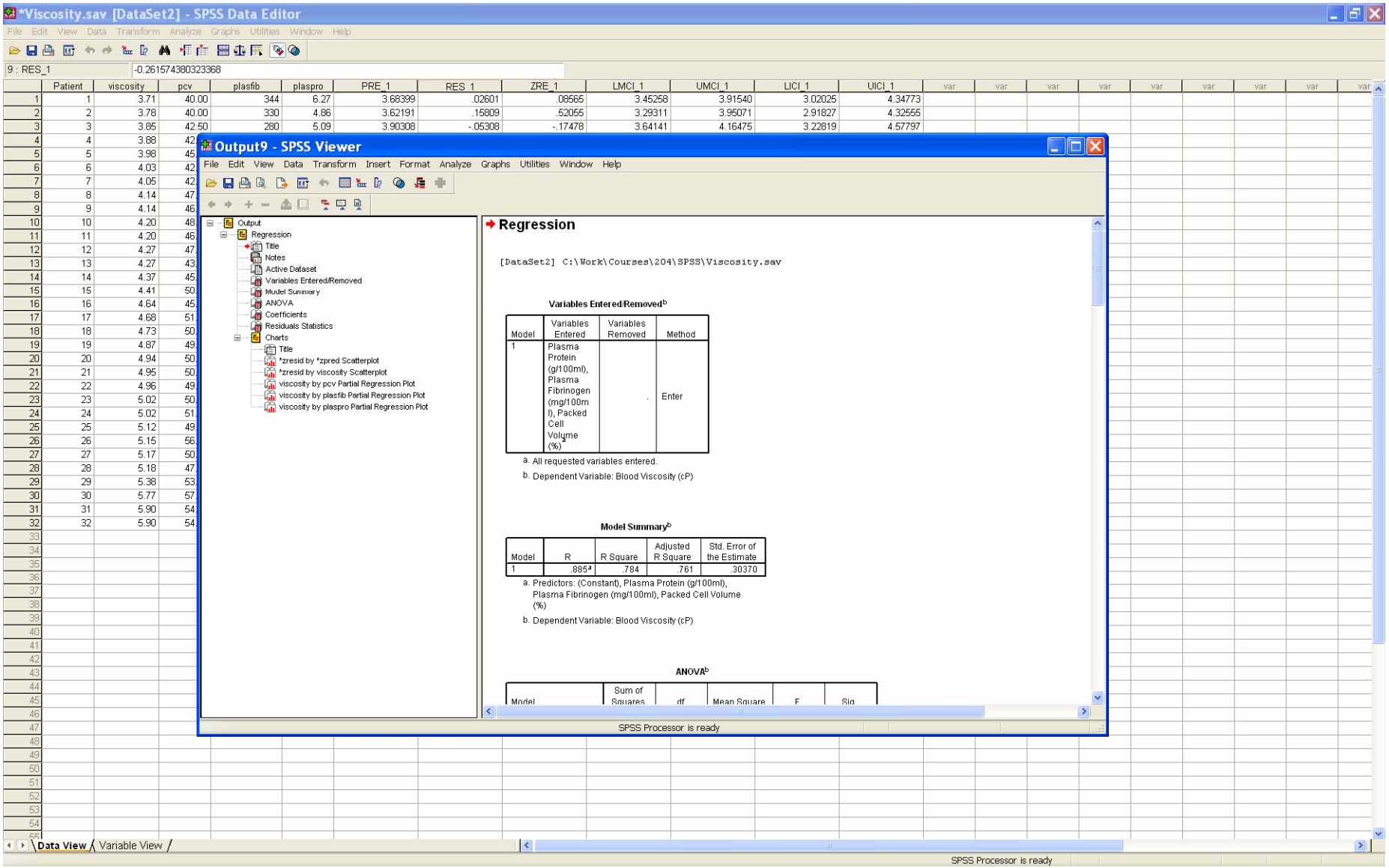


Select the quantities to store as new variables in the data set.

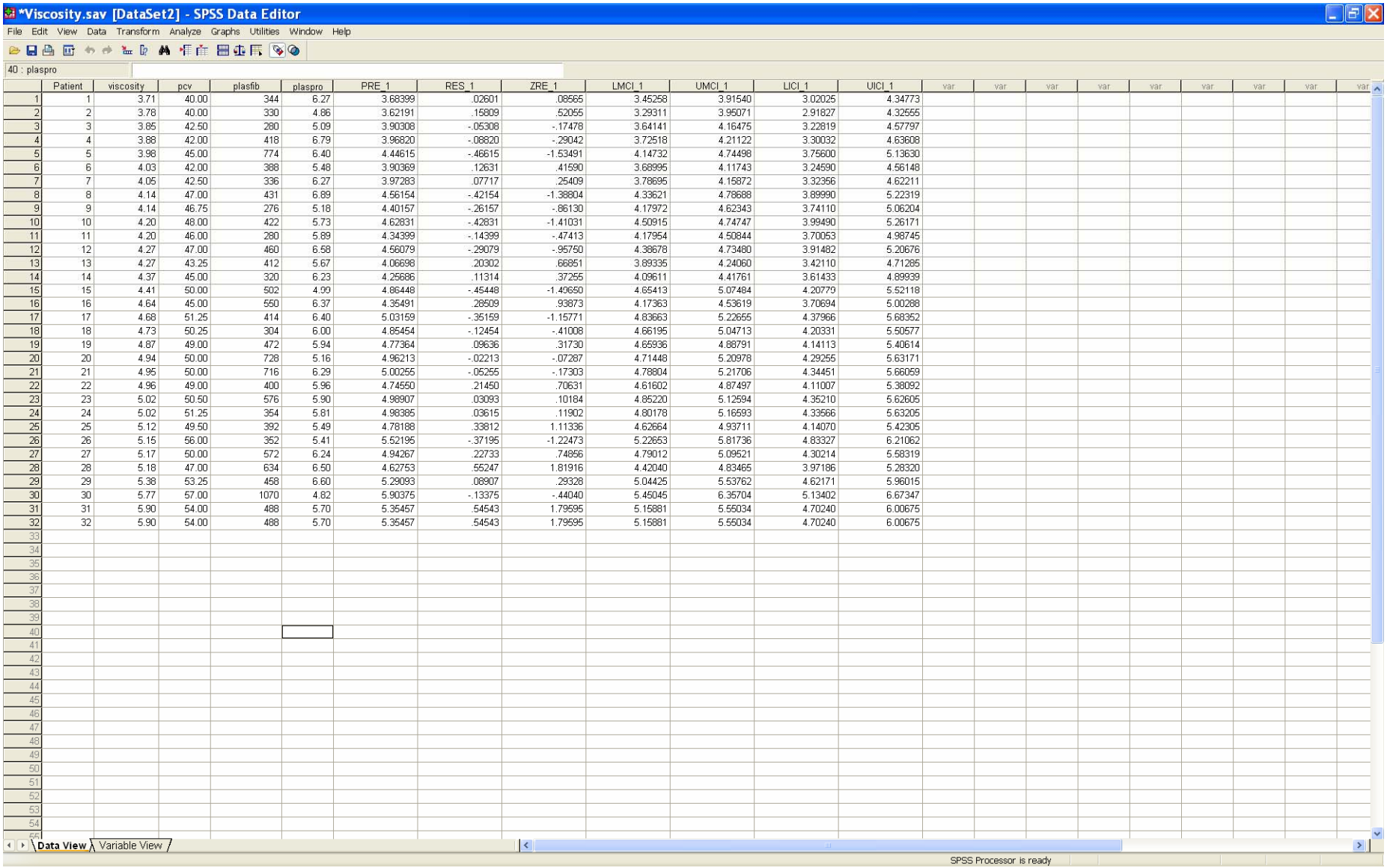
Click *Continue*.



Click OK and the output is generated.



New variables have been computed.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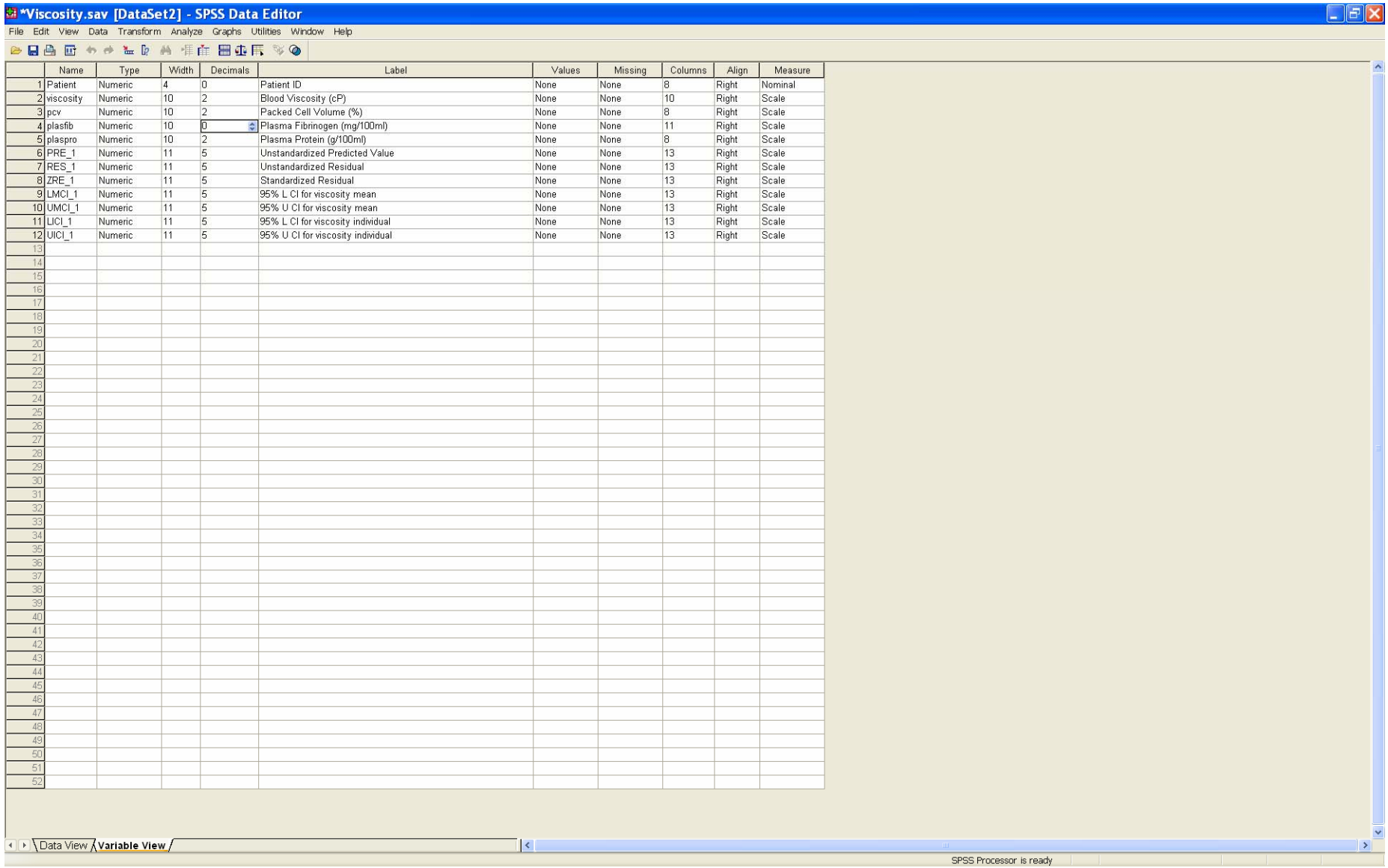
40 : plaspro

	Patient	viscosity	pcv	plasfib	plaspro	PRE_1	RES_1	ZRE_1	LMCI_1	UMCI_1	LICI_1	UICI_1	var	var	var	var	var	var	var	var	var
1	1	3.71	40.00	344	6.27	3.68399	.02601	.08565	3.45258	3.91540	3.02025	4.34773									
2	2	3.78	40.00	330	4.86	3.62191	.15809	.52055	3.29311	3.95071	2.91827	4.32555									
3	3	3.85	42.50	280	5.09	3.90308	-.05308	-.17478	3.64141	4.16475	3.22819	4.57797									
4	4	3.88	42.00	418	6.79	3.96820	-.08820	-.29042	3.72518	4.21122	3.30032	4.63608									
5	5	3.98	45.00	774	6.40	4.44615	-.46615	-1.53491	4.14732	4.74498	3.75600	5.13630									
6	6	4.03	42.00	388	5.48	3.90369	.12631	.41590	3.68995	4.11743	3.24590	4.56148									
7	7	4.05	42.50	336	6.27	3.97283	.07717	.25409	3.78695	4.15872	3.32356	4.62211									
8	8	4.14	47.00	431	6.89	4.56154	-.42154	-1.38804	4.33621	4.78688	3.89990	5.22319									
9	9	4.14	46.75	276	5.18	4.40157	-.26157	-.86130	4.17972	4.62343	3.74110	5.06204									
10	10	4.20	48.00	422	5.73	4.62831	-.42831	-1.41031	4.50915	4.74747	3.99490	5.26171									
11	11	4.20	46.00	280	5.89	4.34399	-.14399	-.47413	4.17954	4.50844	3.70053	4.98745									
12	12	4.27	47.00	460	6.58	4.56079	-.29079	-.95750	4.38678	4.73480	3.91482	5.20676									
13	13	4.27	43.25	412	5.67	4.06698	.20302	.66851	3.89335	4.24060	3.42110	4.71285									
14	14	4.37	45.00	320	6.23	4.25686	.11314	.37255	4.09611	4.41761	3.61433	4.89939									
15	15	4.41	50.00	502	4.99	4.86448	-.45448	-1.49650	4.65413	5.07484	4.20779	5.52118									
16	16	4.64	45.00	550	6.37	4.35491	.28509	.93873	4.17363	4.53619	3.70694	5.00288									
17	17	4.68	51.25	414	6.40	5.03159	-.35159	-1.15771	4.83663	5.22655	4.37966	5.68352									
18	18	4.73	50.25	304	6.00	4.85454	-.12454	-.41008	4.66195	5.04713	4.20331	5.50577									
19	19	4.87	49.00	472	5.94	4.77364	.09636	.31730	4.65936	4.88791	4.14113	5.40614									
20	20	4.94	50.00	728	5.16	4.96213	-.02213	-.07287	4.71448	5.20978	4.29255	5.63171									
21	21	4.95	50.00	716	6.29	5.00255	-.05255	-.17303	4.78804	5.21706	4.34451	5.66059									
22	22	4.96	49.00	400	5.96	4.74550	.21450	.70631	4.61602	4.87497	4.11007	5.38092									
23	23	5.02	50.50	576	5.90	4.98907	.03093	.10184	4.85220	5.12594	4.35210	5.62605									
24	24	5.02	51.25	354	5.81	4.98385	.03615	.11902	4.80178	5.16593	4.33566	5.63205									
25	25	5.12	49.50	392	5.49	4.78188	.33812	1.11336	4.62664	4.93711	4.14070	5.42305									
26	26	5.15	56.00	352	5.41	5.52195	-.37195	-1.22473	5.22653	5.81736	4.83327	6.21062									
27	27	5.17	50.00	572	6.24	4.94267	.22733	.74856	4.79012	5.09521	4.30214	5.58319									
28	28	5.18	47.00	634	6.50	4.62753	.55247	1.81916	4.42040	4.83465	3.97186	5.28320									
29	29	5.38	53.25	458	6.60	5.29093	.08907	.29328	5.04425	5.53762	4.62171	5.96015									
30	30	5.77	57.00	1070	4.82	5.90375	-.13375	-.44040	5.45045	6.35704	5.13402	6.67347									
31	31	5.90	54.00	488	5.70	5.35457	.54543	1.79595	5.15881	5.55034	4.70240	6.00675									
32	32	5.90	54.00	488	5.70	5.35457	.54543	1.79595	5.15881	5.55034	4.70240	6.00675									

Data View | Variable View

SPSS Processor is ready

Full information on the new variables is available.



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	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	Patient	Numeric	4	0	Patient ID	None	None	8	Right	Nominal
2	viscosity	Numeric	10	2	Blood Viscosity (cP)	None	None	10	Right	Scale
3	pcv	Numeric	10	2	Packed Cell Volume (%)	None	None	8	Right	Scale
4	plasfib	Numeric	10	0	Plasma Fibrinogen (mg/100ml)	None	None	11	Right	Scale
5	plaspro	Numeric	10	2	Plasma Protein (g/100ml)	None	None	8	Right	Scale
6	PRE_1	Numeric	11	5	Unstandardized Predicted Value	None	None	13	Right	Scale
7	RES_1	Numeric	11	5	Unstandardized Residual	None	None	13	Right	Scale
8	ZRE_1	Numeric	11	5	Standardized Residual	None	None	13	Right	Scale
9	LMCI_1	Numeric	11	5	95% L CI for viscosity mean	None	None	13	Right	Scale
10	UMCI_1	Numeric	11	5	95% U CI for viscosity mean	None	None	13	Right	Scale
11	LICI_1	Numeric	11	5	95% L CI for viscosity individual	None	None	13	Right	Scale
12	UICI_1	Numeric	11	5	95% U CI for viscosity individual	None	None	13	Right	Scale

Data View | Variable View

SPSS Processor is ready

Results: Model Summary

R squared and Adjusted R squared are quite high, so the fit is moderately good.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.885[a]	.784	.761	.30370

a. Predictors: (Constant), Plasma Protein (g/100ml), Plasma Fibrinogen (mg/100ml), Packed Cell Volume (%)

b. Dependent Variable: Blood Viscosity (cP)

Results: ANOVA

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.368	3	3.123	33.856	.000[a]
	Residual	2.582	28	.092		
	Total	11.950	31			

a. Predictors: (Constant), Plasma Protein (g/100ml), Plasma Fibrinogen (mg/100ml), Packed Cell Volume (%)

b. Dependent Variable: Blood Viscosity (cP)

The ANOVA for the multiple regression has a highly significant F value, with a p-value < 0.001. Here

H0 : E[Y] = beta.0
H1 : E[Y] = beta.0 + beta.*1 x1* + beta.*2 x2* + beta.*3 x3*

This result implies that the multiple regression (Ha) fits significantly better than the model with no dependence on any of the predictors (H0).

Results: Parameter Estimates

Coefficients[a]

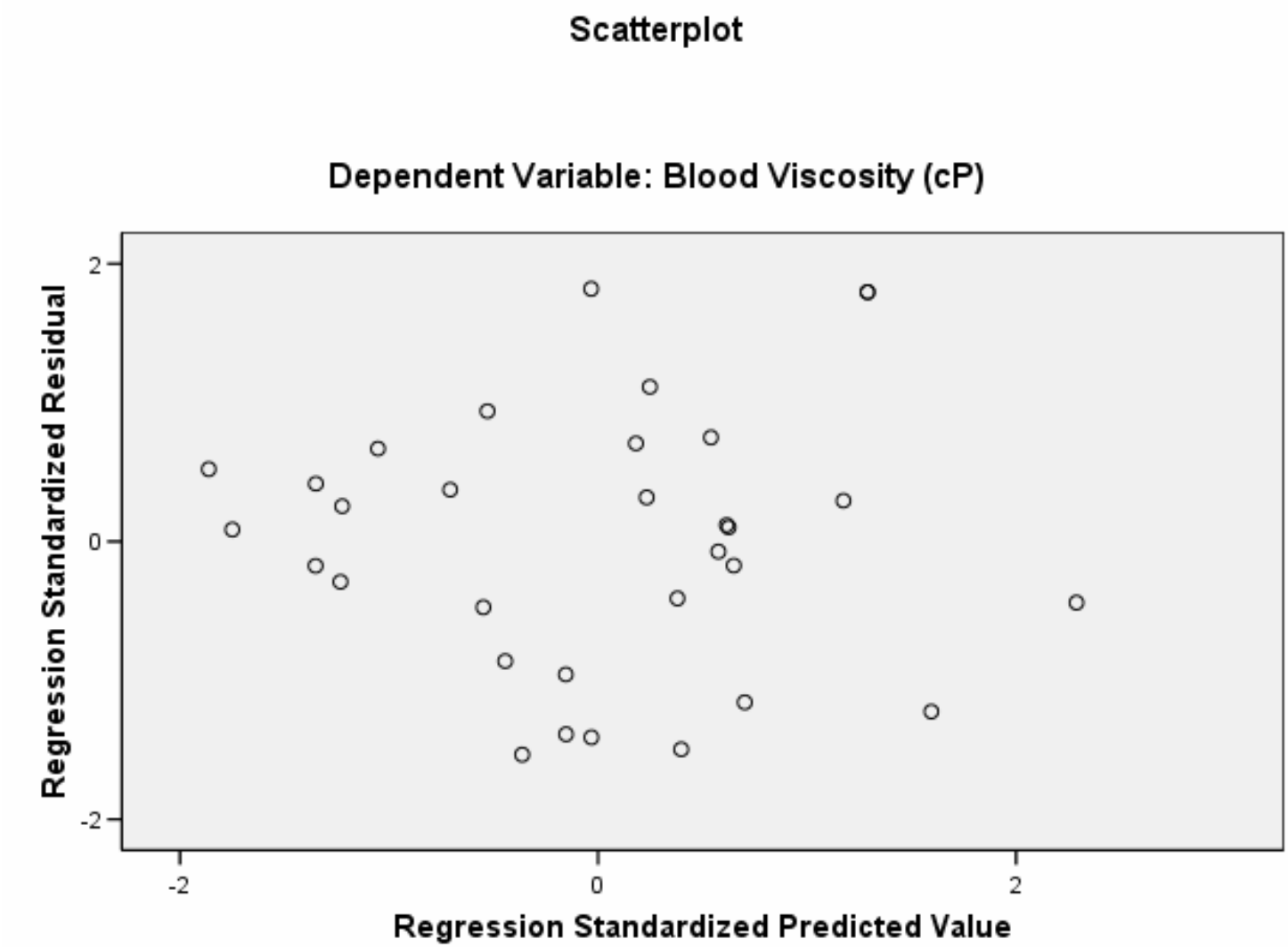
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-1.378	.897		-1.537	.136	-3.215	.458
	Packed Cell Volume (%)	.117	.014	.839	8.584	.000	.089	.145
	Plasma Fibrinogen (mg/100ml)	.000	.000	.111	1.147	.261	.000	.001
	Plasma Protein (g/100ml)	.040	.097	.037	.412	.683	-.159	.239

a. Dependent Variable: Blood Viscosity (cP)

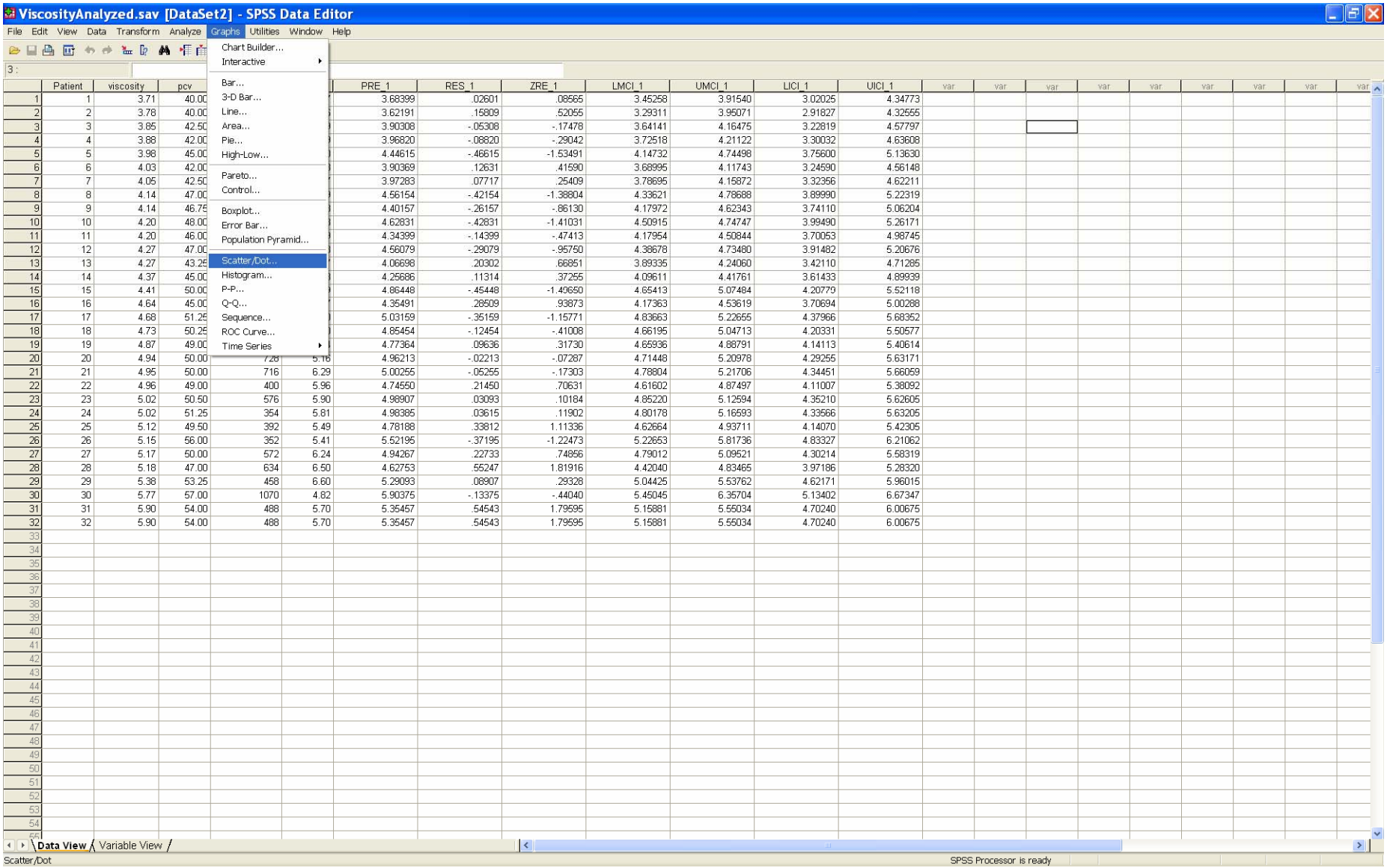
The coefficient and standard error for Plasma Fibrinogen are not exactly zero, but are zero to three decimal places.

Only the Packed Cell Volume coefficient is significantly different from zero ($p < 0.001$). The intercept (Constant), Plasma Fibrinogen, and Plasma Protein coefficients are not significantly different from zero ($p=0.136$, 0.261, 0.683 respectively)

Results: Scatterplot of Standardized Residual vs Predicted Value

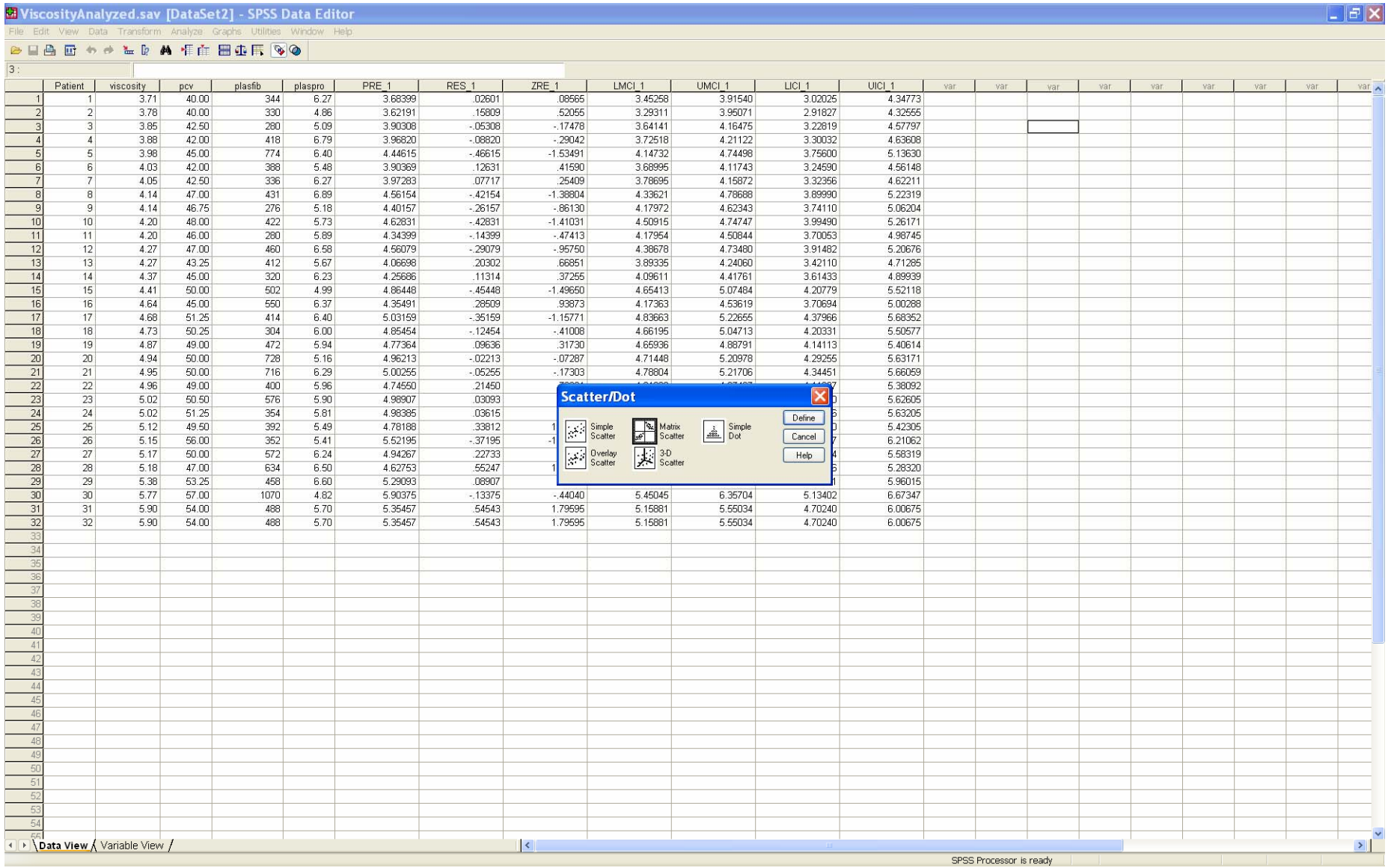


Obtaining: Plots of Residuals vs Covariates



	Patient	viscosity	pcv			PRE_1	RES_1	ZRE_1	LMCI_1	UMCI_1	LICI_1	UICI_1
1	1	3.71	40.00			3.68399	.02601	.08565	3.45258	3.91540	3.02025	4.34773
2	2	3.78	40.00			3.62191	.15809	.52055	3.29311	3.95071	2.91827	4.32555
3	3	3.85	42.50			3.90308	-.05308	-.17478	3.64141	4.16475	3.22819	4.57797
4	4	3.88	42.00			3.96820	-.08820	-.29042	3.72518	4.21122	3.30032	4.63608
5	5	3.98	45.00			4.44615	-.46615	-1.53491	4.14732	4.74498	3.75600	5.13630
6	6	4.03	42.00			3.90369	.12631	.41590	3.68995	4.11743	3.24590	4.56148
7	7	4.05	42.50			3.97283	.07717	.25409	3.78695	4.15872	3.32356	4.62211
8	8	4.14	47.00			4.56154	-.42154	-1.38804	4.33621	4.78688	3.89990	5.22319
9	9	4.14	46.75			4.40157	-.26157	-.86130	4.17972	4.62343	3.74110	5.06204
10	10	4.20	48.00			4.62831	-.42831	-1.41031	4.50915	4.74747	3.99490	5.26171
11	11	4.20	46.00			4.34399	-.14399	-.47413	4.17954	4.50844	3.70053	4.98745
12	12	4.27	47.00			4.56079	-.29079	-.95750	4.38678	4.73480	3.91482	5.20676
13	13	4.27	43.25			4.06698	.20302	.66851	3.89335	4.24060	3.42110	4.71285
14	14	4.37	45.00			4.25686	.11314	.37255	4.09611	4.41761	3.61433	4.89939
15	15	4.41	50.00			4.86448	-.45448	-1.49650	4.65413	5.07484	4.20779	5.52118
16	16	4.64	45.00			4.35491	.28509	.93873	4.17363	4.53619	3.70694	5.00288
17	17	4.68	51.25			5.03159	-.35159	-1.15771	4.83663	5.22655	4.37966	5.68352
18	18	4.73	50.25			4.85454	-.12454	-.41008	4.66195	5.04713	4.20331	5.50577
19	19	4.87	49.00			4.77364	.09636	.31730	4.65936	4.88791	4.14113	5.40614
20	20	4.94	50.00	728	5.16	4.96213	-.02213	-.07287	4.71448	5.20978	4.29255	5.63171
21	21	4.95	50.00	716	6.29	5.00255	-.05255	-.17303	4.78804	5.21706	4.34451	5.66059
22	22	4.96	49.00	400	5.96	4.74550	.21450	.70631	4.61602	4.87497	4.11007	5.38092
23	23	5.02	50.50	576	5.90	4.98907	.03093	.10184	4.85220	5.12594	4.35210	5.62605
24	24	5.02	51.25	354	5.81	4.98385	.03615	.11902	4.80178	5.16593	4.33566	5.63205
25	25	5.12	49.50	392	5.49	4.78188	.33812	1.11336	4.62664	4.93711	4.14070	5.42305
26	26	5.15	56.00	352	5.41	5.52195	-.37195	-1.22473	5.22653	5.81736	4.83327	6.21062
27	27	5.17	50.00	572	6.24	4.94267	.22733	.74856	4.79012	5.09521	4.30214	5.58319
28	28	5.18	47.00	634	6.50	4.62753	.55247	1.81916	4.42040	4.83465	3.97186	5.28320
29	29	5.38	53.25	458	6.60	5.29093	.08907	.29328	5.04425	5.53762	4.62171	5.96015
30	30	5.77	57.00	1070	4.82	5.90375	-.13375	-.44040	5.45045	6.35704	5.13402	6.67347
31	31	5.90	54.00	488	5.70	5.35457	.54543	1.79595	5.15881	5.55034	4.70240	6.00675
32	32	5.90	54.00	488	5.70	5.35457	.54543	1.79595	5.15881	5.55034	4.70240	6.00675

Use the *Matrix Scatter* option, and click *Define*



	Patient	viscosity	pcv	plasfib	plaspro	PRE_1	RES_1	ZRE_1	LMCI_1	UMCI_1	LICI_1	UICI_1
1	1	3.71	40.00	344	6.27	3.68399	.02601	.08565	3.45258	3.91540	3.02025	4.34773
2	2	3.78	40.00	330	4.86	3.62191	.15809	.52055	3.29311	3.95071	2.91827	4.32555
3	3	3.85	42.50	280	5.09	3.90308	-.05308	-.17478	3.64141	4.16475	3.22819	4.57797
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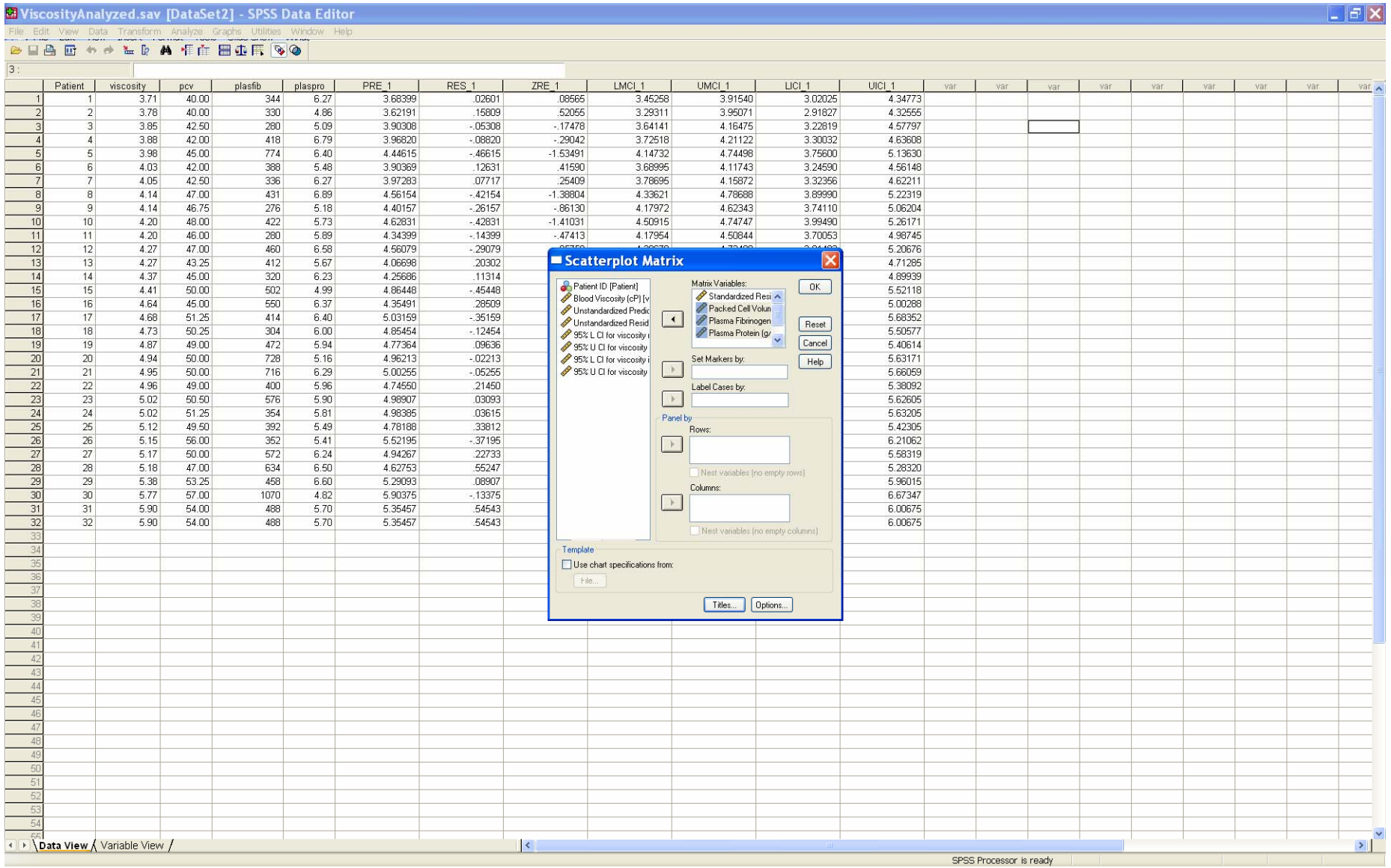
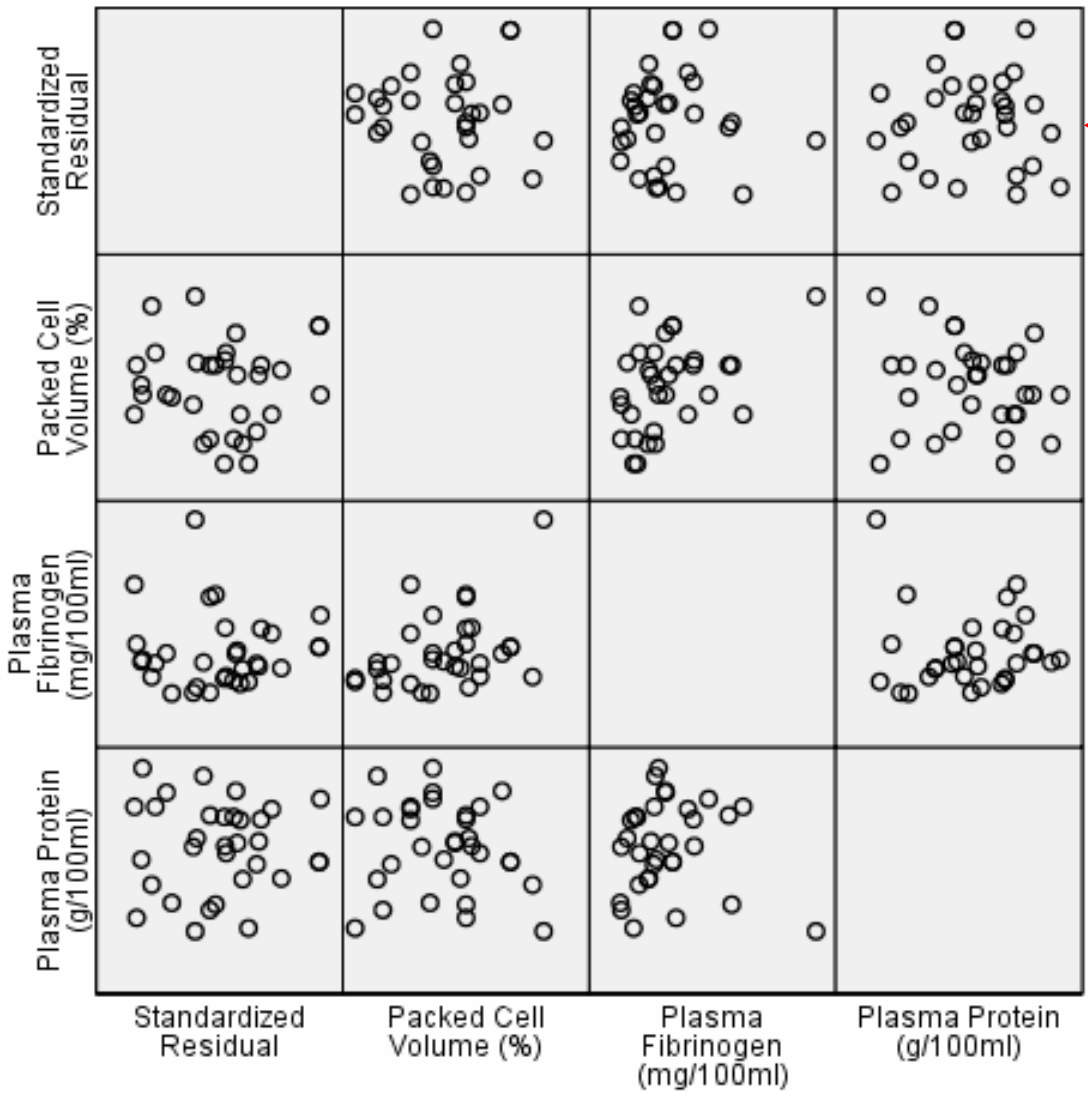
5	5	3.98	45.00	774	6.40	4.44615	-.46615	-1.53491	4.14732	4.74498	3.75600	5.13630
6	6	4.03	42.00	388	5.48	3.90369	.12631	.41590	3.68995	4.11743	3.24590	4.56148
7	7	4.05	42.50	336	6.27	3.97283	.07717	.25409	3.78695	4.15872	3.32356	4.62211
8	8	4.14	47.00	431	6.89	4.56154	-.42154	-1.38804	4.33621	4.78688	3.89990	5.22319
9	9	4.14	46.75	276	5.18	4.40157	-.26157	-.86130	4.17972	4.62343	3.74110	5.06204
10	10	4.20	48.00	422	5.73	4.62831	-.42831	-1.41031	4.50915	4.74747	3.99490	5.26171
11	11	4.20	46.00	280	5.89	4.34399	-.14399	-.47413	4.17954	4.50844	3.70053	4.98745
12	12	4.27	47.00	460	6.58	4.56079	-.29079	-.95750	4.38678	4.73480	3.91482	5.20676
13	13	4.27	43.25	412	5.67	4.06698	.20302	.66851	3.89335	4.24060	3.42110	4.71285
14	14	4.37	45.00	320	6.23	4.25686	.11314	.37255	4.09611	4.41761	3.61433	4.89939
15	15	4.41	50.00	502	4.99	4.86448	-.45448	-1.49650	4.65413	5.07484	4.20779	5.52118
16	16	4.64	45.00	550	6.37	4.35491	.28509	.93873	4.17363	4.53619	3.70694	5.00288
17	17	4.68	51.25	414	6.40	5.03159	-.35159	-1.15771	4.83663	5.22655	4.37966	5.68352
18	18	4.73	50.25	304	6.00	4.85454	-.12454	-.41008	4.66195	5.04713	4.20331	5.50577
19	19	4.87	49.00	472	5.94	4.77364	.09636	.31730	4.65936	4.88791	4.14113	5.40614
20	20	4.94	50.00	728	5.16	4.96213	-.02213	-.07287	4.71448	5.20978	4.29255	5.63171
21	21	4.95	50.00	716	6.29	5.00255	-.05255	-.17303	4.78804	5.21706	4.34451	5.66059
22	22	4.96	49.00	400	5.96	4.74550	.21450					5.38092
23	23	5.02	50.50	576	5.90	4.98907	.03093					5.62605
24	24	5.02	51.25	354	5.81	4.98385	.03615					5.63205
25	25	5.12	49.50	392	5.49	4.78188	.33812	1				5.42305
26	26	5.15	56.00	352	5.41	5.52195	-.37195	-1				6.21062
27	27	5.17	50.00	572	6.24	4.94267	.22733					5.58319
28	28	5.18	47.00	634	6.50	4.62753	.55247	1				5.28320
29	29	5.38	53.25	458	6.60	5.29093	.08907					5.96015
30	30	5.77	57.00	1070	4.82	5.90375	-.13375	-.44040	5.45045	6.35704	5.13402	6.67347
31	31	5.90	54.00	488	5.70	5.35457	.54543	1.79595	5.15881	5.55034	4.70240	6.00675
32	32	5.90	54.00	488	5.70	5.35457	.54543	1.79595	5.15881	5.55034	4.70240	6.00675

Select the standardized residuals, and the three covariates for the *Matrix Variables.* Click *OK.*



Results: Scatterplot Matrix



No real pattern in the plot of standardized residuals against the three predictors.