

Logit Analysis

Using vttown.dta

Logit Regression

The theory of Logit regression

The logistic regression model is the one for which the probability p_i of response = 1 in case i th is equal to

$$\log (p_i/(1-p_i)) = x_i' \beta$$

where x_i is a p -vector of covariates for individual i th, and β is a p -vector of regression coefficients (typically, the first component of x_i is the constant equal to 1). That is, $x_i' \beta$ is equal to the log of the odds ratio. It is this that motivates the name "logistic".

Estimation is undertaken by the ML method. Given the data (y_i, x_i) , $i=1,2, \dots, n$, the Likelihood function is

$$L = \prod_{i=1}^n p_i^{y_i} (1 - p_i)^{1-y_i}, \text{ where } p_i = e^{h_i} / (1 + e^{h_i}),$$

with $h_i = x_i' \beta$. The ML estimate of β is the parameter value that maximizes L as a function of β . In fact, the maximization is undertaken by way of minimizing $-\log L$.

Interpretation of the coefficients

A linear regression model for the logit of the probability of $Y = 1$

$$\text{logit}(\pi_i) = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i}$$

$$\text{Odds} = \frac{\pi_i}{1 - \pi_i} = \frac{\exp(\beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i})}{\exp(\beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i})} = \exp(\beta_0) \exp(\beta_1 x_{1i}) \exp(\beta_2 x_{2i})$$

So when x_2 changes from x_0 to $x_0 + 1$, the odds change from

$$\begin{aligned} A &:= \exp(\beta_0) \exp(\beta_1 x_{1i}) (\exp(x_0))^{\beta_2} \\ &\text{--->} \exp(\beta_0) \exp(\beta_1 x_{1i}) (\exp(x_0 + 1))^{\beta_2} \\ &= \exp(\beta_0) \exp(\beta_1 x_{1i}) (\exp(x_0))^{\beta_2} (\exp(1))^{\beta_2} \\ &= A \exp(\beta_2) \end{aligned}$$

So the change is the multiplying factor $\exp(\beta_2)$.

The value $\exp(\beta_2)$ is called the odds-ratio, and its estimate is reported when in Stata we invoke "logistic" instead of "logit". The appropriate s.e. for the odds are produced. The terminology "odds ratio" follows from the fact that $\exp(\beta_2)$ is the ratio of the odds at two values of X_2 when X_2 is 0 or 1:

Indeed

	Y	0	1
X2			
0		$1 - p_0$	p_0
1		$1 - p_1$	p_1

$$\begin{aligned} \text{The odds ratio is } & \frac{p_1 / (1 - p_1)}{p_0 / (1 - p_0)} \\ &= \left[\frac{\exp(\beta_2) p_0}{1 - p_0} \right] : \frac{p_0}{1 - p_0} = \exp(\beta_2) \end{aligned}$$

$$\text{Note that } \frac{p_1 / (1 - p_1)}{p_0 / (1 - p_0)} = \frac{p_1 (1 - p_0)}{p_0 (1 - p_1)},$$

Thus, in % change, we have

$$100 \times (A \exp(\beta_1) - A)/A = 100 \times (\exp(\beta_1) - 1)$$

For example, when $\exp(\beta_1) = .58$ then $\exp(\beta_1) - 1 = -.42$, so we can say that Odds decline by 42 % when x_2 increase one unit.

When $\exp(\beta_1) = 1.42$ then $\exp(\beta_1) - 1 = .42$ and we can say that the odds increase by 42 % when x_2 increases one unit.

Odds ratio

- The most common way of interpreting a logit is to convert it to an odds ratio using the $\exp()$ function. One can convert back using the $\ln()$ function.
- An odds ratio above 1.0 refers to the odds that $Y = 1$ in binary logistic regression. The closer the odds ratio is to 1.0, the more the independent variable's categories (ex., male and female for gender) are independent of the dependent variable, with 1.0 representing no association.

For instance:

If in the logit regression, $b_1 = 2.303$, the corresponding odds ratio is $\exp(2.303) = 10$, then we may say that when the independent variable increases one unit, the odds that the dependent = 1 increase by a factor of 10 (i.e., an increase of $100(10-1)$ per cent, 900 %) when other variables are controlled. If $b_1 = -1.5$ then the odds of $Y = 1$ decrease by a factor of $\exp(-1.5) = 0.22$, i.e. a decrease of $100(0.22 - 1)$ per cent (-88%).

In SPSS, odds ratios appear as "Exp(B)" in the "Variables in the Equation" table.

Pseudo R2 (measures of overall fit)

1) One pseudo-R2 (Aldrich and Nelson, 1984, see Hamilton, p. 233) is just

$$\text{pseudo-R2} = 2(\log L - \log L_0) / [2(\log L - \log L_0) + n]$$

where n is the sample size.

2) McFadden (1974) proposes

$$\text{pseudo-R2} = 1 - (\log L_0 / \log L)^{1/n}$$

3) The SAS program uses the following pseudo-R2:

$$\text{pseudo R2} := (2(\log L - \log L_0) - 2k) / -2 \log L_0$$

where L is the likelihood under the full model and L_0 is the likelihood with the intercept only, and k is the number of regressors (not including the intercept).

Partial correlation and Wald Test of SPSS:

R statistic (bounded between -1 and 1)

$R := \text{sqrt} [(\text{Wald statistic} - 2k) / -2 \log L_0]$

where k is the number of regressors considered (usually just one variable) and L_0 is the likelihood in the case of only the intercept. With the sign of the regression coefficient.

In SPSS instead of z-test we have Wald test which is $\text{Wald} = (\text{estimate}/\text{se})^2$

Dades Vermont town:

Survey data from a small Vermont town where toxic wastes had contaminated the grounds of two public schools. Some people on town think that the school should be closed until proven safe. Others opposed this costly step and said that the schools should stay open.

School: 1= close , 0 = open

Lived: years respondent had lived in the town

Educ: respondent's education, in years

Contam: whether respondent believed his/her own property or water had been affected by the chemical contamination

Meetings: whether respondent attended meetings of the Health and Safety Committee, a citizen's group that organized in response to the contamination crisis.

```
. use "C:\DATA\Hamilt2\SWS5\Vttown.dta", clear
(VT town survey (Hamilton 85))
```

```
. describe
```

```
Contains data from C:\DATA\Hamilt2\SWS5\Vttown.dta
```

```
obs:          153          VT town survey (Hamilton 85)
vars:          7          16 Dec 1996 09:36
size:         1,683 (99.7% of memory free)
```

```
-----
 1. gender      byte    %8.0g      sexlbl   Respondent's gender
 2. lived       byte    %8.0g                Years lived in town
 3. kids        byte    %8.0g      kidlbl   Have children <19 in town?
 4. educ        byte    %8.0g                Highest year school completed
 5. meetings    byte    %8.0g      kidlbl   Attended 2 or more meetings
 6. contam      byte    %8.0g      contamlb Believe own property/water cont
 7. school      byte    %8.0g      close    School closing opinion
-----
```

```
Sorted by:  gender
```


Model Lineal de Probabilitat

Resultados1 - Visor SPSS

Archivo Edición Ver Insertar Formato Analizar Gráficos Utilidades Ventana ?

Utilidades
Regresión
Título
Notas
Variables in
Resumen d
ANOVA
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Estadísticos
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Título
*zresid
*zresid
*zresid

a. Todas las variables solicitadas introducidas
b. Variable dependiente: SCHOOL CLOSING OPINION

Resumen del modelo^b

Modelo	R	R cuadrado	R cuadrado corregida	Error típ. de la estimación
1	,288 ^a	,083	,077	,477

a. Variables predictoras: (Constante), YEARS LIVED IN TOWN
b. Variable dependiente: SCHOOL CLOSING OPINION

ANOVA^b

Modelo		Suma de cuadrados	gl	Media cuadrática	F	Sig.
1	Regresión	3,111	1	3,111	13,648	,000 ^a
	Residual	34,418	151	,228		
	Total	37,529	152			

a. Variables predictoras: (Constante), YEARS LIVED IN TOWN
b. Variable dependiente: SCHOOL CLOSING OPINION

Coefficientes^a

Modelo		Coeficientes no estandarizados		Coeficientes estandarizados		t	Sig.
		B	Error típ.	Beta			
1	(Constante)	,594	,059			10,147	,000
	YEARS LIVED IN TOWN	-,008	,002	-,288		-3,694	,000

a. Variable dependiente: SCHOOL CLOSING OPINION

Pulse dos veces para editar Tabla pivote

SPSS El procesador está preparado

GET

FILE='G:\Albert\Web\Metodes2005\Da
des\VtTown.sav'.

*** Regressió lineal

REGRESSION

/MISSING LISTWISE

/STATISTICS COEFF OUTS R

ANOVA

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT school

/METHOD=ENTER lived

/SCATTERPLOT=(*ZRESID
,*ZPRED)

/RESIDUALS HIST(ZRESID)
NORM(ZRESID) .

Residus ?

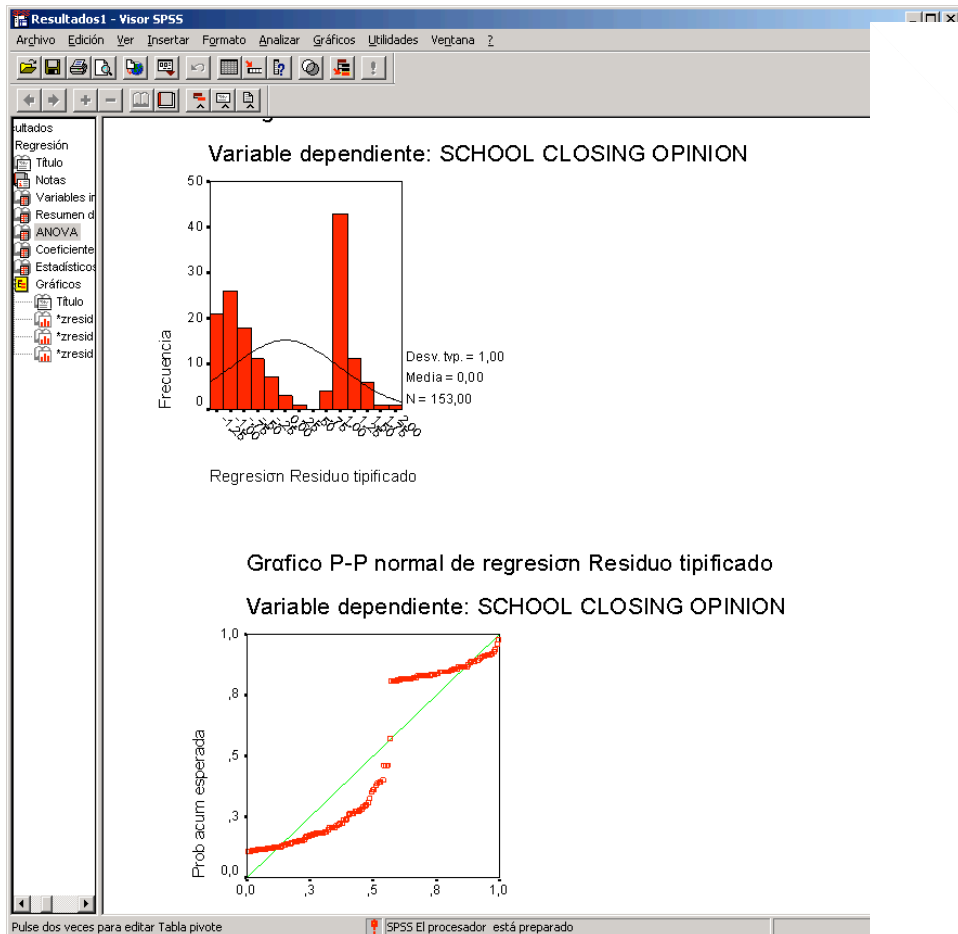
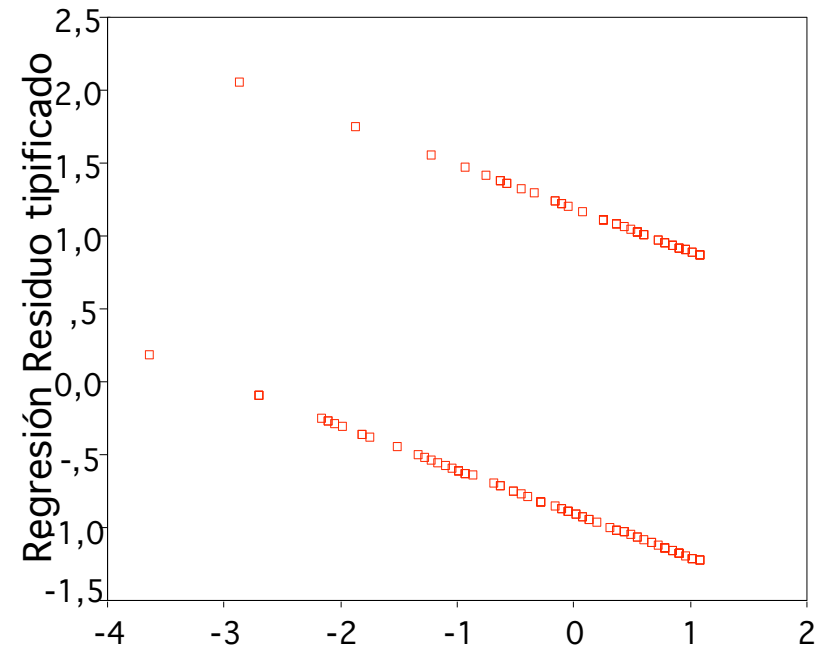


Gráfico de dispersión

Variable dependiente: SCHOOL



Regresión Valor pronosticado tipificado

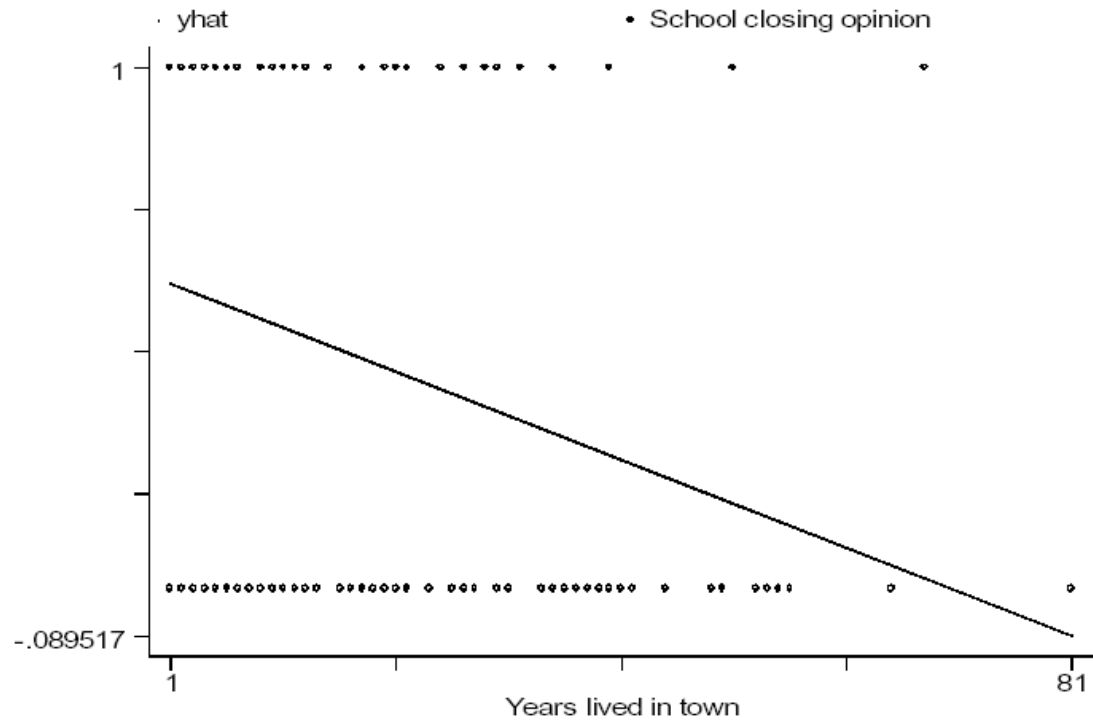
Albert Satorra, UPF

school	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lived	-.0084379	.002284	-3.694	0.000	-.0129506	-.0039252
_cons	.593954	.0585363	10.147	0.000	.4782981	.7096099

```

. predict yhat
. graph yhat school lived, c(1.) s(.o)
.

```



Resultados1 - Visor SPSS

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Regresión

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ANOVA

Coefficiente

Estadísticos

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*zresid

*zresid

*zresid

Regresión logis

Título

Notas

Resumen d

Codificación

Bloque 0: B

Título

Tabla d

Variabl

Variabl

Bloque 1: M

Título

Prueba

Resumen

Tabla d

Variabl

Bloque 2: M

Título

Prueba

Resumen

Tabla d

Variabl

Variables en la ecuación

	B	E.T.	Wald	gl	Sig.	Exp(B)
Paso 0 Constante	-,276	,163	2,864	1	,091	,759

Variables que no están en la ecuación

	Puntuación	gl	Sig.
Paso 0 Variables LIVED	12,683	1	,000
Estadísticos globales	12,683	1	,000

Bloque 1: Método = Introducir

Pruebas omnibus sobre los coeficientes del modelo

	Chi-cuadrado	gl	Sig.
Paso 1 Paso	13,944	1	,000
Bloque	13,944	1	,000
Modelo	13,944	1	,000

Resumen de los modelos

Paso	-2 log de la verosimilitud	R cuadrado de Cox y Snell	R cuadrado de Nagelkerke
1	195,267 ^a	,087	,117

^a. La estimación ha finalizado en el número de iteración 4 porque las estimaciones de los parámetros han cambiado en menos de ,001.

Tabla de clasificación^a

	Pronosticado
SCHOOL CLOSING	

SPSS El procesador está preparado

Resultados1 - Visor SPSS

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Tabla de clasificación^a

Observado			Pronosticado		
			SCHOOL CLOSING OPINION		Porcentaje correcto
	OPEN	CLOSE			
Paso 1	SCHOOL CLOSING	OPEN	59	28	67,8
	OPINION	CLOSE	29	37	56,1
Porcentaje global					62,7

a. El valor de corte es ,500

Variables en la ecuación

		B	E.T.	Wald	gl	Sig.	Exp(B)
Paso 1 ^a	LIVED	-,041	,012	11,399	1	,001	,960
	Constante	,460	,263	3,069	1	,080	1,584

a. Variable(s) introducida(s) en el paso 1: LIVED.

Bloque 2: Método = Introducir

Pruebas omnibus sobre los coeficientes del modelo

		Chi-cuadrado	gl	Sig.
Paso 1	Paso	38,090	2	,000
	Bloque	38,090	2	,000
	Modelo	52,035	3	,000

Resumen de los modelos

Paso	-2 log de la verosimilitud	R cuadrado de Coxy Snell	R cuadrado de Nagelkerke
1	157,177 ^a	,288	,387

a. La estimación ha finalizado en el número de iteración 5 porque las estimaciones de los parámetros han cambiado en menos de ,001.

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Resultados1 - Visor SPSS

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Chi-cuadrado

		Chi-cuadrado	gl	Sig.
Paso 1	Paso	38,090	2	,000
	Bloque	38,090	2	,000
	Modelo	52,035	3	,000

Resumen de los modelos

Paso	-2 log de la verosimilitud	R cuadrado de Cox y Snell	R cuadrado de Nagelkerke
1	157,177 ^a	,288	,387

a. La estimación ha finalizado en el número de iteración 5 porque las estimaciones de los parámetros han cambiado en menos de ,001.

Tabla de clasificación^a

	Observado	Pronosticado			Porcentaje correcto
		SCHOOL CLOSING OPINION			
		OPEN	CLOSE		
Paso 1	SCHOOL CLOSING	OPEN	80	7	92,0
	OPINION	CLOSE	28	38	57,6
	Porcentaje global				77,1

a. El valor de corte es ,500

Variables en la ecuación

Paso		B	E.T.	Wald	gl	Sig.	Exp(B)
Paso 1 ^a	LIVED	-,032	,014	5,528	1	,019	,968
	MEETINGS	2,462	,459	28,810	1	,000	11,734
	GENDER	,727	,421	2,976	1	,084	2,068
	Constante	-,884	,455	3,765	1	,052	,413

a. Variable(s) introducida(s) en el paso 1: MEETINGS, GENDER.

SPSS El procesador está preparado

LOGISTIC REGRESSION VAR=school

/METHOD=ENTER lived

/METHOD=ENTER meetings gender

/CRITERIA PIN(.05) POUT(.10)

ITERATE(20) CUT(.5) .

Logit analysis

```
library(foreign)  
data=read.dta("E:/Albert/COURSES/cursDAS/AS2003/data/vttown.dta")  
help(glm)  
help(family)  
attach(data)  
names(data)  
[1] "gender"      "lived"       "kids"        "educ"        "meetings"   "contam"  
"school"  
results = glm(school ~lived + meetings, family=binomial)  
results  
Call:  glm(formula = school ~ lived + meetings, family = binomial)  
Coefficients:  
(Intercept)          lived  meetingsyes  
   -0.34850      -0.03575       2.36881  
  
Degrees of Freedom: 152 Total (i.e. Null); 150 Residual  
Null Deviance:      209.2  
Residual Deviance: 160.3      AIC: 166.3  
fv=results$fitted.values  
re=results$residuals  
plot(fv, re)  
logit = results$linear.predictor
```

Logit analysis

summary(results)

Call:

```
glm(formula = school ~ lived + meetings, family = binomial)
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-2.0559	-0.8567	-0.5140	0.6189	2.3832

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-0.34850	0.31796	-1.096	0.2731
lived	-0.03575	0.01352	-2.644	0.0082 **
meetingsyes	2.36881	0.44251	5.353	8.65e-08 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Dispersion parameter for binomial family taken to be 1)

Null deviance: 209.21 on 152 degrees of freedom
Residual deviance: 160.27 on 150 degrees of freedom
AIC: 166.27

Number of Fisher Scoring iterations: 3

Residual deviance = $-2 \log L$

The test of the significance of the model is

```
1-pchisq(209.21 -160.27 , 2)
```

```
[1] 2.359468e-11
```

```
(exp(-0.03575)-1)*100
```

```
[1] -3.511852, i.e. 3.5% decrease on the odds when lived +1
```

Albert Satorra, UPEL

Logit analysis

Resultados1 - Visor SPSS

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Variables in

Resumen d ANOVA

Coeficiente

Estadísticos

Gráficos

Título

*zresid

*zresid

*zresid

regresión logís

Título

Notas

Resumen d

Codificación

Bloque 0: B

Título

Tabla d

Variabl

Variabl

Bloque 1: M

Título

Prueba:

Resume

Tabla d

Variabl

Bloque 2: M

Título

Prueba:

Resume

Tabla d

Variabl

regresión logís

Título

Notas

Resumen d

Codificación

Bloque 0: B

Título

Tabla d

Variabl

Variabl

Bloque 1: M

Título

Prueba:

Resumen de los modelos

Paso	-2 log de la verosimilitud	R cuadrado de Cox y Snell	R cuadrado de Nagelkerke
1	160,266 ^a	,274	,367

a. La estimación ha finalizado en el número de iteración 4 porque las estimaciones de los parámetros han cambiado en menos de ,001.

Tabla de clasificación^a

Observado		Pronosticado		Porcentaje correcto	
		SCHOOL CLOSING OPINION			
		OPEN	CLOSE		
Paso 1	SCHOOL CLOSING	OPEN	78	9	89,7
	OPINION	CLOSE	28	38	57,6
Porcentaje global					75,8

a. El valor de corte es ,500

Variables en la ecuación

Paso		B	E.T.	Wald	gl	Sig.	Exp(B)
Paso 1	LIVED	-,036	,014	6,962	1	,008	,965
	MEETINGS	2,369	,443	28,595	1	,000	10,685
	Constante	-,348	,318	1,200	1	,273	,706

a. Variable(s) introducida(s) en el paso 1: LIVED, MEETINGS.

LOGISTIC REGRESSION VAR=school

/METHOD=ENTER lived meetings

/SAVE COOK ZRESID

/CRITERIA PIN(.05) POUT(.10)

ITERATE(20) CUT(.5) .

Logit regression using R

```
fitlogit =glm(school ~ lived , binomial)
summary(fitlogit)
ind=sort(lived, index.return=T)$ix
plot(lived[ind],fp[ind], type ="l", col="red", xlab="years living
```

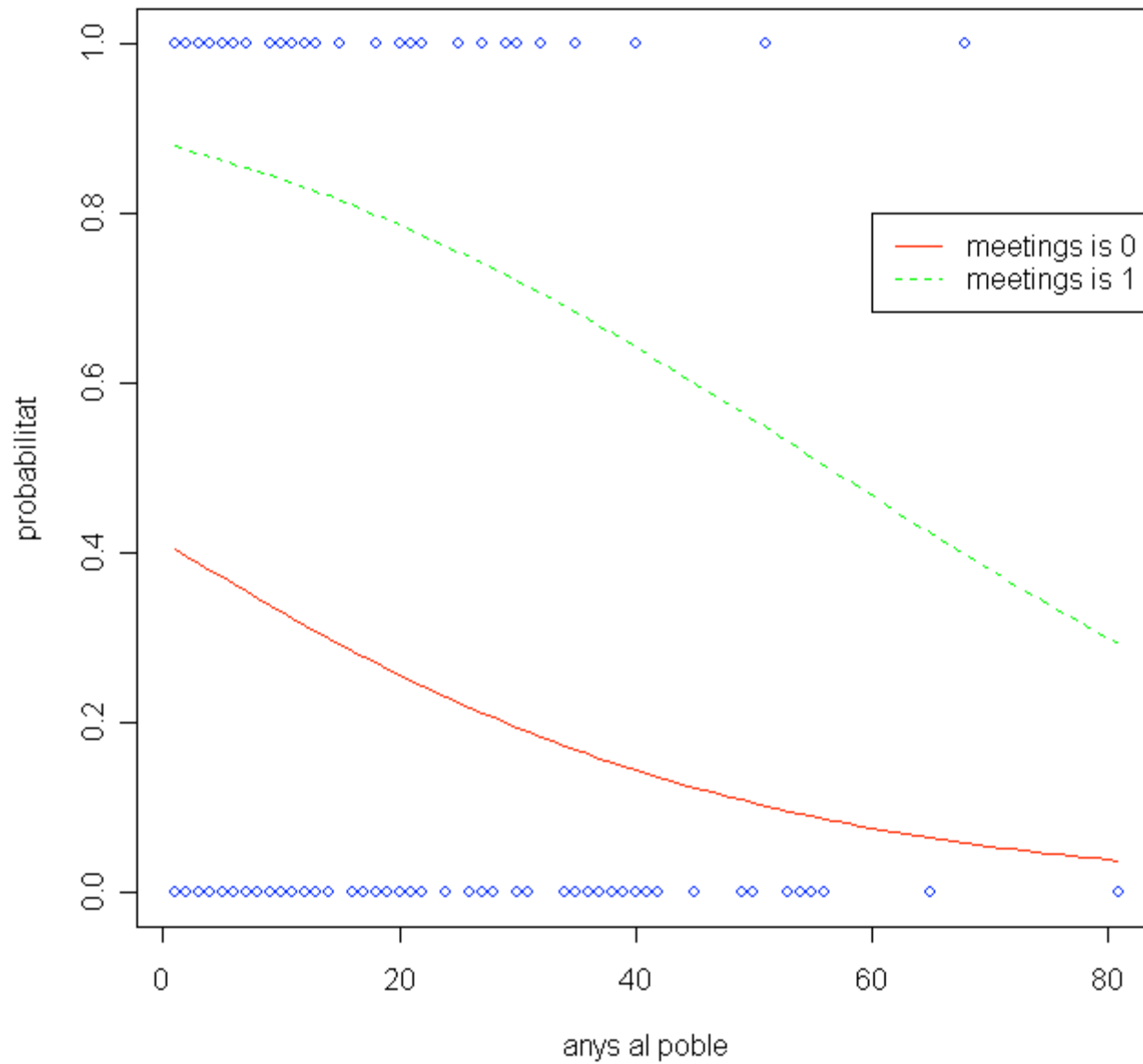
```
hatvalues(fitlogit)
dfbetas(fitlogit)
rstudent(fitlogit)
```

```
plot(hatvalues(fitlogit),rstudent(fitlogit),type="n")
dfb=dfbetas(fitlogit)[2]
points(hatvalues(fitlogit),rstudent(fitlogit), cex = 10*dfb/max(df
  abline(h =c(-1,0,1), lty=2)
  abline(v= =c(.015,.030), lty=2)
abline(v= c(.015,.030), lty=2)
identify(hatvalues(fitlogit),rstudent(fitlogit), 1:length(rstudent
```

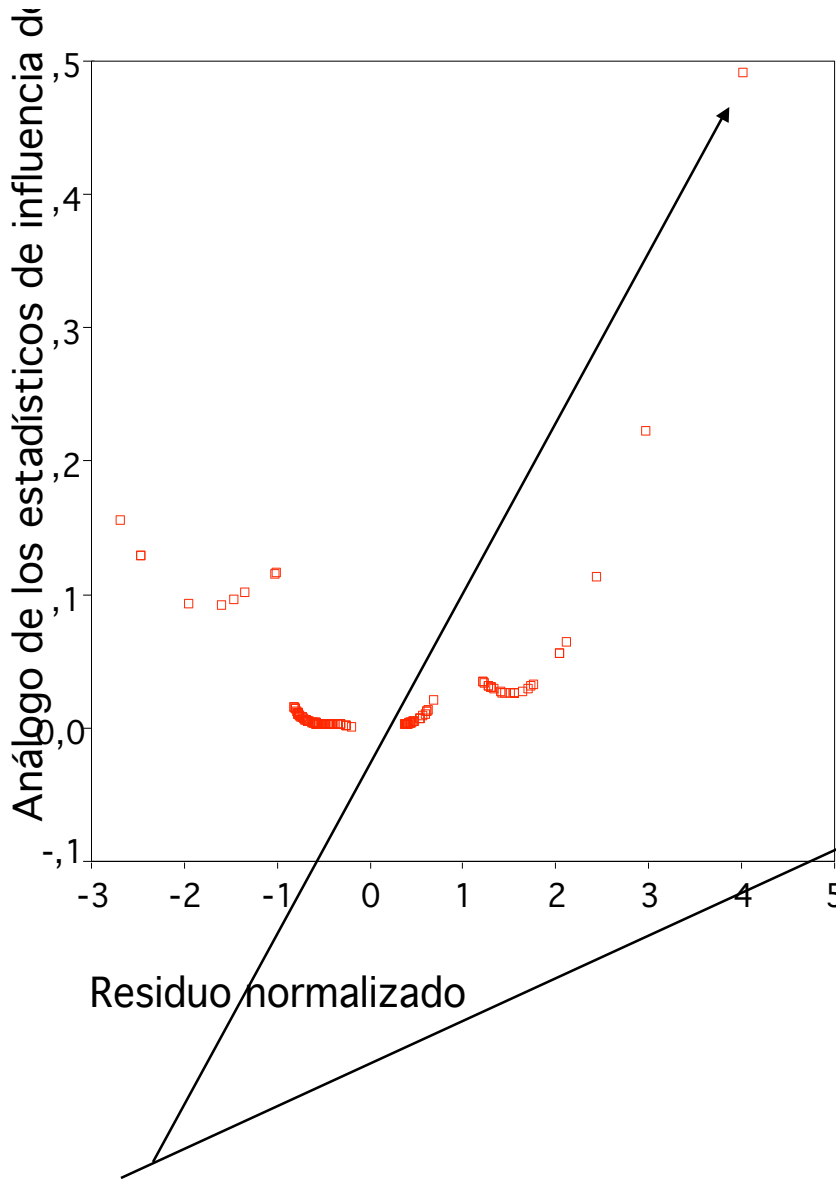
Making a conditional effect plot

```
### making a plot
x=seq(1,81,1)
logit0 =-.3485 -.0358*x +2.3688*0
logit1 =-.3485 -.0358*x +2.3688*1
p0=1/(1+exp(-logit0))
p1=1/(1+exp(-logit1))
library(foreign)
data=read.spss("I:/pol/Metodes/DADES/VtTown.sav")
names(data)
attach(data)
DS=rep(0,length(SCHOOL))
DS[SCHOOL=="CLOSE"] =1
plot(LIVED,DS, col="blue", main="Prob. en funció d'anys al poble",
cex=.8,xlab="anys al poble", ylab="probabilitat")
lines(x,p0,col="red", lty=1 )
lines(x,p1,col="green", lty=2 )
legend(60,.8,c("meetings is 0", "meetings is 1"), lty=c(1,2), col=c("red",
"green"), cex=.8)
#### abline(lm(DS ~LIVED), col="orange")
```

Probabilitat (tancar escola) en funció d'anys al poble



Cook vs residuo normalizado



VtTown.sav - Editor de datos SPSS

Archivo Edición Ver Datos Transformar Analizar Gráficos Utilidades

Ventana ?

1 : id 1

	school	coo_1	zre_1	var
134	0	,15622	-2,69739	
135	0	,00346	-,57715	
136	1	,02981	1,70195	
137	0	,00324	-,50927	
138	1	,02636	1,44902	
139	0	,00381	-,60895	
140	0	,00399	-,61993	
141	0	,00324	-,50927	
142	0	,00326	-,42590	
143	0	,01443	-,81058	
144	0	,00957	-,75465	
145	0	,00510	-,66588	
146	1	,49143	4,01416	
147	1	,00336	,39821	
148	1	,03454	1,21182	
149	0	,00367	-,59816	
150	1	,00770	,53962	
151	1	,03343	1,23368	
152	1	,00722	,53006	
153	1	,00348	,40539	
154				

Vista de datos Vista de variables

SPSS El prc

Multinomial Logit Regression

```
plogit <- function(x) 1/(1+exp(-x))
eta <- seq(-10, 10, len=100)
p1 <- plogit(eta-1)
p2 <- plogit(eta+1)
p3 <- plogit(eta+4.5)
plot(c(-10,10), range(p1,p2,p3), type="n", axes=FALSE, xlab="x", ylab="Pr(y > j)")
axis(2)
box()
abline(h=c(0,1), col="gray")
lines(eta, p1, lwd=2)
lines(eta, p2, lwd=2)
lines(eta, p3, lwd=2)
coords <- locator(2)
arrows(coords$x[1], coords$y[1], coords$x[2], coords$y[2], code=1, length=0.125)
text(coords$x[2], coords$y[2], pos=3, "Pr(y > 1)")
coords <- locator(2)
arrows(coords$x[1], coords$y[1], coords$x[2], coords$y[2], code=1, length=0.125)
text(coords$x[2], coords$y[2], pos=3, "Pr(y > 2)")
coords <- locator(2)
arrows(coords$x[1], coords$y[1], coords$x[2], coords$y[2], code=1, length=0.125)
text(coords$x[2], coords$y[2], pos=3, "Pr(y > 3)")
```

1	149,382(a)	,324	,434
---	------------	------	------

a La estimación ha finalizado en el número de iteración 5 porque las estimaciones de los parámetros han cambiado en menos de ,001.

Tabla de clasificación(a)

Observado		Pronosticado			
		SCHOOL CLOSING OPINION		Porcentaje correcto	
		OPEN	CLOSE		
Paso 1	SCHOOL CLOSING OPINION	OPEN	75	12	86,2
		CLOSE	24	42	63,6
Porcentaje global					76,5

a El valor de corte es ,500

Variables en la ecuación

		B	E.T.	Wald	gl	Sig.	Exp(B)
Paso 1(a)	LIVED	-,046	,015	9,698	1	,002	,955
	EDUC	-,166	,090	3,404	1	,065	,847
	CONTAM	1,208	,465	6,739	1	,009	3,347
	MEETINGS	2,173	,464	21,919	1	,000	8,784
	Constante	1,731	1,302	1,768	1	,184	5,649

a Variable(s) introducida(s) en el paso 1: LIVED, EDUC, CONTAM, MEETINGS.

Sintaxis de SPSS

Activa un fitxer de sintaxis,
que es pot executar parcialment

Logistic Regression dialog box showing dependent variable 'SCHOOL CLOSING OI' and covariables 'meetings' and 'lived'. The 'Aceptar' button is highlighted with a red arrow.

```
LOGISTIC REGRESSION VAR=school
/METHOD=ENTER meetings lived
/SAVE PRED COOK LRESID
/CRITERIA PIN(.05) POUT(.10) ITERATE(20) CUT(.5) .
```


Suprimir casos en el análisis

Selecciona casos

condición

The image shows a sequence of three screenshots from the SPSS software interface, illustrating the steps to select cases based on a condition.

Top Screenshot: The 'Seleccionar casos' (Select Cases) dialog box is open. The 'Si se satisface la condición' (If condition is satisfied) option is selected. The condition 'id = 146' is entered in the text box. The 'Filtrados' (Filtered) radio button is selected under 'Los casos no seleccionados son' (Cases not selected are). The 'Aceptar' (OK) button is highlighted.

Middle Screenshot: The 'Seleccionar casos: Si' (Select Cases: If) dialog box is shown. The condition 'id = 146' is entered in the text box. The 'Funciones' (Functions) list is visible, including 'ABS(expr_num)', 'ANY(prueba,valor,valor,...)', 'ARSIN(expr_num)', 'ARTAN(expr_num)', 'CDFNORM(valorz)', and 'CDF.BERNOULLI(c,p)'. The 'Continuar' (Continue) button is highlighted.

Bottom Screenshot: The main SPSS data editor window is shown. The data table has columns 'id', 'educ', 'marrings', 'contam', 'school', and 'pre_1'. The row for 'id' = 146 is highlighted in blue, indicating it is the selected case.

... filtrat de casos

The screenshot shows the SPSS data editor window for 'V1:Town.sav'. The data is displayed in a grid with columns: id, gender, lived, kids, educ, meetings, contam, school, pre_1, coo_1, lre_1, and filter_\$. The 'filter_1' column contains values of 1 for most cases, but it is empty for case 146. An arrow points to this row from the text 'Caso suprimido'.

	id	gender	lived	kids	educ	meetings	contam	school	pre_1	coo_1	lre_1	filter_1
123	123	1	3	1	12	1	1	1	,87136	,00315	1,14763	1
124	124	1	5	1	12	0	0	0	,37116	,01059	-1,59022	1
125	125	1	35	0	15	1	0	0	,88330	,09637	-3,15759	1
126	126	1	35	0	12	0	0	0	,16801	,00327	-1,20193	1
127	127	1	20	0	12	0	0	0	,25663	,00355	-1,34523	1
128	128	1	6	1	16	1	0	0	,85885	,12896	-7,08490	1
129	129	1	45	0	13	0	0	0	,12375	,00313	-1,14123	1
130	130	1	40	1	12	1	1	0	,84342	,10206	-2,80440	1
131	131	1	7	1	10	1	1	1	,85446	,00361	1,17032	1
132	132	1	4	1	12	1	1	1	,86730	,00325	1,15300	1
133	133	1	12	0	12	1	0	1	,83080	,00443	1,20366	1
134	134	1	1	1	12	1	1	0	,87917	,15622	-8,27593	1
135	135	1	21	1	12	0	0	0	,24987	,00346	-1,33311	1
136	136	1	20	1	12	0	0	1	,25663	,02981	3,89662	1
137	137	1	28	0	12	0	0	0	,20594	,00324	-1,25935	1
138	138	1	11	1	12	0	0	1	,32262	,02636	3,09966	1
139	139	1	18	0	16	0	0	0	,27051	,00381	-1,37082	1
140	140	1	17	1	12	0	0	0	,27762	,00399	-1,38432	1
141	141	1	28	0	14	0	0	0	,20594	,00324	-1,25935	1
142	142	1	38	0	12	0	0	0	,15354	,00326	-1,18139	1
143	143	1	2	1	12	0	0	0	,39652	,01443	-1,85705	1
144	144	1	6	1	7	0	0	0	,36285	,00957	-1,56949	1
145	145	1	13	1	17	0	1	0	,30719	,00510	-1,44340	1
146	146	1	68	0	12	0	0	1	,05843	,49143	17,11348	0
147	147	1	5	1	16	1	0	1	,86313	,00336	1,15857	1
148	148	1	1	0	15	0	1	1	,40510	,03454	2,46851	1
149	149	1	19	0	12	0	0	0	,26351	,00367	-1,35780	1
150	150	1	22	0	12	1	1	1	,77448	,00770	1,29119	1
151	151	1	2	0	13	0	1	1	,39652	,03343	2,52196	1
152	152	1	21	0	12	1	1	1	,78066	,00722	1,28097	1
153	153	1	6	1	12	1	0	1	,85885	,00348	1,16434	1

Caso suprimido