
log: /mnt/idel/home/ssschulhl/apc/apc_example.log
log type: text
opened on: 21 Jul 2006, 18:08:20

```
. *replicate table 5 and cols 7-9 of table 3 in Yang, Fu and Land (2004)
.
. *Stata can maximize GLM objective functions using two different numerical
. *optimization methods: Newton-Raphson (NR) and iterative reweighted least
. *squares (IRLS). NR is the default in Stata. However, NR presents a
. *problem in replicating Yang, Fu and Land: The paper set the scale
. *parameter equal to the deviance divided by the residual degrees of
. *freedom, but Stata allows this scale parameter only with IRLS and not
. *with NR. So, we show two sets of results below:
. * 1. NR optimization with scale parameter=Pearson chi-squared/residual df
. * 2. IRLS optimization with scale parameter=deviance/residual df
. *Version 1 is basically the default in Stata. Version 2 matches what was
. *done in the paper. The results are numerically identical to the number of
. *decimal places shown in the paper.
.
. use apc_example_data.dta
.
. *first, using Newton-Raphson optimization (the default in Stata) and scale(x2
> )
. * (scale parameter = Pearson chi-squared / residual degrees of freedom)
. #delim ;
delimiter now ;
. apc_ie death_f if age<=90,
> age(age) period(year) cohort(cohort) family(poisson) link(log)
> exposure(exp_f) scale(x2);
note: death_f has non-integer values

Iteration 0: log likelihood = -855016.6
Iteration 1: log likelihood = -40957.752
Iteration 2: log likelihood = -10126.322
Iteration 3: log likelihood = -9789.1855
Iteration 4: log likelihood = -9789.1442
Iteration 5: log likelihood = -9789.1442
Intrinsic estimator of APC effects
Optimization : ML
No. of obs = 152
Residual df = 102
Scale parameter = 1
Deviance = 17530.51016 (1/df) Deviance = 171.8677
Pearson = 17517.3853 (1/df) Pearson = 171.7391

Variance function: V(u) = u [Poisson]
Link function : g(u) = ln(u) [Log]

Log likelihood = -9789.14424
AIC = 129.4624
BIC = 17018.07
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-----
death_f |          Coef.      OIM Std. Err.      z    P>|z|      [95% Conf. Interval]
-----+-----
age_0   |      .4528543      .0158182    28.63    0.000      .4218512      .4838574
```

age_5	-2.143741	.0392401	-54.63	0.000	-2.22065	-2.066832
age_10	-2.353749	.0411104	-57.25	0.000	-2.434324	-2.273175
age_15	-1.704232	.0291515	-58.46	0.000	-1.761367	-1.647096
age_20	-1.629935	.0275174	-59.23	0.000	-1.683869	-1.576002
age_25	-1.570829	.0261851	-59.99	0.000	-1.622151	-1.519508
age_30	-1.377286	.0233821	-58.90	0.000	-1.423115	-1.331458
age_35	-1.091327	.0203925	-53.52	0.000	-1.131295	-1.051358
age_40	-.7506259	.0180246	-41.64	0.000	-.7859534	-.7152984
age_45	-.397673	.0156564	-25.40	0.000	-.428359	-.3669869
age_50	-.0567519	.013543	-4.19	0.000	-.0832957	-.0302082
age_55	.2663666	.0117123	22.74	0.000	.2434109	.2893223
age_60	.6102102	.0100392	60.78	0.000	.5905338	.6298866
age_65	.9559724	.008723	109.59	0.000	.9388757	.9730691
age_70	1.331287	.0078762	169.03	0.000	1.315849	1.346724
age_75	1.72417	.0075585	228.11	0.000	1.709355	1.738984
age_80	2.156734	.0077788	277.26	0.000	2.141487	2.17198
age_85	2.59007	.0086002	301.16	0.000	2.573214	2.606926
age_90	2.988486	.0104157	286.92	0.000	2.968072	3.008901
period_1960	-.0389114	.0080523	-4.83	0.000	-.0546936	-.0231292
period_1965	-.0090969	.0071465	-1.27	0.203	-.0231038	.00491
period_1970	-.0070998	.0064584	-1.10	0.272	-.019758	.0055585
period_1975	-.0670092	.00616	-10.88	0.000	-.0790827	-.0549357
period_1980	-.0426419	.0059702	-7.14	0.000	-.0543432	-.0309405
period_1985	.0113779	.0060933	1.87	0.062	-.0005648	.0233206
period_1990	.0379144	.0065691	5.77	0.000	.0250392	.0507895
period_1995	.1154669	.0072861	15.85	0.000	.1011864	.1297473
cohort_1870	1.008335	.0311666	32.35	0.000	.9472493	1.06942
cohort_1875	.9767367	.0186646	52.33	0.000	.9401547	1.013319
cohort_1880	.9216318	.0138967	66.32	0.000	.8943947	.9488688
cohort_1885	.8533015	.0112908	75.57	0.000	.8311719	.8754311
cohort_1890	.7756295	.0096215	80.61	0.000	.7567718	.7944873
cohort_1895	.6983224	.0085807	81.38	0.000	.6815046	.7151402
cohort_1900	.6104943	.0079727	76.57	0.000	.5948682	.6261205
cohort_1905	.5215143	.007564	68.95	0.000	.5066892	.5363394
cohort_1910	.455177	.0080985	56.21	0.000	.4393042	.4710497
cohort_1915	.382613	.0091723	41.71	0.000	.3646356	.4005904
cohort_1920	.3169078	.0105577	30.02	0.000	.2962151	.3376006
cohort_1925	.2615428	.0122417	21.36	0.000	.2375495	.2855361
cohort_1930	.1780552	.0145238	12.26	0.000	.149589	.2065213
cohort_1935	.0770235	.0172175	4.47	0.000	.0432778	.1107692
cohort_1940	-.0668784	.0196588	-3.40	0.001	-.1054091	-.0283478
cohort_1945	-.2044153	.0214381	-9.54	0.000	-.2464332	-.1623974
cohort_1950	-.2869849	.0231115	-12.42	0.000	-.3322825	-.2416872
cohort_1955	-.3116058	.0246563	-12.64	0.000	-.3599313	-.2632804
cohort_1960	-.3187029	.0194917	-16.35	0.000	-.3569059	-.2805
cohort_1965	-.4604435	.0226096	-20.36	0.000	-.5047576	-.4161295
cohort_1970	-.6198367	.0262888	-23.58	0.000	-.6713619	-.5683116
cohort_1975	-.747627	.0303638	-24.62	0.000	-.8071389	-.688115
cohort_1980	-.9342512	.0331409	-28.19	0.000	-.9992061	-.8692963
cohort_1985	-1.137277	.036401	-31.24	0.000	-1.208622	-1.065933
cohort_1990	-1.342292	.0389731	-34.44	0.000	-1.418677	-1.265906
cohort_1995	-1.60697	.0480454	-33.45	0.000	-1.701137	-1.512803
_cons	-5.400347	.0060911	-886.60	0.000	-5.412285	-5.388409
exp_f	(exposure)					

. apc_cglim death_f if age<=90,

```

> age(age) period(year) cohort(cohort)
> agepfx("_A") periodpfx("_P") cohortpfx("_C")
> family(poisson) link(log)
> exposure(exp_f) scale(x2) constraint("a5=a10");
note: death_f has non-integer values

```

```

Iteration 0: log likelihood = -855016.6
Iteration 1: log likelihood = -40957.759
Iteration 2: log likelihood = -10126.33
Iteration 3: log likelihood = -9789.1931
Iteration 4: log likelihood = -9789.1518
Iteration 5: log likelihood = -9789.1518

```

```

Generalized linear models          No. of obs   =      152
Optimization      : ML              Residual df   =      102
                                          Scale parameter =      1
Deviance          = 17530.52533      (1/df) Deviance = 171.8679
Pearson           = 17517.40052      (1/df) Pearson  = 171.7392

```

```

Variance function: V(u) = u          [Poisson]
Link function      : g(u) = ln(u)     [Log]

```

```

Log likelihood      = -9789.151825    AIC            = 129.4625
                                          BIC            = 17018.09

```

death_f	Coef.	OIM Std. Err.	z	P> z	[95% Conf. Interval]	
_A_10	-2.386587	.0956633	-24.95	0.000	-2.574083	-2.19909
_A_15	-1.52706	.1850711	-8.25	0.000	-1.889793	-1.164327
_A_20	-1.242755	.2448719	-5.08	0.000	-1.722695	-.7628152
_A_25	-.9736407	.3051204	-3.19	0.001	-1.571666	-.3756158
_A_30	-.570089	.3654375	-1.56	0.119	-1.286333	.1461552
_A_35	-.0741206	.4258852	-0.17	0.862	-.9088402	.7605991
_A_40	.4765888	.4864616	0.98	0.327	-.4768585	1.430036
_A_45	1.03955	.5470944	1.90	0.057	-.032735	2.111836
_A_50	1.59048	.6079696	2.62	0.009	.3988814	2.782078
_A_55	2.123607	.668727	3.18	0.001	.8129264	3.434288
_A_60	2.677459	.7295039	3.67	0.000	1.247658	4.107261
_A_65	3.23323	.7902966	4.09	0.000	1.684277	4.782183
_A_70	3.818553	.851102	4.49	0.000	2.150424	5.486682
_A_75	4.421445	.9119155	4.85	0.000	2.634123	6.208766
_A_80	5.064017	.9727349	5.21	0.000	3.157492	6.970543
_A_85	5.707363	1.033561	5.52	0.000	3.681621	7.733104
_A_90	6.315787	1.094398	5.77	0.000	4.170807	8.460767
_P_1965	-.1801941	.061602	-2.93	0.003	-.3009319	-.0594564
_P_1970	-.3882057	.122038	-3.18	0.001	-.6273958	-.1490155
_P_1975	-.6581237	.1827628	-3.60	0.000	-1.016332	-.2999152
_P_1980	-.843765	.2435446	-3.46	0.001	-1.321104	-.3664264
_P_1985	-.9997539	.3043594	-3.28	0.001	-1.596287	-.4032204
_P_1990	-1.183226	.3651418	-3.24	0.001	-1.898891	-.4675613
_P_1995	-1.315682	.4260095	-3.09	0.002	-2.150645	-.4807189
_C_1875	.1784108	.0712796	2.50	0.012	.0387054	.3181162
_C_1880	.3333146	.1267025	2.63	0.009	.0849822	.5816469
_C_1885	.4749929	.1858053	2.56	0.011	.1108211	.8391647
_C_1890	.6073295	.2458078	2.47	0.013	.1255552	1.089104

_C_1895	.740031	.3061637	2.42	0.016	.1399612	1.340101
_C_1900	.8622116	.3666833	2.35	0.019	.1435255	1.580898
_C_1905	.9832402	.4272975	2.30	0.021	.1457525	1.820728
_C_1910	1.126911	.4880031	2.31	0.021	.170443	2.08338
_C_1915	1.264356	.5487374	2.30	0.021	.1888507	2.339862
_C_1920	1.40866	.6095006	2.31	0.021	.2140605	2.603259
_C_1925	1.563303	.6702844	2.33	0.020	.2495698	2.877037
_C_1930	1.689824	.7310919	2.31	0.021	.2569104	3.122738
_C_1935	1.798801	.7919189	2.27	0.023	.2466687	3.350934
_C_1940	1.864908	.8527479	2.19	0.029	.1935526	3.536263
_C_1945	1.93738	.9135616	2.12	0.034	.1468317	3.727927
_C_1950	2.064819	.9754629	2.12	0.034	.1529464	3.976691
_C_1955	2.250206	1.034978	2.17	0.030	.2216865	4.278726
_C_1960	2.453118	1.09521	2.24	0.025	.3065464	4.599689
_C_1965	2.521386	1.155945	2.18	0.029	.2557758	4.786996
_C_1970	2.572001	1.216839	2.11	0.035	.1870405	4.956962
_C_1975	2.65422	1.277736	2.08	0.038	.1499031	5.158536
_C_1980	2.677604	1.338529	2.00	0.045	.0541362	5.301072
_C_1985	2.684587	1.399482	1.92	0.055	-.0583481	5.427521
_C_1990	2.689581	1.458133	1.84	0.065	-.1683068	5.547469
_C_1995	2.634911	1.521334	1.73	0.083	-.3468478	5.61667
_cons	-7.758225	1.094866	-7.09	0.000	-9.904123	-5.612326
exp_f	(exposure)					

(Standard errors scaled using square root of Pearson X2-based dispersion)

A_5=A_10

. drop _A* _P* _C*;

```
. apc_cglim death_f if age<=90,
> age(age) period(year) cohort(cohort)
> agepfx("_A") periodpfx("_P") cohortpfx("_C")
> family(poisson) link(log)
> exposure(exp_f) scale(x2) constraint("p1965=p1960");
```

note: death_f has non-integer values

```
Iteration 0: log likelihood = -855016.6
Iteration 1: log likelihood = -40957.759
Iteration 2: log likelihood = -10126.33
Iteration 3: log likelihood = -9789.1931
Iteration 4: log likelihood = -9789.1518
Iteration 5: log likelihood = -9789.1518
```

Generalized linear models	No. of obs	=	152
Optimization : ML	Residual df	=	102
	Scale parameter	=	1
Deviance = 17530.52533	(1/df) Deviance	=	171.8679
Pearson = 17517.40052	(1/df) Pearson	=	171.7392

Variance function: V(u) = u [Poisson]
Link function : g(u) = ln(u) [Log]

Log likelihood = -9789.151825	AIC	=	129.4625
	BIC	=	17018.09

death_f	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
_A_5	-2.566781	.0451768	-56.82	0.000	-2.655326	-2.478236
_A_10	-2.746975	.0501999	-54.72	0.000	-2.845365	-2.648585
_A_15	-2.067642	.0450515	-45.90	0.000	-2.155942	-1.979343
_A_20	-1.963532	.0511821	-38.36	0.000	-2.063847	-1.863217
_A_25	-1.874611	.0586489	-31.96	0.000	-1.989561	-1.759662
_A_30	-1.651254	.0663025	-24.90	0.000	-1.781204	-1.521304
_A_35	-1.33548	.0742786	-17.98	0.000	-1.481063	-1.189896
_A_40	-.9649644	.0835718	-11.55	0.000	-1.128762	-.8011666
_A_45	-.5821971	.0924043	-6.30	0.000	-.7633061	-.401088
_A_50	-.2114616	.1014431	-2.08	0.037	-.4102863	-.0126368
_A_55	.1414715	.1106156	1.28	0.201	-.0753312	.3582741
_A_60	.5151295	.1199278	4.30	0.000	.2800754	.7501836
_A_65	.8907062	.1293084	6.89	0.000	.6372663	1.144146
_A_70	1.295835	.138728	9.34	0.000	1.023933	1.567737
_A_75	1.718533	.1481719	11.60	0.000	1.428121	2.008944
_A_80	2.180911	.1576125	13.84	0.000	1.871996	2.489826
_A_85	2.644062	.1670493	15.83	0.000	2.316651	2.971473
_A_90	3.072293	.1763944	17.42	0.000	2.726566	3.418019
_P_1970	-.0278174	.0163316	-1.70	0.089	-.0598267	.004192
_P_1975	-.1175413	.0252372	-4.66	0.000	-.1670053	-.0680772
_P_1980	-.1229884	.0345423	-3.56	0.000	-.1906901	-.0552866
_P_1985	-.0987831	.0440429	-2.24	0.025	-.1851056	-.0124606
_P_1990	-.1020611	.0536473	-1.90	0.057	-.2072079	.0030857
_P_1995	-.0543231	.0632841	-0.86	0.391	-.1783577	.0697116
_C_1875	-.0017833	.0374126	-0.05	0.962	-.0751106	.0715439
_C_1880	-.0270737	.0378411	-0.72	0.474	-.1012409	.0470934
_C_1885	-.0655896	.0416626	-1.57	0.115	-.1472467	.0160675
_C_1890	-.1134471	.0475724	-2.38	0.017	-.2066873	-.0202068
_C_1895	-.1609397	.0547136	-2.94	0.003	-.2681763	-.0537031
_C_1900	-.2189533	.0626267	-3.50	0.000	-.3416993	-.0962073
_C_1905	-.2781189	.071001	-3.92	0.000	-.4172783	-.1389594
_C_1910	-.3146417	.0797978	-3.94	0.000	-.4710425	-.1582409
_C_1915	-.3573912	.0887308	-4.03	0.000	-.5313003	-.183482
_C_1920	-.3932819	.0978511	-4.02	0.000	-.5850665	-.2014973
_C_1925	-.4188324	.1071498	-3.91	0.000	-.6288422	-.2088226
_C_1930	-.4725056	.1166313	-4.05	0.000	-.7010988	-.2439125
_C_1935	-.5437228	.1262841	-4.31	0.000	-.791235	-.2962106
_C_1940	-.6578103	.1360103	-4.84	0.000	-.9243855	-.3912351
_C_1945	-.7655327	.1457047	-5.25	0.000	-1.051109	-.4799566
_C_1950	-.8182878	.1553349	-5.27	0.000	-1.122739	-.513837
_C_1955	-.8130943	.1653866	-4.92	0.000	-1.137246	-.4889425
_C_1960	-.7903768	.1767803	-4.47	0.000	-1.13686	-.4438939
_C_1965	-.902303	.1818861	-4.96	0.000	-1.258793	-.5458127
_C_1970	-1.031882	.1945369	-5.30	0.000	-1.413167	-.6505964
_C_1975	-1.129858	.204748	-5.52	0.000	-1.531156	-.7285588
_C_1980	-1.286667	.2147892	-5.99	0.000	-1.707646	-.8656882
_C_1985	-1.459879	.2249617	-6.49	0.000	-1.900796	-1.018962
_C_1990	-1.635079	.2350308	-6.96	0.000	-2.095731	-1.174427
_C_1995	-1.869943	.2456334	-7.61	0.000	-2.351375	-1.38851
_cons	-4.51473	.1792801	-25.18	0.000	-4.866112	-4.163347
exp_f	(exposure)					

(Standard errors scaled using square root of Pearson X2-based dispersion)

_P_1965=_P_1960

```

. drop _A* _P* _C*;

. apc_cglim death_f if age<=90,
> age(age) period(year) cohort(cohort)
> agepfx("_A") periodpfx("_P") cohortpfx("_C")
> family(poisson) link(log)
> exposure(exp_f) scale(x2) constraint("c1995=c1990");
note: death_f has non-integer values

```

```

Iteration 0: log likelihood = -855016.6
Iteration 1: log likelihood = -40957.759
Iteration 2: log likelihood = -10126.33
Iteration 3: log likelihood = -9789.1931
Iteration 4: log likelihood = -9789.1518
Iteration 5: log likelihood = -9789.1518

```

```

Generalized linear models          No. of obs   =      152
Optimization      : ML              Residual df   =      102
                                          Scale parameter =         1
Deviance          = 17530.52533      (1/df) Deviance = 171.8679
Pearson          = 17517.40054      (1/df) Pearson  = 171.7392

Variance function: V(u) = u          [Poisson]
Link function     : g(u) = ln(u)     [Log]

Log likelihood    = -9789.151825     AIC           = 129.4625
                                          BIC           = 17018.09

```

death_f	Coef.	OIM Std. Err.	z	P> z	[95% Conf. Interval]
_A_5	-2.331917	.0758645	-30.74	0.000	-2.480608 -2.183225
_A_10	-2.277247	.1360273	-16.74	0.000	-2.543856 -2.010638
_A_15	-1.363051	.1949943	-6.99	0.000	-1.745232 -.9808689
_A_20	-1.024076	.2581374	-3.97	0.000	-1.530016 -.5181363
_A_25	-.7002919	.3216904	-2.18	0.029	-1.330793 -.0697903
_A_30	-.2420704	.3853203	-0.63	0.530	-.9972844 .5131435
_A_35	.3085678	.4490753	0.69	0.492	-.5716035 1.188739
_A_40	.9139469	.5129686	1.78	0.075	-.091453 1.919347
_A_45	1.531578	.5768638	2.66	0.008	.4009459 2.662211
_A_50	2.137178	.6407812	3.34	0.001	.8812695 3.393086
_A_55	2.724975	.7047254	3.87	0.000	1.343738 4.106211
_A_60	3.333497	.7686814	4.34	0.000	1.826909 4.840084
_A_65	3.943937	.8326568	4.74	0.000	2.31196 5.575914
_A_70	4.58393	.8966368	5.11	0.000	2.826554 6.341306
_A_75	5.241491	.9606305	5.46	0.000	3.35869 7.124293
_A_80	5.938734	1.024632	5.80	0.000	3.930492 7.946975
_A_85	6.636749	1.088639	6.10	0.000	4.503056 8.770441
_A_90	7.299843	1.152656	6.33	0.000	5.040679 9.559007
_P_1965	-.2348639	.0647705	-3.63	0.000	-.3618117 -.1079162
_P_1970	-.4975452	.128453	-3.87	0.000	-.7493084 -.245782
_P_1975	-.822133	.192376	-4.27	0.000	-1.199183 -.4450829
_P_1980	-1.062444	.2563479	-4.14	0.000	-1.564877 -.5600115
_P_1985	-1.273103	.3203428	-3.97	0.000	-1.900963 -.6452424
_P_1990	-1.511245	.3848444	-3.93	0.000	-2.265526 -.7569634
_P_1995	-1.698371	.4478893	-3.79	0.000	-2.576217 -.8205236

_C_1875	.2330806	.0740208	3.15	0.002	.0880025	.3781587
_C_1880	.4426541	.132847	3.33	0.001	.1822788	.7030294
_C_1885	.6390022	.1952258	3.27	0.001	.2563666	1.021638
_C_1890	.8260086	.2584628	3.20	0.001	.3194309	1.332586
_C_1895	1.01338	.3220324	3.15	0.002	.3822081	1.644552
_C_1900	1.19023	.3858337	3.08	0.002	.4340101	1.94645
_C_1905	1.365929	.4495961	3.04	0.002	.4847364	2.247121
_C_1910	1.56427	.5134668	3.05	0.002	.5578932	2.570646
_C_1915	1.756384	.577363	3.04	0.002	.6247734	2.887995
_C_1920	1.955357	.6412955	3.05	0.002	.6984412	3.212273
_C_1925	2.164671	.7052564	3.07	0.002	.7823936	3.546948
_C_1930	2.345861	.7692407	3.05	0.002	.8381772	3.853546
_C_1935	2.509508	.8332518	3.01	0.003	.8763647	4.142652
_C_1940	2.630285	.8972739	2.93	0.003	.87166	4.388909
_C_1945	2.757426	.9612924	2.87	0.004	.8733276	4.641525
_C_1950	2.939535	1.025325	2.87	0.004	.9299345	4.949135
_C_1955	3.179592	1.089485	2.92	0.004	1.044241	5.314943
_C_1960	3.437174	1.153298	2.98	0.003	1.176752	5.697596
_C_1965	3.560111	1.217397	2.92	0.003	1.174058	5.946165
_C_1970	3.665397	1.281497	2.86	0.004	1.153709	6.177084
_C_1975	3.802285	1.345617	2.83	0.005	1.164923	6.439646
_C_1980	3.880339	1.409686	2.75	0.006	1.117404	6.643274
_C_1985	3.941991	1.473819	2.67	0.007	1.05336	6.830623
_C_1990	4.001655	1.565265	2.56	0.011	.9337915	7.069519
_cons	-8.742281	1.153101	-7.58	0.000	-11.00232	-6.482244
exp_f	(exposure)					

(Standard errors scaled using square root of Pearson X2-based dispersion)

_C_1995=_C_1990

. drop _A* _P* _C*;

. #delim cr
delimiter now cr

.
 . *next, using IRLS optimization (the default in S-Plus) and scale(dev)
 . * (scale parameter = deviance / residual degrees of freedom)
 . #delim ;

delimiter now ;

. apc_ie death_f if age<=90,
 > age(age) period(year) cohort(cohort) family(poisson) link(log)
 > exposure(exp_f) scale(dev)irls;
 note: death_f has non-integer values

Iteration 1: deviance = 1707985
 Iteration 2: deviance = 197030.6
 Iteration 3: deviance = 26516.35
 Iteration 4: deviance = 17599.35
 Iteration 5: deviance = 17530.52
 Iteration 6: deviance = 17530.51
 Iteration 7: deviance = 17530.51

Intrinsic estimator of APC effects
 Optimization : MQL Fisher scoring
 (IRLS EIM)

Deviance = 17530.51016
 Pearson = 17517.38529

No. of obs = 152
 Residual df = 102
 Scale parameter = 1
 (1/df) Deviance = 171.8677
 (1/df) Pearson = 171.7391

Variance function: $V(u) = u$
 Link function : $g(u) = \ln(u)$

[Poisson]
 [Log]

Deviance = . AIC = .
 BIC = 17018.07

death_f	Coef.	EIM Std. Err.	z	P> z	[95% Conf. Interval]	
age_0	.4528543	.0158241	28.62	0.000	.4218396	.483869
age_5	-2.143741	.0392548	-54.61	0.000	-2.220679	-2.066803
age_10	-2.353749	.0411258	-57.23	0.000	-2.434354	-2.273144
age_15	-1.704232	.0291624	-58.44	0.000	-1.761389	-1.647074
age_20	-1.629935	.0275277	-59.21	0.000	-1.683889	-1.575982
age_25	-1.570829	.0261949	-59.97	0.000	-1.622171	-1.519488
age_30	-1.377286	.0233909	-58.88	0.000	-1.423132	-1.331441
age_35	-1.091327	.0204001	-53.50	0.000	-1.13131	-1.051343
age_40	-.7506259	.0180313	-41.63	0.000	-.7859666	-.7152851
age_45	-.397673	.0156623	-25.39	0.000	-.4283705	-.3669754
age_50	-.0567519	.013548	-4.19	0.000	-.0833056	-.0301983
age_55	.2663666	.0117167	22.73	0.000	.2434023	.2893309
age_60	.6102102	.0100429	60.76	0.000	.5905264	.629894
age_65	.9559724	.0087262	109.55	0.000	.9388693	.9730755
age_70	1.331287	.0078792	168.96	0.000	1.315844	1.346729
age_75	1.72417	.0075614	228.02	0.000	1.70935	1.73899
age_80	2.156734	.0077818	277.15	0.000	2.141482	2.171986
age_85	2.59007	.0086034	301.05	0.000	2.573208	2.606933
age_90	2.988486	.0104196	286.81	0.000	2.968064	3.008909
period_1960	-.0389114	.0080553	-4.83	0.000	-.0546995	-.0231233
period_1965	-.0090969	.0071492	-1.27	0.203	-.023109	.0049153
period_1970	-.0070998	.0064608	-1.10	0.272	-.0197628	.0055632
period_1975	-.0670092	.0061624	-10.87	0.000	-.0790872	-.0549312
period_1980	-.0426419	.0059724	-7.14	0.000	-.0543476	-.0309362
period_1985	.0113779	.0060956	1.87	0.062	-.0005693	.0233251
period_1990	.0379144	.0065715	5.77	0.000	.0250344	.0507944
period_1995	.1154669	.0072888	15.84	0.000	.1011811	.1297527
cohort_1870	1.008335	.0311782	32.34	0.000	.9472264	1.069443
cohort_1875	.9767367	.0186716	52.31	0.000	.940141	1.013332
cohort_1880	.9216318	.0139019	66.30	0.000	.8943845	.948879
cohort_1885	.8533015	.0112951	75.55	0.000	.8311636	.8754394
cohort_1890	.7756295	.0096251	80.58	0.000	.7567647	.7944944
cohort_1895	.6983224	.0085839	81.35	0.000	.6814983	.7151465
cohort_1900	.6104943	.0079756	76.54	0.000	.5948624	.6261263
cohort_1905	.5215143	.0075668	68.92	0.000	.5066836	.5363449
cohort_1910	.455177	.0081015	56.18	0.000	.4392983	.4710557
cohort_1915	.382613	.0091757	41.70	0.000	.3646289	.4005972
cohort_1920	.3169078	.0105617	30.01	0.000	.2962073	.3376083
cohort_1925	.2615428	.0122463	21.36	0.000	.2375405	.2855451
cohort_1930	.1780552	.0145292	12.25	0.000	.1495784	.206532
cohort_1935	.0770235	.017224	4.47	0.000	.0432651	.1107819
cohort_1940	-.0668784	.0196662	-3.40	0.001	-.1054235	-.0283334
cohort_1945	-.2044153	.0214461	-9.53	0.000	-.246449	-.1623816
cohort_1950	-.2869849	.0231201	-12.41	0.000	-.3322995	-.2416702
cohort_1955	-.3116058	.0246655	-12.63	0.000	-.3599494	-.2632623
cohort_1960	-.3187029	.019499	-16.34	0.000	-.3569202	-.2804857
cohort_1965	-.4604435	.0226181	-20.36	0.000	-.5047742	-.4161129

cohort_1970	-.6198367	.0262987	-23.57	0.000	-.6713812	-.5682923
cohort_1975	-.747627	.0303752	-24.61	0.000	-.8071612	-.6880927
cohort_1980	-.9342512	.0331533	-28.18	0.000	-.9992304	-.869272
cohort_1985	-1.137277	.0364146	-31.23	0.000	-1.208648	-1.065906
cohort_1990	-1.342292	.0389877	-34.43	0.000	-1.418706	-1.265877
cohort_1995	-1.60697	.0480634	-33.43	0.000	-1.701172	-1.512767
_cons	-5.400347	.0060933	-886.27	0.000	-5.41229	-5.388404
exp_f	(exposure)					

```

. apc_cglim death_f if age<=90,
> age(age) period(year) cohort(cohort)
> agepfx("_A") periodpfx("_P") cohortpfx("_C")
> family(poisson) link(log)
> exposure(exp_f) scale(dev) irls constraint("a5=a10");
note: death_f has non-integer values

```

```

Iteration 1: deviance = 1707985
Iteration 2: deviance = 197030.6
Iteration 3: deviance = 26516.37
Iteration 4: deviance = 17599.37
Iteration 5: deviance = 17530.53
Iteration 6: deviance = 17530.53
Iteration 7: deviance = 17530.53

```

Generalized linear models		No. of obs	=	152
Optimization	: MQL Fisher scoring	Residual df	=	102
	(IRLS EIM)	Scale parameter	=	1
Deviance	= 17530.52533	(1/df) Deviance	=	171.8679
Pearson	= 17517.40051	(1/df) Pearson	=	171.7392

Variance function: V(u) = u	[Poisson]
Link function : g(u) = ln(u)	[Log]
	BIC = 17018.09

death_f	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
_A_10	-2.386587	.0956991	-24.94	0.000	-2.574153	-2.19902
_A_15	-1.52706	.1851404	-8.25	0.000	-1.889928	-1.164192
_A_20	-1.242755	.2449636	-5.07	0.000	-1.722875	-.7626354
_A_25	-.9736407	.3052347	-3.19	0.001	-1.57189	-.3753918
_A_30	-.570089	.3655743	-1.56	0.119	-1.286602	.1464235
_A_35	-.0741206	.4260447	-0.17	0.862	-.9091528	.7609117
_A_40	.4765888	.4866438	0.98	0.327	-.4772156	1.430393
_A_45	1.03955	.5472993	1.90	0.058	-.0331366	2.112237
_A_50	1.59048	.6081973	2.62	0.009	.3984351	2.782525
_A_55	2.123607	.6689774	3.17	0.002	.8124354	3.434779
_A_60	2.677459	.7297771	3.67	0.000	1.247122	4.107796
_A_65	3.23323	.7905926	4.09	0.000	1.683697	4.782763
_A_70	3.818553	.8514207	4.48	0.000	2.149799	5.487307
_A_75	4.421445	.912257	4.85	0.000	2.633454	6.209436
_A_80	5.064017	.9730992	5.20	0.000	3.156778	6.971257
_A_85	5.707363	1.033948	5.52	0.000	3.680862	7.733863
_A_90	6.315787	1.094808	5.77	0.000	4.170004	8.461571

_P_1965	-.1801941	.0616251	-2.92	0.003	-.3009771	-.0594112
_P_1970	-.3882057	.1220838	-3.18	0.001	-.6274854	-.1489259
_P_1975	-.6581237	.1828313	-3.60	0.000	-1.016466	-.299781
_P_1980	-.843765	.2436358	-3.46	0.001	-1.321282	-.3662476
_P_1985	-.9997539	.3044734	-3.28	0.001	-1.596511	-.4029969
_P_1990	-1.183226	.3652785	-3.24	0.001	-1.899159	-.4672933
_P_1995	-1.315682	.426169	-3.09	0.002	-2.150958	-.4804061
_C_1875	.1784108	.0713063	2.50	0.012	.0386531	.3181686
_C_1880	.3333146	.12675	2.63	0.009	.0848891	.58174
_C_1885	.4749929	.1858749	2.56	0.011	.1106847	.8393011
_C_1890	.6073295	.2458998	2.47	0.014	.1253747	1.089284
_C_1895	.740031	.3062784	2.42	0.016	.1397364	1.340326
_C_1900	.8622116	.3668207	2.35	0.019	.1432563	1.581167
_C_1905	.9832402	.4274575	2.30	0.021	.1454389	1.821041
_C_1910	1.126911	.4881859	2.31	0.021	.1700848	2.083738
_C_1915	1.264356	.5489429	2.30	0.021	.1884479	2.340264
_C_1920	1.40866	.6097288	2.31	0.021	.213613	2.603706
_C_1925	1.563303	.6705355	2.33	0.020	.2490778	2.877529
_C_1930	1.689824	.7313657	2.31	0.021	.2563737	3.123275
_C_1935	1.798801	.7922155	2.27	0.023	.2460873	3.351515
_C_1940	1.864908	.8530673	2.19	0.029	.1929266	3.536889
_C_1945	1.93738	.9139038	2.12	0.034	.1461611	3.728598
_C_1950	2.064819	.9758283	2.12	0.034	.1522304	3.977407
_C_1955	2.250206	1.035366	2.17	0.030	.2209268	4.279486
_C_1960	2.453118	1.09562	2.24	0.025	.3057424	4.600493
_C_1965	2.521386	1.156378	2.18	0.029	.2549272	4.787845
_C_1970	2.572001	1.217295	2.11	0.035	.1861473	4.957855
_C_1975	2.65422	1.278215	2.08	0.038	.1489652	5.159474
_C_1980	2.677604	1.33903	2.00	0.046	.0531536	5.302054
_C_1985	2.684587	1.400006	1.92	0.055	-.0593755	5.428549
_C_1990	2.689581	1.458679	1.84	0.065	-.1693772	5.548539
_C_1995	2.634911	1.521903	1.73	0.083	-.3479645	5.617787
_cons	-7.758225	1.095277	-7.08	0.000	-9.904927	-5.611522
exp_f	(exposure)					

(Standard errors scaled using square root of deviance-based dispersion)

_A_5=_A_10

```
. drop _A* _P* _C*;
```

```
. apc_cglim death_f if age<=90,
> age(age) period(year) cohort(cohort)
> agepfx("_A") periodpfx("_P") cohortpfx("_C")
> family(poisson) link(log)
> exposure(exp_f) scale(dev) irls constraint("p1965=p1960");
note: death_f has non-integer values
```

```
Iteration 1: deviance = 1707985
Iteration 2: deviance = 197030.6
Iteration 3: deviance = 26516.37
Iteration 4: deviance = 17599.37
Iteration 5: deviance = 17530.53
Iteration 6: deviance = 17530.53
Iteration 7: deviance = 17530.53
```

```
Generalized linear models          No. of obs    =      152
Optimization      : QML Fisher scoring      Residual df    =      102
```

(IRLS EIM)
 Deviance = 17530.52533
 Pearson = 17517.40051

Scale parameter = 1
 (1/df) Deviance = 171.8679
 (1/df) Pearson = 171.7392

Variance function: $V(u) = u$
 Link function : $g(u) = \ln(u)$

[Poisson]
 [Log]

BIC = 17018.09

death_f	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
_A_5	-2.566781	.0451937	-56.80	0.000	-2.655359	-2.478203
_A_10	-2.746975	.0502187	-54.70	0.000	-2.845402	-2.648548
_A_15	-2.067642	.0450684	-45.88	0.000	-2.155975	-1.97931
_A_20	-1.963532	.0512012	-38.35	0.000	-2.063884	-1.863179
_A_25	-1.874611	.0586709	-31.95	0.000	-1.989604	-1.759619
_A_30	-1.651254	.0663273	-24.90	0.000	-1.781253	-1.521255
_A_35	-1.33548	.0743064	-17.97	0.000	-1.481117	-1.189842
_A_40	-.9649644	.0836031	-11.54	0.000	-1.128824	-.8011053
_A_45	-.5821971	.0924389	-6.30	0.000	-.7633739	-.4010202
_A_50	-.2114616	.1014811	-2.08	0.037	-.4103608	-.0125624
_A_55	.1414715	.1106571	1.28	0.201	-.0754124	.3583553
_A_60	.5151295	.1199727	4.29	0.000	.2799874	.7502717
_A_65	.8907062	.1293569	6.89	0.000	.6371714	1.144241
_A_70	1.295835	.13878	9.34	0.000	1.023831	1.567839
_A_75	1.718533	.1482274	11.59	0.000	1.428012	2.009053
_A_80	2.180911	.1576715	13.83	0.000	1.87188	2.489941
_A_85	2.644062	.1671118	15.82	0.000	2.316529	2.971595
_A_90	3.072293	.1764605	17.41	0.000	2.726437	3.418149
_P_1970	-.0278174	.0163377	-1.70	0.089	-.0598387	.0042039
_P_1975	-.1175413	.0252467	-4.66	0.000	-.1670239	-.0680587
_P_1980	-.1229884	.0345553	-3.56	0.000	-.1907155	-.0552613
_P_1985	-.0987831	.0440594	-2.24	0.025	-.185138	-.0124283
_P_1990	-.1020611	.0536674	-1.90	0.057	-.2072473	.003125
_P_1995	-.0543231	.0633078	-0.86	0.391	-.1784042	.069758
_C_1875	-.0017833	.0374266	-0.05	0.962	-.075138	.0715714
_C_1880	-.0270737	.0378552	-0.72	0.474	-.1012686	.0471212
_C_1885	-.0655896	.0416782	-1.57	0.116	-.1472773	.0160981
_C_1890	-.1134471	.0475902	-2.38	0.017	-.2067222	-.0201719
_C_1895	-.1609397	.054734	-2.94	0.003	-.2682165	-.0536629
_C_1900	-.2189533	.0626501	-3.49	0.000	-.3417453	-.0961613
_C_1905	-.2781189	.0710276	-3.92	0.000	-.4173305	-.1389073
_C_1910	-.3146417	.0798277	-3.94	0.000	-.471101	-.1581824
_C_1915	-.3573912	.088764	-4.03	0.000	-.5313655	-.1834168
_C_1920	-.3932819	.0978877	-4.02	0.000	-.5851383	-.2014254
_C_1925	-.4188324	.10719	-3.91	0.000	-.6289209	-.208744
_C_1930	-.4725056	.116675	-4.05	0.000	-.7011844	-.2438268
_C_1935	-.5437228	.1263314	-4.30	0.000	-.7913277	-.2961179
_C_1940	-.6578103	.1360612	-4.83	0.000	-.9244854	-.3911352
_C_1945	-.7655327	.1457593	-5.25	0.000	-1.051216	-.4798497
_C_1950	-.8182878	.1553931	-5.27	0.000	-1.122853	-.5137229
_C_1955	-.8130943	.1654485	-4.91	0.000	-1.137367	-.4888211
_C_1960	-.7903768	.1768465	-4.47	0.000	-1.13699	-.4437641
_C_1965	-.902303	.1819542	-4.96	0.000	-1.258927	-.5456792
_C_1970	-1.031882	.1946098	-5.30	0.000	-1.41331	-.6504536

_C_1975	-1.129858	.2048247	-5.52	0.000	-1.531307	-.7284084
_C_1980	-1.286667	.2148696	-5.99	0.000	-1.707804	-.8655305
_C_1985	-1.459879	.225046	-6.49	0.000	-1.900961	-1.018797
_C_1990	-1.635079	.2351188	-6.95	0.000	-2.095903	-1.174254
_C_1995	-1.869943	.2457254	-7.61	0.000	-2.351556	-1.38833
_cons	-4.51473	.1793472	-25.17	0.000	-4.866244	-4.163216
exp_f	(exposure)					

(Standard errors scaled using square root of deviance-based dispersion)
_P_1965=_P_1960

```
. drop _A* _P* _C*;

. apc_cglim death_f if age<=90,
> age(age) period(year) cohort(cohort)
> agepfx("_A") periodpfx("_P") cohortpfx("_C")
> family(poisson) link(log)
> exposure(exp_f) scale(dev) irls constraint("c1995=c1990");
note: death_f has non-integer values
```

```
Iteration 1: deviance = 1707985
Iteration 2: deviance = 197030.6
Iteration 3: deviance = 26516.37
Iteration 4: deviance = 17599.37
Iteration 5: deviance = 17530.53
Iteration 6: deviance = 17530.53
Iteration 7: deviance = 17530.53
```

```
Generalized linear models                               No. of obs   =       152
Optimization      : MQL Fisher scoring                 Residual df   =       102
                   (IRLS EIM)                       Scale parameter =        1
Deviance          = 17530.52533                       (1/df) Deviance = 171.8679
Pearson          = 17517.40051                       (1/df) Pearson  = 171.7392
```

```
Variance function: V(u) = u                               [Poisson]
Link function      : g(u) = ln(u)                       [Log]
BIC                                                         = 17018.09
```

death_f	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
_A_5	-2.331917	.0758929	-30.73	0.000	-2.480664	-2.183169
_A_10	-2.277247	.1360783	-16.73	0.000	-2.543955	-2.010538
_A_15	-1.363051	.1950673	-6.99	0.000	-1.745376	-.9807258
_A_20	-1.024076	.258234	-3.97	0.000	-1.530206	-.5179468
_A_25	-.7002919	.3218109	-2.18	0.030	-1.33103	-.0695542
_A_30	-.2420704	.3854646	-0.63	0.530	-.9975672	.5134264
_A_35	.3085678	.4492435	0.69	0.492	-.5719332	1.189069
_A_40	.9139469	.5131607	1.78	0.075	-.0918296	1.919723
_A_45	1.531578	.5770799	2.65	0.008	.4005224	2.662634
_A_50	2.137178	.6410212	3.33	0.001	.8807991	3.393556
_A_55	2.724975	.7049894	3.87	0.000	1.343221	4.106728
_A_60	3.333497	.7689693	4.34	0.000	1.826344	4.840649
_A_65	3.943937	.8329687	4.73	0.000	2.311349	5.576526
_A_70	4.58393	.8969726	5.11	0.000	2.825896	6.341964

_A_75	5.241491	.9609903	5.45	0.000	3.357985	7.124998
_A_80	5.938734	1.025016	5.79	0.000	3.92974	7.947727
_A_85	6.636749	1.089047	6.09	0.000	4.502257	8.771241
_A_90	7.299843	1.153088	6.33	0.000	5.039833	9.559853
_P_1965	-.2348639	.0647947	-3.62	0.000	-.3618592	-.1078686
_P_1970	-.4975452	.1285011	-3.87	0.000	-.7494027	-.2456877
_P_1975	-.822133	.1924481	-4.27	0.000	-1.199324	-.4449417
_P_1980	-1.062444	.2564439	-4.14	0.000	-1.565065	-.5598233
_P_1985	-1.273103	.3204628	-3.97	0.000	-1.901198	-.6450072
_P_1990	-1.511245	.3849886	-3.93	0.000	-2.265808	-.7566809
_P_1995	-1.698371	.448057	-3.79	0.000	-2.576546	-.8201948
_C_1875	.2330806	.0740485	3.15	0.002	.0879482	.378213
_C_1880	.4426541	.1328968	3.33	0.001	.1821812	.7031269
_C_1885	.6390022	.1952989	3.27	0.001	.2562233	1.021781
_C_1890	.8260086	.2585596	3.19	0.001	.3192412	1.332776
_C_1895	1.01338	.322153	3.15	0.002	.3819717	1.644788
_C_1900	1.19023	.3859782	3.08	0.002	.4337269	1.946734
_C_1905	1.365929	.4497645	3.04	0.002	.4844063	2.247451
_C_1910	1.56427	.5136592	3.05	0.002	.5575162	2.571023
_C_1915	1.756384	.5775793	3.04	0.002	.6243495	2.888419
_C_1920	1.955357	.6415357	3.05	0.002	.6979704	3.212744
_C_1925	2.164671	.7055205	3.07	0.002	.7818758	3.547466
_C_1930	2.345861	.7695289	3.05	0.002	.8376125	3.85411
_C_1935	2.509508	.8335639	3.01	0.003	.875753	4.143263
_C_1940	2.630285	.89761	2.93	0.003	.8710013	4.389568
_C_1945	2.757426	.9616525	2.87	0.004	.8726219	4.64223
_C_1950	2.939535	1.025709	2.87	0.004	.9291818	4.949888
_C_1955	3.179592	1.089893	2.92	0.004	1.043442	5.315743
_C_1960	3.437174	1.15373	2.98	0.003	1.175905	5.698442
_C_1965	3.560111	1.217853	2.92	0.003	1.173164	5.947059
_C_1970	3.665397	1.281977	2.86	0.004	1.152768	6.178025
_C_1975	3.802285	1.346121	2.82	0.005	1.163935	6.440634
_C_1980	3.880339	1.410214	2.75	0.006	1.11637	6.644308
_C_1985	3.941991	1.474371	2.67	0.008	1.052278	6.831705
_C_1990	4.001655	1.565852	2.56	0.011	.9326424	7.070668
_cons	-8.742281	1.153533	-7.58	0.000	-11.00316	-6.481398
exp_f	(exposure)					

(Standard errors scaled using square root of deviance-based dispersion)

_C_1995=_C_1990

. drop _A* _P* _C*;

. #delim cr
delimitter now cr

.

. log close

log: /mnt/ide1/home/ssschulh1/apc/apc_example.log

log type: text

closed on: 21 Jul 2006, 18:08:28