Appendix E. Loglinear Regressions

Loglinear regression analysis was employed in this report to estimate the odds that a person will provide financial assistance to a person living outside his or her household. The results of this analysis are shown in tables E-1 and E-3.

Table E-1. Log of Odds of Providing Financial Support for a Nonhousehold Member: 1985

Factors in model	All recipients	Relationship to provider			
		Own child	All adults	Parent	Spouse or ex-spouse[1]
Constant	**-3.783	**-5.046	**-4.594	**-5.989	**-3.483
	(0.120)	(0.255)	(0.206)	(0.373)	(0.485)
SEX (Female)	...	...	...	...	...
Male	**0.867	**1.207	**0.488	*0.330	**1.128
	(0.093)	(0.147)	(0.123)	(0.166)	(0.344)
AGE (18-24)	...	...	...	...	...
25 to 44 years	**0.677	**1.376	0.129	**0.768	-0.228
	(0.125)	(0.241)	(0.232)	(0.382)	(0.503)
45 to 64 years	**0.319	*0.446	**0.777	**0.915	0.282
	(0.140)	(0.259)	(0.234)	(0.404)	(0.502)
65 years and over	-0.211	**-2.070	**0.876	0.128	0.565
	(0.197)	(0.627)	(0.266)	(0.545)	(0.628)
MARITAL STATUS (Single/widowed)	...	...	...	...	[2]...
Married, spouse present	**-0.427	**-0.447	**-0.451	-0.126	[3]**1.344
	(0.117)	(0.189)	(0.154)	(0.253)	(0.395)
Divorced/separated[4]	**1.117	**1.318	**0.874	-0.014	[5]-0.278
	(0.135)	(0.203)	(0.181)	(0.360)	(0.348)
YEARS OF SCHOOL COMPLETED					
(Less than high school)	...	...	...	...	...
High school	0.093	-0.008	**0.331	0.202	0.394
	(0.090)	(0.110)	(0.138)	(0.236)	(0.326)
College, 1 year or more	0.028	0.083	-0.109	0.054	-0.230
	(0.089)	(0.107)	(0.146)	(0.236)	(0.360)
FAMILY INCOME (<$15,000)	...	...	...	...	...
$15,000 to $29,999	-0.079	-0.025	-0.144	-0.076	0.055
	(0.099)	(0.119)	(0.163)	(0.271)	(0.358)
$30,000 to $44,999	0.168	0.129	*0.291	0.287	0.071
	(0.109)	(0.132)	(0.170)	(0.277)	(0.456)
$45,000 and over	**0.375	0.195	**0.620	**0.474	**0.963
	(0.116)	(0.149)	(0.168)	(0.280)	(0.423)
MARITAL STATUS * SEX					
(Male*Single/widowed)	...	...	...	(X)	(X)
Male * married, spouse present	-0.061	0.065	-0.132		
	(0.111)	(0.182)	(0.145)		
Male * separated/divorced	**0.577	**0.603	**0.286		
	(0.130)	(0.197)	(0.175)		
Likelihood X^2	456.1	308.2	311.6	186.3	166.6
Degrees of freedom	274	274	274	276	276
Number of cases (unweighted)	33,032	33,032	33,032	33,032	3,461

Note: Individual categories following factor headings indicate reference category in the model. Cases were first weighted to preserve sampling frame but then divided by the average weight of providers in the sample to estimate the logits and the standard errors. Standard errors were then adjusted to compensate for survey design effects.

... Reference category. * Statistically significant at the 90-percent confidence level. **Statistically significant at the 95-percent confidence level. X Term omitted from model.

[1]Universe limited to persons who were married, spouse absent, separated, or divorced at the time of the interview.

[2]For spousal support models, reference group is divorced persons.

[3]For spousal support model, this logit refers to married, spouse absent.

[4]Includes persons who were married, spouse absent at the time of the interview.

[5]For spousal support model, this logit refers to separated persons.

Table E-2. Illustrative Example for Procedure to Derive Composite Odds for Providing Support for a Nonhousehold Member

Factor	Characteristic	Logit value
Constant term	...	-3.783
Sex	Male	0.867
Age	25 to 44	0.677
Marital status	Separated/divorced	1.117
Sex * marital status	Male * Separated/divorced	0.577
Education	College, 1+ years	0.028
Family income	$15,000 to $29,999	-0.079
Sum of logits		-0.596
Odds of being a provider[1]		0.551 to 1 or 1 to 1.8

[1]Odds derived from calculating the antilog of -0.596.
Source: Logits from the "All recipients" model in table E-1.

Loglinear regression analysis is a form of multivariate analysis where the dependent variable, in this case whether or not a person is a provider, assumes a dichotomous or yes/no value. The resulting coefficients or logits represent the logarithm of the odds of being a provider versus not being a provider relative to other population groups. The standard errors of the logits are shown in parenthesis under each logit and have been adjusted upwards by a factor of 1.97 to account for the complex sample design of the SIPP (the loglinear regression results shown in this report were derived from the statistical routine in SPSS-X). The observations used in the loglinear models were first weighted up to national totals (each respondent in the sample represented about 5,100 persons) to preserve the sampling design of the survey and then divided by this average weight in order to evaluate the significance of the results based on the actual number of persons responding in the survey sample.

The "odds" of being a provider are derived by calculating the antilog of the logits shown in table E-1. The difference between any two characteristic categories indicate how much more likely one particular group is to be a provider to a nonhousehold member than another group. For example, the first regression in table E-1 shows the results of the loglinear regressions for the likelihood of providing support for any person not a member of the respondent's household. The logit for separated/divorced persons is 1.117, while for married persons it is -0.427, indicating it is more likely that a person who is currently separated or divorced will be providing outside assistance than a person currently married.[1]

The relative odds of a person being a provider given he or she is separated/divorced vs married is simply the antilog of the difference between the two categories [(1.117)-(-0.427)=1.544], resulting in odds of about 4.7 to 1. Similarly, an examination of the relative likelihood of being a provider by educational level results in relative odds of about 1:1 between high school graduates and college educated respondents, suggesting that neither is more likely to be a provider than the other.

Composite odds. The analytical capabilities of the loglinear regression permit the derivation of composite or overall odds for a person with an arrray of various characteristics by computing the antilog of the sum of all the appropriate logits (including the constant term in the regression). For example, the likelihood of being a provider for the illustrative "young adulthood" profile developed in the text (table L) was obtained by summing the appropriate logits based on the characteristics in the profile (table E-2), and taking the antilog of that summed result. The antilog of -0.596 is 0.551 resulting in odds of 1 to 1.8 [(1.0/0.551)=1.8]

. These odds are interpreted as follows: for every person with these composite characteristics in the overall population providing financial support for a nonhousehold member, there are estimated to be 1.8 persons, with the same characteristics, who are not providing such support.

[1]The logit for the referencecategory(single/widowed) is derived by obtaining the number that, when added to the logits for the remaining categories, sums to the value 0.0.

Table E-3. Likelihood-Ratio Chi-Square Terms for Provider Models for a Nonhousehold Member: 1985

Factors in model	Degrees of freedom	All recipients	Relationship to provider			
			Own child	All adults	Parent	Spouse or ex-spouse
Baseline	287	2,453.2	2,458.6	800.3	289.9	364.9
S	286	1,724.4	1,661.5	705.8	269.2	273.4
A	284	2,064.9	1,940.2	664.6	235.9	356.1
M	285	1,648.5	1,632.6	660.6	280.0	308.6
E	285	2,389.1	2,418.5	749.2	272.1	347.2
Y	284	2,377.1	2,424.4	714.5	253.7	307.2
S,A,M,E,Y	276	538.6	344.1	323.8	186.3	166.6
M*S,A,E,Y	274	456.1	308.2	311.6	186.0	164.3
(p =)		<0.000	0.076	0.059	1.000	1.000

Note: Factor abbreviations in this table are as follows: S (sex); A (age); M (marital status); E (educational level); Y (family income). Categories for these factors are shown in appendix table E-1. The term M*S has been included in the final model in addition to the independent factors M and S. The baseline model presents the overall chi-square term for the crosstabulation before the inclusion of explanatory factors.

Assessing the relative importance of factors in loglinear models. Table E-3 presents the likelihood-ratio chi-square terms for the loglinear models shown in table E-1. These chi-square terms illustrate the variation in the model with the baseline model including no independent factors which explain the overall variation. As subsequent factors are added to the basic crosstabulation, reductions in the chi-square term indicate the relative importance of different factors in explaining the variation in the model.

For example, the first column of chi-square terms in table E-3 indicates that the baseline model for the "all recipients" loglinear regression has a chi-square value of 2,453.2. In evaluating the relative importance of the individual factors, one can readily see that the sex (S) of the respondent accounts for a greater reduction in the chi-square term from the baseline model (1,724.4) than the educational attainment (E) of the respondent (only 2,389.1), indicating that the respondent's sex is more likely to account for differences in the likelihood of being a provider than his educational attainment. One can also see that the addition of the interaction term, M*S, to the model offers further explanatory power to the model for the (1) all recipients, (2) own child, and (3) all adults regressions, but nothing to the parental or spousal provider regressions.

The final model, including the marital status*sex inter action term, was used for illustrative purposes in this report. With the exception of the "all recipients" logistic regression, all regressions provided a fit with $p > 0.05$. While additional terms could be added to improve the fit of the model, examination of the resulting parameters indicated the basic analysis was not altered by these further additions to the selected "final" model.