APPENDIX 7B

Tests of Overdispersion

The Poisson regression restricts the dependent variable to have mean-variance equality. If this assumption is violated the resulting estimates are consistent, however, estimates of the variance are not. Inconsistent variance estimates invalidate any hypothesis testing. A regression-based test of this assumption as set out by Cameron and Trivedi (1990) is adopted here. The test is of the following null and alternative hypotheses:

$$H_0 : Var(y) = \mu(y)$$
$$H_a : Var(y) = \mu(y) + \alpha g(\mu)$$

using the predicted values of from the Poisson regressions. Tests have been conducted using two alternative hypotheses:

$$g(\mu) = \mu \qquad (7B.1)$$
$$g(\mu) = \mu^2 \qquad (7B.2)$$

Optimal test statistics (i.e., that maximize local power) identified by Cameron and Trivedi were used. The results of the tests appear in Table 7B.1

Table 7B.1 Results of Tests of Overdispersion

	Coefficient	***Standard Error***	***P-value***	***Alpha Estimate***
Work to Home				
W	.361	.044	.000	
W^2	.654	.097	.000	.686
Home to Work				
W	.277	.056	.000	
W^2	1.310	.270	.000	1.154

In each case, mean-variance equality is rejected. Overdispersion appears to be present in every model. Alternatively, the models were all estimated with a negative binomial estimation of the alternative form of equation (7B.2). The negative binomial regression provides efficient estimates of the variances of the parameter estimates in cases of overdispersion (Cameron and Trivedi, 1990). Estimates of α from those regressions are included in the table of results. Those estimates are close to those of the test regressions, particularly in the estimation of stops on the way home from work, supporting the reliance on the negative binomial regression.