AN EMPIRICAL STUDY OF THE LIFE-CYCLE HYPOTHESIS WITH RESPECT TO ALUMNI DONATIONS

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It has been shown through the life-cycle hypothesis that as age increases so does consumer spending. We propose to relate this hypothesis to the specific case of charitable contributions at a small liberal arts college. This study is similar to one done previously by James H. Grant and David L. Lindauer (4). However, our model specification and econometric treatment differ somewhat from their study.

Tax treatment of charitable donations plays an important role in the size of donations. Many previous studies have assessed this relationship and found it to be positive.[1] Grant and Lindauer go on however to say that more than just income and marginal tax rates determine the level of alumni contributions. The results of their study demonstrate that although the growth rate of alumni donations does eventually become negative, this point does not coincide with the retirement age. This suggests that the level of contributions is not entirely dependent on the income profile of the donor.

Our results were not consistent with this finding. Instead of a diverging pattern of contribution level, we discovered that the growth rate of donations coincided with the age-income profile and became negative at the retirement age.

Data and Methodology

Data on alumni contributions received in the years 1968 through 1987 from the graduating classes of 1926 and 1967 was obtained from a small liberal arts college, namely Middlebury College, located in Vermont.[2] The alumni gifts were standardized[3] to 1967 dollars by dividing the figures by the appropriate CPI. Age of the classes was calculated as the difference between t (time) and c (year of graduation).

Grant and Lindauer averaged the data over the 31 years they studied so that it became purely cross-sectional in nature. This was done to account for the fact that their data included classes who graduated during the time period studied, which caused an incomplete data matrix. This changed the nature of the original data, which had been both time-series and cross-sectional in character. The problem with this method is that it may introduce a high level of autocorrelation into the regression since it removes most of the randomness of the data. To avoid this problem, we chose to pool the data and use a covariance model.[4]

Following is our log-linear covariance specification as given in equation (1):

$$\begin{aligned} \ln \text{Gift}_{ct} = {} & \mu_o + \beta_1(\text{Age})_{ct} \\ & + \beta_2\,(\text{Age}^2)_{ct} \\ & + \beta_3\,(R_1)_{ct} + \beta_4\,(R_2)_{ct} \\ & + [\mathbf{CD}]\pi + [\mathbf{TD}]\emptyset \\ & + \text{Error}_{ct} \end{aligned} \qquad (1)$$

where
Gift = average real per capita gift
c = graduating class (1926, 1927, . . . 1967)
t = year (1968, 1969, . . . 1987)
Age = age of the class (t − c)
R_1, R_2 = Reunion dummies
CD = vector of cross-sectional/graduating class dummies
TD = vector of time-series/year dummies

Grant and Lindauer also proposed the use of a reunion dummy to capture the effect reunions have on the level of donations. Following their model we used a dummy (R_1) for every fifth year reunion, i.e. when age equals any multiple of five. With the idea in mind that not every reunion would affect donations equally, we

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included a second reunion dummy (R_2) to capture the effect of the three biggest reunions, namely the twenty-fifth, the fiftieth and the sixtieth.

Time-series dummies were used for each of the years from 1969 to 1987, with 1968 as the base year. This would account for any year specific effects. Similarly, cross-sectional dummies were incorporated to account for possible differences across graduating classes. To conserve degrees of freedom and as well as to alleviate the problem of multicolinearity[5] we employed only eight cross-sectional dummies.

Results

The OLS estimates of equation (1) are presented in Table 1. The estimates for the intercept, the two reunion dummies and the age and age squared variables are all significant at a level of .01 or better. The time dummies for the years 1970, 1971 and 1972 show a statistically significant downward trend in the level of donations. The trend could have been initiated as a result of a recession in the early 1970s. The estimate for the 1987 dummy is also statistically significant, but shows a positive change, following the upward trend which exists for the years 1985, 1986, and 1987. This may reflect the increased effectiveness of the alumni fund raisers, due to the newly implemented fund drive at Middlebury College. Or, as suggested by a recent report, may be indicative of a more general economic trend (1, pp. A1). According to this study, a 28% surge in the level of charitable donations to colleges and universities was experienced during the 1986–87 fiscal year. Two explanations offered in this article are the booming Stock Market prior to the crash on October 19, 1987, and the new tax laws. Both lower tax brackets and a changed treatment of charitable contributions may have induced individuals to be more generous to their alma maters.

Interestingly, there are two class dummies which are statistically significant at the .05 significance level. These two class groups represent the graduating classes of 1931 through 1940. The coefficient estimate for both dummies indicates a lower level of donations for alumni who graduated during this time. This trend most likely reflects the negative influence which the depression of the 1930s had on alumni contributions. These alumni who graduated in the depression years left college during unstable economic times, when finding a job and being able to support oneself was extremely hard. They would therefore be less willing to give away their money as contributions.

Both reunion dummies were statistically significant and supported the idea that people are

TABLE 1
OLS Estimates of the Covariance Model

Variable	Parameter Estimate	T-Values
Intercept	2.92490043	5.657
AGE	0.0703052	4.782
AGE^2	−0.000886542	7.461
REUNION DUMMIES		
R_1	0.23709226	4.946
R_2	0.86937001	8.853
CROSS-SECTION DUMMIES		
class 1931–1935	−0.320967	3.312
class 1936–1940	−0.351226	2.376
class 1941–1945	−0.16169	0.788
class 1946–1950	−0.266144	1.007
class 1951–1955	−0.147609	0.455
class 1956–1960	−0.15805	0.410
class 1961–1965	−0.15738	0.352
class 1966–1967	−0.0883208	0.179
TIME-SERIES* DUMMIES		
1969	0.006668788	0.062
1970	−0.281722	2.552
1971	−0.466487	4.090
1972	−0.576224	4.845
1973	0.06972892	0.558
1974	−0.036138	0.274
1975	−0.165948	1.190
1977	−0.312538	1.995
1978	−0.294548	1.774
1979	−0.163112	0.928
1980	−0.201785	1.086
1981	−0.19035	0.970
1982	−0.148234	0.717
1983	−0.0986898	0.454
1984	0.009462256	0.041
1985	0.20922842	0.873
1986	0.44294859	1.765
1987	0.71647901	2.731

N = 798 R^2 = .4796 F-Ratio = 25.482
* Alumni giving data for 1976 was missing.

much more likely to make a substantial donation during a reunion year. The estimated coefficient for the R_1 dummy, or the dummy which represents each fifth year reunion, is similar to that obtained by Grant and Lindauer. The R_2 dummy also showed a significant increase in donations in the specific reunion years of the twenty-fifth, the fiftieth, and the sixtieth.

We calculated the percentage increase in donations during reunion years. This was done by equating the estimate coefficient to the natural log of one (1) plus Ω, where Ω represents the percentage change in the average real per capita gift during a reunion year as compared to a regular year:

$$\begin{aligned} .23709226 &= \ln (1+\Omega) \\ \text{thus: } e^{.23709226} &= (1+\Omega) \\ \text{and } \Omega &= .26756 \end{aligned}$$

This means that a 26.76% increase in the level of alumni donations occurs during the reunion years. This increase in the level is to be expected, and corresponds with the results presented by Grant and Lindauer's study which predicted a 22% increase. Much more interesting however, is the coefficient of the R_2 dummy, or the dummy for the three big reunion years. Once this estimated value was added to the coefficient for R_1, the total reunion effect of the three important reunions, the twenty-fifth, the fiftieth, and the sixtieth, was calculated. The results suggest that during these three reunion years alumni contributions show a 202% increase over contributions received in non-reunion years. This increase seems exceedingly large, but should be qualified. As Grant and Lindauer noted, "one should be cautious in interpreting these relative increases as the net return to reunion drives. Anticipation of reunions may cause a pre-reunion decrease in gifts and donors while post-reunion responses may also produce shortfalls from trend projections" (4, pp.137).

Finally, one can predict the growth rate of the average per capita alumni donation for the 61 year cycle studied by evaluating the partial derivative ∂ ln Gift/∂ Age = .0703 − 2 (.0008865) Age. So it is apparent that the growth rate of the average per capita alumni gift remains positive until the class age reaches 39.6 years.[6] Assuming that the average student is between 21 and 22 years old when he graduates from college, this would mean that he would be between 60 and 61 years of age when the growth rate of giving becomes negative and the level of contributions begins to level off and then decline. Since this age bracket corresponds to the average retirement age, this suggests that the relationship between the level of donations and age may in fact be mostly a reflection of the previously established relationship between income, marginal tax rate, and the level of donations. Since the rate of growth of gifts does not appear to diverge from the general income profile one cannot conclude that a separate life-cycle giving pattern exists.

Conclusion

The goal of this study was to determine whether a life-cycle trend of donations exists independently of the age-income profile. By including an additional reunion dummy and incorporating the covariance technique, we developed a model which we believe to be less restrictive than those used previously. Our results contradicted those found earlier by Grant and Lindauer, suggesting that the level of alumni contributions does in fact converge with the age-income profile of the contributor. The use of the covariance technique made it possible to detect the responsiveness of donations to macroeconomic trends as well as to individual characteristics of the classes. The results of our five year reunion dummy coincided with those found by Grant and Lindauer. In addition, the results of the second reunion dummy supported our hypothesis that there is a significant increase in donations given in the twenty-fifth, fiftieth, and sixtieth reunion years.

Notes

1. See Feldstein (2, 3). Not all studies had such strong results, for example Reece (5).
2. This college is similar in both size and income profile to the one studied by Grant and Lindauer. It does, however, differ in that Middlebury is a coed institution, whereas Wellesley is single sex. Due to the specific nature of the institutions studied, it would not be accurate to apply the results to all colleges and universities in general.
3. Unlike Grant and Lindauer however, we used an

averaged CPI figure for each year studied since the time was measured in fiscal years as opposed to calendar years.

4. We selected a time period which allowed for a complete data matrix both over cross-section and time-series.
5. Since 'age' was defined as t-c, a perfect linear relationship resulted between 'age', time-series and cross-sectional dummies.
6. Age* = .0703/2(.0008865) = 39.6 years.

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