College tuition and household savings and consumption

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Abstract

Despite the high cost of college, there has been little study of the adequacy of household savings and other resources available to fund college. To gauge their adequacy this paper examines households’ standard of living as they pay for college. Using the Consumer Expenditure Survey, the main finding is that households appear to do a relatively good job smoothing their consumption into the academic year, despite large expenses. This is consistent with the Life-Cycle Theory of saving and consumption. There is some evidence of a delayed decline in consumption, and of a decline for households with children first beginning college, but the magnitudes of these declines are rather small. © 2000 Elsevier Science S.A. All rights reserved.

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JEL classification: E21; I22

1. Introduction

Sending the kids to college is a central episode in the life-cycle of many households. Even so there has been surprisingly little study of the adequacy of household savings and other resources available to pay for college. In part this might be due to the difficulty of determining what would count as adequate
resources for a given household. For instance, one cannot simply compare the level of assets on starting college to the cost of college. The optimal level of assets also depends on a host of other factors, such as expected future income and medical expenses, the strength of any bequest motive, etc., that the econometrician does not observe. Further, assets and other resources (especially informal resources like contributions from relatives) are often poorly measured. To gauge the adequacy of college resources this paper instead examines whether households are able to maintain their standard of living — that is, their consumption — as they pay for college. Such an examination does not require measurement of the assets available specifically for college. It also recognizes that, given the cost of college, what matters for household welfare is any distortion in the path of consumption that results from meeting the cost.

The data are drawn from the Consumer Expenditure Survey, which has comprehensive coverage of household expenditure, including educational expenditure. Specifically, this paper tests whether households’ noneducational consumption decreases in the fall and following winter and spring in proportion to their college expenditures in the fall. The change in consumption is measured in relation to consumption in the previous summer, spring, and winter, to determine whether saving sharply accelerated just before the start of the academic year, or whether it was already fully underway by then. Of course households use other resources in addition to savings to pay for college, including current income, loans, and contributions from relatives. The test here considers the change in consumption given all the resources available to the household. This is the appropriate consideration as regards household welfare. Although it would be quite interesting to examine the response of consumption over longer horizons as well, the data do not permit this. Nonetheless, the periods examined here are of the greatest interest, since they cover the time when college costs are actually incurred.

The response of consumption at this time constitutes a salient test of the Life-Cycle Theory of saving and consumption, and more generally a test of any theory that requires forward-looking households to smooth their consumption. In the high-frequency analysis of this paper, paying for college can be thought of as a predictable, predetermined decrease in a household’s net income, that is income net of educational expenditures. Therefore, assuming separability between ‘college services’ and the rest of consumption, the response of noncollege consumption to college expenditures constitutes a test of whether consumption ‘tracks’ income. Forward-looking households should save in advance or borrow to meet the costs of college, in order to smooth their consumption during college. Since they can

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1 Economists looking at college savings have mostly focused on the substantial tax to saving resulting from means-testing in the financial aid system (Case and McPherson, 1986; Edlin, 1993; Feldstein, 1995; Kim, 1995; Dick and Edlin, 1997). In the context of the Life-Cycle Model, the focus can be said to have been on the intertemporal elasticity of substitution, not on the adequacy of resources, at issue here.
foresee the potential costs many years in advance, this represents a minimal and so powerful test of consumption-smoothing.

This particular test has a number of additional advantages compared to most other life-cycle tests. First, focusing on a specific life-cycle episode — paying for college — controls for much of the variation in marginal utility across the life-cycle, which generically is difficult to control for. Second, since net income is decreasing at the time of payment, the test is free of complications due to liquidity constraints. Finally, the test can be interpreted as an excess sensitivity test. In that context, since college expenditures are predictable there is no need to find a good instrument for them, which should increase the test’s power to detect violations of consumption-smoothing (Shea, 1995). However, unlike declines in income due to unemployment, for instance, college spending is voluntary. Households with fewer resources can choose less expensive colleges, or even delay college. This endogeneity does not vitiate the test of consumption-smoothing, since college expenditures are predetermined by the fall, but it can affect the policy implications of the results. In particular, if households are protecting their consumption by reducing college spending, this could have important consequences for the accumulation of human capital and the distribution of income. In response, some specifications will instrument for a household’s college expenditures with variables like average college costs in the state in which the household resides.

The outline of the paper is as follows. Section 2 reviews the literature on college costs and on testing the Life-Cycle Theory. Section 3 describes the data. Section 4 sets out the null and alternative hypotheses that are considered, on the extent to which college costs are paid for out of consumption. Section 5 reports the results. The conclusion, Section 6, is followed by Appendix A further describing the data.

2. Related literature

2.1. Paying for college

Table 1 reports the costs of different types of colleges. Of the 10 million or so undergraduates in the U.S. each year, about 40% are enrolled in public 4-year colleges. There the average total cost (including room and board) for the 1992–93 academic year was about $6000. About 20% of undergraduates are at private 4-year colleges, where the total cost averaged about $15,000 per year. The

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McPherson and Schapiro (1991) provide a good introduction to the issues in this section. Despite many changes in the particulars of college financing, the basic picture presented below did not essentially change during the 1980s and early 1990s. See also Mumper (1993), and Kane (1998) for a more recent review. There is also a large literature that examines the decision to attend college. See, e.g., McPherson and Schapiro, Kane (1994), and Dynarski (1999).
Table 1
Undergraduate enrollment and costs

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Private, 4 year</td>
<td>2.3 million (19%)</td>
<td>$10,393</td>
<td>$15,128</td>
</tr>
<tr>
<td>Public, 4 year</td>
<td>4.7 million (38%)</td>
<td>2352</td>
<td>6029</td>
</tr>
<tr>
<td>Public, 2 year</td>
<td>5.4 million (44%)</td>
<td>1018</td>
<td></td>
</tr>
</tbody>
</table>

Notes. Source: DOE (1993). Total costs are in current dollars and include tuition, fees, and room and board assuming full-time enrollment. For public schools tuition is the in-state charge.

remaining undergraduates are mostly at public 2-year colleges, where tuition alone was about $1000 per year.

The fraction of these large costs that households actually pay is hard to estimate, because it varies with the financial-aid package a household receives. Miller and Hexter (1985, 1985a) estimate this fraction for full-time students financially dependent on their families, using the 1983–84 Student Aid Recipient Survey. For the most common aid package, consisting of a Pell grant and state and campus-based aid, middle-income households typically paid at least two-thirds of the total cost of college. Under the next most common package, with a Guaranteed Student Loan instead of state aid, the fraction paid rose to over four-fifths, taking into account the repayment of the loan. For low-income households, the fractions were about one-half and two-thirds, respectively. Miller and Hexter argue that

these [low-income] families have virtually no discretionary income to tap and can rarely call upon savings for [paying this remaining fraction]. Thus we can only speculate that these students are living at a lower standard than was allowed for in their student budget or that they are receiving additional support (from grandparents or other relatives, for example) that is not captured in the need analysis process.\(^4\)

\(^3\)Pell grants and GSLs were the most important forms of financial aid. In 1988–89, over 3 million students received Pells, averaging about $1400. About 3.6 million (including graduate students) took out subsidized Stafford loans, averaging about $2600. Many of these students took out the maximum Stafford loan. For them and others ineligible for Staffords, there were also guaranteed PLUS (parent loans to undergraduate students) and SLS (supplemental loans to students) loans. In 1988–89, about 800 thousand students (including graduate students) borrowed an average of about $2600 via SLSs, and 200 thousand borrowed about $3100, on average, via PLUSs (McPherson and Schapiro, 1991). Little is known about other, nonguaranteed loans taken out for college, apart from the self-reported total use of loans described below. About one-third of aid-recipients at public colleges receive only GSLs, so pay 100% of cost (not including the subsidized interest rate). For private colleges, the figure is about one-eighth.

\(^4\)One might add that the families of these students (including their grandparents or other relatives) might as a result also be living at a low standard.
The 1986–87 National Postsecondary Student Aid Survey (NPSAS) asked parents themselves how much they contributed to their children’s college costs during the academic year. Choy and Henke (1992) summarize the results for families with dependent undergraduates. Sixty-seven percent of the parents contributed at least some amount, with the average contribution about $3900 (for tuition, housing, and other expenses). On adding the 11% of parents who extended loans to their children, the average conditional contribution was about $4200. On also adding the 83% of parents giving in-kind gifts (e.g., housing and clothing), the average was about $6200. The probability and magnitude of contribution were generally increasing in the income and wealth of the parents. Focusing only on the households with children attending private colleges, the average contribution was about $6500, rising to $8800 on including loans and in-kind gifts. These amounts, usually multiplied by 2 or 4 (for 2- or 4-year colleges, respectively), are substantial relative to typical household income and savings.

According to the NPSAS, of the parents giving gifts (not including in-kind gifts, but including loans), about 80% said they used at least some current income as a source of funds, 65% used some previous savings, 24% used some loans, and 30% used some additional income from increased work. Unfortunately, the dollar amounts used of each source are not available. Still, there are two points worth noting. First, 35% of households did not save in advance at all for college. This fraction rose to about 50% for households of lower income or wealth. Second, the extent to which those using current income are cutting their current consumption, or just diverting other current saving, remains unclear.

Of the parents saving for college, about 47% report they started saving before their child was in junior high, 44% started during junior and senior high, and 10% still waited until after high school ended (20% for poorer families). So, even of the households that save, over half wait until they are at most 6 years from college. And even those starting earlier might not be saving sufficiently. A 1984 Roper poll found that most households that were saving for college were not saving enough to meet at current rates their own stated target for savings by the time of college. In

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5The extent to which the parents will in fact be paid back is unclear.
6The monotonicity does not hold for loans. See also Churaman (1992) for a multivariate analysis of these gifts.
7The figures are also important relative to aggregate saving. Gale and Scholz (1994) estimate household contributions for college totaled about $35 billion per year in the mid-1980s. It is interesting that such contributions represent about one-third of the difference between Kotlikoff/Summers and Modigliani in their debate about the relative importance of bequests versus life-cycle savings (Modigliani, 1988).
8These figures still condition on the parents’ giving. Unconditionally, over one-half of parents with dependent undergraduates did not save at all in advance.
9Of those not saving but still expecting to send a child to college, most said that the reason they were not saving was that they could not currently afford to save, but that they would start saving later. About a quarter of the nonsavers said they did not expect to start saving later, either (Roper, 1984).
sum, it remains unclear whether households have adequate savings and other resources for college, and in particular whether they are substantially cutting their consumption right at the time of college.

2.2. Testing the Life-Cycle Theory

A number of studies have examined the ability of households to smooth their consumption past idiosyncratic fluctuations in their income, especially due to unemployment (e.g., Gruber, 1997). While Cochrane (1991) rejects the hypothesis of complete risk-sharing, Dynarski and Gruber (1997) find quantitatively that households do a relatively good job at consumption-smoothing. The Life-Cycle/Permanent-Income Theory requires that consumption should not fluctuate in particular with predictable (or transitory) changes in income. While the theory is often rejected using aggregate data, aggregation bias can induce spurious excess sensitivity of consumption to income even when there is no such sensitivity in the underlying micro data (Attanasio and Weber, 1995). On the other hand, the results using micro data are more mixed (Deaton, 1992; Browning and Lusardi, 1996). In large part this might be due to the difficulty of isolating the predictable component of income at the micro level. Most studies proceed by instrumenting for income, but since the available instruments are typically poor, their results might be prejudiced against finding significant excess sensitivity. In response, recently a few micro studies have examined specific situations in which it is known in advance that income will change. Shea (1995) looks at the consumption of union members in response to anticipated changes in union contracts, and Souleles (1999) looks at the response of U.S. taxpayers to their income tax refunds, which they had requested in advance as part of their tax returns. Both studies reject the Life-Cycle Theory, with Souleles finding evidence of binding liquidity constraints. (See also Parker, 1989 and Souleles, 1996.) This paper examines a different situation, paying for college, which by contrast avoids complications due to liquidity constraints and changes in marginal utility over the life-cycle.

3. The data

The data are drawn from the Consumer Expenditure Survey (CEX) for 1980 to 1993. In the CEX households are interviewed four times, 3 months apart, though starting in different months for different households. In each interview are recorded household expenditures over the previous 3 months. For each household-quarter all expenditures on college tuition, room and board have been added together and deflated (1982–84 $) to produce total real college expenditure, COLEXP. These amounts reflect out-of-pocket outlays, net of expenses covered by noncash scholarships. Total real nondurable consumption was also computed for
each household-quarter, following the BLS’s classification but excluding educational expenditure. This classification includes many relatively durable and lumpy expenditures which are not readily ‘smoothable’, for instance clothing and repairs. Clothing, in particular, might be less separable from educational expenditure than are other nondurable expenditures, insofar as families send their kids off to college in the fall with new clothing. In response, following Lusardi (1996) such expenditures have been removed to create a subset of nondurables, ‘strictly nondurables’. The average ratio of strictly nondurables to nondurables is about 0.66. A subset of strictly nondurables, food, will also be examined.

The sample is limited to ‘traditional’ collegiate households: households in which there is a child aged 16–24, and no one over 24 in school. Other, less traditional households making college payments are more difficult to analyze. The sample is also limited as usual to households with satisfactory data on consumption. Appendix A provides further details about the data. For traditional collegiate households, the average real COLEXP is about $980 (the median $480) for quarters in which COLEXP is nonzero. These expenditures are most frequent and greatest in magnitude (averaging about $1150) for quarters that include August and September. The large amount of variation in COLEXP should give this paper’s test of consumption-smoothing more power than many similar tests. Further, since the CEX specializes in recording expenditures, COLEXP is probably better measured than most of the income variables in the CEX used in other tests.

The lower profile in Fig. 1 shows the age distribution of quarterly college expenditure for heads of traditional collegiate households. The frequency (reflected in the size of the bubbles) and magnitude of expenditure are greatest for heads in their middle years (40s and early 50s), the ages at which parents typically send children to college. For comparison, the upper profile in Fig. 1 shows the age distribution of quarterly nondurable consumption for the same household quarters.

10The major components of strictly nondurables are food, household operations, including monthly utilities and small-scale rentals, transportation fuel and services, including public transportation, personal services, and entertainment services and high-frequency fees.

11There are a couple of reasons why the average CEX college expenditure of about $1150 in the fall is smaller than, say, the $3900 figure from the 1986 NPSAS (which is about $3600 in 1982 $). First, as explained in Appendix A, COLEXP does not include cash contributions given to students living away. These average about $900 per year in the CEX, bringing potential college expenditures in the fall to about $2050. Second, some households make additional college payments later in the academic year. Finally, as noted by Choy and Henke (1992), due to its sample design the NPSAS is not representative of U.S. households, to a degree that is hard to ascertain. One complication is that it samples dependent students. Since one (sufficient) condition for dependency is receiving over $750 from one’s parents, this will bias up the figures in the NPSAS relative to those in the CEX. (To illustrate, on restricting the sum of expenditures in the fall and cash contributions to be greater than $750, the CEX sample average rises to almost $4000.)
This distribution follows a rather similar pattern as that for COLEXP below it.\textsuperscript{12} As others have noted (e.g., Carroll and Summers, 1991), the path of nondurable consumption also tracks the path of income with age. But it does not follow that either nondurable or college expenditures are constrained by current income in ways inconsistent with the Life-Cycle Theory. First, progressivity in the financial aid system results in larger college payments when income is larger. Second, other expenditures that are included in nondurables, whether for child-rearing or not, might also naturally be high in the middle years. That is, the marginal utility of consumption might itself be a hump-shaped function of age. Finally, the time path of income might have been sufficiently unpredictable to warrant the observed path of consumption even under the Life-Cycle Theory. In contrast, this paper provides a clean test of whether consumption tracks income by examining an episode

\textsuperscript{12}The cross-sectional correlation between COLEXP and (lagged) nondurable consumption is about 0.25. Under the Permanent-Income Hypothesis this implies that households with greater permanent income make greater college expenditures. Fig. 1 shows that the average ratio of COLEXP to nondurable consumption is almost one-third. The time-series average of this ratio has risen by over 20\% over the sample period.
during the middle-age years when net income is sharply predictably decreasing because of college expenditures.

4. Econometric specifications

It is convenient to implement the test of consumption-smoothing via an equation interpretable as an Euler equation derived from the Life-Cycle Theory. Following Zeldes (1989) and Lusardi (1996), the equation that governs household $i$'s change in consumption is specified as

$$
dC_{i,t+1} = \sum b_{it} \text{time}_t + b_1 \text{age}_{it} + b_2 d(ages \ 0-15)_{i,t+1}$$
$$+ b_4 d(ages \ 16-24)_{i,t+1} + b_5 d(ages \ 25-90)_{i,t+1} + u_{i,t+1},$$

(1)

where age$_t$ is the age of the household head in period $t$, and $d(ages \ 0-15)_{i,t+1}$, $d(ages \ 16-24)_{i,t+1}$, and $d(ages \ 25-90)_{i,t+1}$ record the changes between periods $t + 1$ and $t$ in the number of household members less than 16 (e.g., births), between 16 and 24 (inclusive), and greater than 24 (e.g., deaths), respectively. $d(ages \ 16-24)$ accommodates children leaving the household for college or for other reasons. These demographic variables help control for the most basic changes in the marginal utility of consumption, namely with family size and over time. The full set of dummy variables for time (a separate variable for each month of each year) helps control for seasonality, aggregate shocks, and changes in interest rates across time.

Assuming separability of college expenditures and the rest of nondurable consumption (Feldstein, 1995), the null hypothesis to be tested is that households smooth their consumption even as they pay for college. A natural alternative hypothesis is that households pay for (minus) $m\%$ of their college expenditures COLEXP out of current consumption. The generalization of the Euler equation that is estimated is then

$$
dC_{i,t+1} = \sum b_{it} \text{time}_t + b_1 \text{age}_{it} + b_2 d(ages \ 0-15)_{i,t+1}$$
$$+ b_4 d(ages \ 16-24)_{i,t+1} + b_5 d(ages \ 25-90)_{i,t+1} + m\times \text{COLEXP}_{i,t+1} + u_{i,t+1},$$

(2)

where $t + 1$ is the quarter covering the household’s first payments for the fall semester, with no college payments made in quarter $t$. The coefficient $m$ then measures the size of the distortion to consumption due to college expenditures. Under the null hypothesis $m$ should be zero. A large negative $m$ would evidence the inadequacy of household resources to smooth consumption in the face of college expenditures. It would count, in particular, as a violation of the Life-Cycle Theory, insofar as COLEXP is a predictable expense by quarter $t$.

Since most college payments are made in August and September, to focus the
analysis the sample is further restricted to households for whom a CEX reference quarter \( t + 1 \) can be chosen to include an August or September in which college expenditures are made. As a result, \( C_{t+1} - C_t \) essentially compares consumption in the fall when paying for college to baseline consumption in the previous summer or late spring. (To avoid any distortion in baseline consumption, the relatively few households making college expenditures in quarter \( t \) as well are not included in the sample.) Although college expenditures are from a longer-run point of view endogenous, they have largely been predetermined by this baseline period. Even households with children entering the freshman year of college have usually committed to a particular college and its cost by this time.

The response of consumption in Eq. (2) is net of all the mechanisms available to households to help them smooth their consumption, including loans, contributions from relatives, and other informal resources. There is also a potentially important role for the endogenous choice of college expenditures. Unlike shocks to income resulting from unemployment or disability, for example, college spending is voluntary. Households that foresee their resources will be inadequate for an expensive college can instead choose a less expensive one. Although the longer-run endogeneity of COLEXP and the other consumption-smoothing mechanisms does not vitiate the high-frequency life-cycle test, they can affect the policy implications of the results — especially if households are smoothing their consumption by reducing college expenditures. Unfortunately, the data do not allow one to disentangle the relative importance of the various smoothing mechanisms. But one can nonetheless control for the endogeneity of college expenditures by instrumenting for COLEXP. This will also mitigate any measurement error in COLEXP.

It is possible that distortions in consumption due to COLEXP\(_{t+1}\) do not show up until later into the academic year, after quarter \( t + 1 \). To test for distortions in the following winter and spring, the change in consumption over a longer, 6-month period, \( d^2C_{t+2} = C_{t+2} - C_t \), will also be examined:

\[
d^2C_{t+2} = \sum b^s_i \text{time}_{it} + b^\text{age}_{it} + b^d_1d^2(\text{ages } 0-15)_{i,t+2} + b^d_2d^2(\text{ages } 16-24)_{i,t+2} + b^d_3d^2(\text{ages } 25-90)_{i,t+2} + m^*\text{COLEXP}_{i,t+1} + u_{i,t+2},
\]

where the changes are all over 6 months. Eq. (3) will be estimated for the subset of households used in Eq. (2) that are still present in the data set for an additional quarter \( t + 2 \). (This is about 60% of the households.) Unfortunately, there are not enough observations in the data to look further forward in the year.

It is interesting to examine consumption before period \( t \) as well. To illustrate, Fig. 2 shows two households whose change in consumption between periods \( t \) and \( t + 1 \) is the same, but whose previous paths of consumption are quite different. Household #1 starts to save seriously only at period \( t \) — ‘crash saving’ — and so
Fig. 2. Consumption paths when saving. Household #1 waits to save until period $t$ (crash saving), household #2 starts saving earlier.

suffers a large drop in consumption between periods $t - 1$ and $t$. Household #2 by contrast started saving earlier, lowering its consumption before period $t$ to avoid a large drop in consumption in period $t$. To distinguish such households, the consumption in the fall, quarter $t + 1$, will also be examined relative to quarter $t - 1$, the previous spring and winter, using $C_{t+1} - C_{t-1}$ as the dependent variable:

$$d^2 C_{t,t+1} = \sum b^*_{0i} \text{time}_i + b^*_1 \text{age}_i + b^*_2 d^2(\text{ages 0–15})_{i,t+1}$$
$$+ b^*_3 d^2(\text{ages 16–24})_{i,t+1} + b^*_4 d^2(\text{ages 25–90})_{i,t+1}$$
$$+ m^* \text{COLEXP}_{t,t+1} + u_{i,t+1}. \quad (4)$$

Again, there is not enough data to look further back in time. And even if there were, inference would be complicated by the fact that college expenditures would less likely be predetermined. Nonetheless, the specifications just described are sufficient to test whether households have saved enough 6–9 months in advance of the academic year, or have sufficient other resources, to sustain their consumption up to 6 months into the year.

Eqs. (2) to (4) are estimated by OLS, correcting the standard errors for heteroskedasticity. To increase precision, other 'traditional' households that do not make any educational expenditures in any quarter (and whose quarter $t + 1$ includes August or September) are added to the sample as a kind of control group, with COLEXP set to zero.

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13Most households learn about admissions decisions and financial aid packages in the previous winter or spring. Also, the means-testing of the financial aid system can distort households' incentives to save before filling out their financial aid forms, typically done in the preceding winter (Edlin, 1993; Feldstein, 1995; Kim, 1995; Dick and Edlin, 1997).
Table 2

The effect of college expenditures on consumption in the fall, relative to consumption in the previous summer, Eq. (2). Dependent variable is $C_{t+1} - C_t$.

<table>
<thead>
<tr>
<th>Consumption group</th>
<th>Nondurables</th>
<th>Strictly nondurables</th>
<th>Food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (ages 0–15)</td>
<td>–0.531 (1.93)</td>
<td>0.420 (1.49)</td>
<td>0.716 (1.00)</td>
</tr>
<tr>
<td>Age (ages 16–24)</td>
<td>29.3 (54.3)</td>
<td>30.7 (36.7)</td>
<td>17.4 (24.4)</td>
</tr>
<tr>
<td>Age (ages 25–90)</td>
<td>137.0** (43.4)</td>
<td>109.8** (31.3)</td>
<td>58.2** (24.0)</td>
</tr>
<tr>
<td>COLEXP</td>
<td>222.3** (93.2)</td>
<td>201.2** (66.0)</td>
<td>109.4** (50.2)</td>
</tr>
<tr>
<td># obs</td>
<td>7109</td>
<td>7200</td>
<td>7200</td>
</tr>
<tr>
<td># (COLEXP &gt; 0)</td>
<td>1227</td>
<td>1249</td>
<td>1249</td>
</tr>
</tbody>
</table>

Notes. The data are drawn from the CEX from 1980 to 1993. $C_t$ is real household noneducational consumption in quarter $t$. COLEXP is real total college expenditure in quarter $t+1$. Age is the age of the household head. $d$(ages 0–15), $d$(ages 16–24), and $d$(ages 25–90) record the changes between quarters $t+1$ and $t$ in the number of household members aged less than 16, between 16 and 24, and greater than 24. All regressions also include a full set of month dummy variables. Heteroscedasticity-corrected standard errors in parentheses.

*Significant at the 10% level.
**Significant at the 5% level.

5. Results

Table 2 reports the basic results for Eq. (2), for consumption in the fall. For nondurables the coefficient on COLEXP is positive, the unexpected sign, and marginally significant at the 10% level. The coefficients on strictly nondurables and food are smaller and insignificant. Thus, households appear to have enough resources in the fall to maintain their consumption despite large college expenditures, consistent with models of consumption-smoothing. As for the demographic control variables, the coefficients on $d$(ages 16–24) and $d$(ages 25–90) are positive and significant, reflecting increased spending with additional household members. Since the demographic coefficients turned out to be similar across specifications, subsequent tables will not report them. The coefficients on the month dummies, not shown, are together highly significant.

As a check of robustness, Table 3 presents a number of extensions to the basic results. Eq. (2) was first re-estimated in logs. As shown in row (1), again the coefficients on COLEXP are positive, not negative. To guard against measurement error and endogeneity in the amount expended, COLEXP $t+1$ was replaced by an indicator variable $I_{COLEXP_{t+1} > 0}$ for making any college expenditures at all. The resulting coefficients, in row (2), are again all positive, and significant for strictly

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Note that traditional collegiate families do not often have newborns (births), so there is not much variation in $d$(ages 0–15).
Table 3
Consumption in the fall: extensions. Dependent variable is \( C_{t+1} - C_{t} \)

<table>
<thead>
<tr>
<th>Row</th>
<th>Consumption group</th>
<th>Nondurables</th>
<th>Strictly nondurables</th>
<th>Food</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>ln(COLEXP)</td>
<td>0.003* (0.002)</td>
<td>0.004** (0.002)</td>
<td>0.000 (0.002)</td>
</tr>
<tr>
<td>(2)</td>
<td>I_{colexp&gt;0}</td>
<td>76.0 (53.4)</td>
<td>71.3** (35.4)</td>
<td>27.7 (22.7)</td>
</tr>
<tr>
<td>(3)</td>
<td>COLEXP IV: I_{colexp&gt;0}</td>
<td>0.093 (0.065)</td>
<td>0.085** (0.042)</td>
<td>0.033 (0.027)</td>
</tr>
<tr>
<td>(4)</td>
<td>COLEXP IV: STATEEXP</td>
<td>0.038 (0.062)</td>
<td>0.054 (0.040)</td>
<td>0.029 (0.027)</td>
</tr>
<tr>
<td>(5)</td>
<td>COLEXP (nontrip)</td>
<td>0.029 (0.040)</td>
<td>-0.018 (0.022)</td>
<td>-0.026 (0.016)</td>
</tr>
<tr>
<td># obs</td>
<td></td>
<td>7109</td>
<td>7200</td>
<td>7200</td>
</tr>
</tbody>
</table>

Notes: The data are drawn from the CEX from 1980 to 1993. \( C_t \) is real household noneducational consumption in quarter \( t \). COLEXP is real total college expenditure in quarter \( t+1 \). All regressions also include a full set of month dummy variables and controls for age and changes in family size between quarters \( t+1 \) and \( t \). Heteroscedasticity-corrected standard errors in parentheses.

In row (1), the dependent variable is \( \ln C_{t+1} - \ln C_t \), the independent variable is \( \ln \text{COLEXP}_{t+1} \).

In row (2), the independent variable is an indicator for having any college expenditure in \( t+1 \). In row (3) this indicator variable is used as an instrument for COLEXP. In row (4), real average tuition and fees in the state in which the household resides, STATEEXP, is used as an instrument for COLEXP. In row (5), the dependent variable does not include spending away from home on trips.

* Significant at the 10% level.
** Significant at the 5% level.

nondurables though small in magnitude. Households paying for college actually increase their noneducational spending in the fall, by about $75. In row (3) this indicator variable is used as an instrument for COLEXP. Again the coefficients are positive, and significant though small for strictly nondurables. An alternative instrument for \( \text{COLEXP}_{t+1} \) is average college tuition and fees in the state in which the household resides, \( \text{STATEEXP}_{t+1} \), which is exogenous to the household. The results, in row (4), are similar to those using the indicator variable as the instrument, though no longer significant. Both IV results are generally similar to the basic results in Table 2, suggesting that measurement error and endogeneity are not driving the results. The positive coefficients on COLEXP might reflect remaining nonseparabilities between college expenditure and the dependent consumption variables, even for food and strictly nondurables. One possibility is that food and travel spending increases in the fall as parents take their children to college. To investigate this possibility, the consumption categories were re-aggregated without including such spending. The results are in row (5). The

15The underlying first-stage regression yields \( \text{COLEXP} = 283(82) + 0.30(0.04) * \text{STATEEXP} \), with the standard errors in parentheses. \( R^2 = 0.06 \), suggesting STATEEXP is a good instrument. Kane (1994) and Kim (1995) also exploit average state costs.
The coefficient for nondurables is still positive, but insignificant and smaller than in Table 2. The coefficients for food and strictly nondurables are now negative, though small in magnitude.\textsuperscript{16} These extensions confirm the basic result that households are able to smooth their consumption in the fall. If anything their consumption is slightly increasing, in part due to nonseparabilities.

Table 4 reports the results for Eq. (3), for consumption later in the academic year, during the following winter and spring. The basic results appear in row (1). The coefficients on COLEXP are now all negative. While insignificant for nondurables, they are significant for strictly nondurables and food. But again they are rather small in magnitude. The point estimate for strictly nondurables is about $-0.07$, representing a decline in consumption of only 7 cents for each dollar of college expenditure. The 95\% confidence interval bounds the decline at 13 cents.

The second panel of Table 4 explores various extensions. In logs, in row (2), the coefficients on COLEXP are significantly negative for nondurables and strictly nondurables. In row (3) the coefficient on $I_{\text{COLEXP}>0}$ implies that household consumption is decreasing by 2\% for each dollar of college expenditure.

Table 4
The effect of college expenditures on consumption in the following winter/spring, Eq. (3). Dependent variable is $C_{t+2} - C_t$.

<table>
<thead>
<tr>
<th>Row</th>
<th>Consumption group</th>
<th>Nondurables</th>
<th>Strictly nondurables</th>
<th>Food</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>COLEXP</td>
<td>$-0.073$ (0.052)</td>
<td>$-0.066**$ (0.031)</td>
<td>$-0.032**$ (0.016)</td>
</tr>
<tr>
<td></td>
<td># obs</td>
<td>4175</td>
<td>4216</td>
<td>4216</td>
</tr>
<tr>
<td></td>
<td># (COLEXP &gt; 0)</td>
<td>713</td>
<td>728</td>
<td>728</td>
</tr>
<tr>
<td>(2)</td>
<td>$\ln(\text{COLEXP})$</td>
<td>$-0.007**$ (0.002)</td>
<td>$-0.004**$ (0.002)</td>
<td>$-0.002$ (0.003)</td>
</tr>
<tr>
<td>(3)</td>
<td>$I_{\text{COLEXP}&gt;0}$</td>
<td>$-222.5**$ (66.8)</td>
<td>$-72.4^*$ (44.8)</td>
<td>$-15.9$ (22.4)</td>
</tr>
<tr>
<td>(4)</td>
<td>COLEXP IV: $I_{\text{COLEXP}&gt;0}$</td>
<td>$-0.264**$ (0.081)</td>
<td>$-0.086^*$ (0.053)</td>
<td>$-0.019$ (0.032)</td>
</tr>
<tr>
<td>(5)</td>
<td>COLEXP IV: STATEEXP</td>
<td>$-0.250**$ (0.076)</td>
<td>$-0.101**$ (0.049)</td>
<td>$-0.034$ (0.029)</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Notes. The data are drawn from the CEX from 1980 to 1993. $C_t$ is real household noneducational consumption in quarter $s$. COLEXP is real total college expenditure in quarter $t + 1$. All regressions also include a full set of month dummy variables and controls for age and changes in family size between quarters $t + 2$ and $t$. Heteroscedasticity-corrected standard errors in parentheses.

\textsuperscript{b}Row (1) presents the basic results for consumption in the following winter/spring, relative to the previous summer. In the extensions in the second panel, in row (2) the dependent variable is $\ln(C_{t+2} - \ln(C_t$, the independent variable is $\ln(\text{COLEXP} + 1)$. In row (3) the independent variable is an indicator for having any college expenditure in $t + 1$. In row (4) this indicator variable is used as an instrument for COLEXP. In row (5), real average tuition and fees in the state in which the household resides, STATEEXP, is used as an instrument for COLEXP.

*Significant at the 10\% level.
**Significant at the 5\% level.

\textsuperscript{16}Instrumenting does not make them much larger in magnitude nor significant.
spending drops by only about $70 in strictly nondurables and another $150 in nondurables. Instrumenting with this indicator variable or with STATEEXP produces similar results, in rows (4) and (5), though somewhat larger in magnitude than the basic results in row (1). In both cases strictly nondurables decline by about 10 cents for each dollar, and nondurables decline by another 15 cents.\footnote{A different response to endogeneity is to compare the consumption of the households with college-age children (whether they make any college expenditures or not) to the consumption of all other households, without college-age children. Eqs. (2) and (3) were re-estimated on this larger sample replacing COLEXP with an indicator variable for having college-age children. In Eq. (2) the indicator was generally negative but not significant, in Eq. (3) the indicator was significantly negative. These results could reflect difficulty smoothing consumption past college expenses. However, they could also reflect a difference in the marginal utility of households with children, one which affects their Euler equation such that their consumption profiles are less steep.} In sum, although there is some delayed decline in consumption in the following winter and spring, it is not substantial. Households appear to have sufficient resources to do a relatively good job smoothing their consumption well into the academic year. It remains possible that households’ consumption decreases substantially only after the spring. But the original results of Table 2 suggest that consumption does not decrease much further with any new round of college expenditures in the following fall, because such rounds were already included in the sample used for Table 2 for students who were beyond their first year of college.\footnote{Consider a household that has resources sufficient for only the first year of college. If it happens to be in the sample during its second or later year of college, its tuition payment in the fall of that year would depress its consumption that fall, and so would be reflected in Eq. (2).}

To investigate the possibility of crash saving, Eq. (4) compares consumption in the fall to consumption in the previous spring and winter. The results are in Table 5. The coefficients on COLEXP are broadly similar to those in Table 2 for Eq. (2).
This result counts against crash saving, at least crash saving in the previous spring and winter. Insofar as savings are being used to maintain consumption in the fall, this saving appears to be fully underway at least 6 to 9 months in advance.

Of course households can tap many different types of resources in addition to savings to fund college expenditures. Unfortunately, the CEX is not well suited for identifying the resources that are in fact tapped. There is some data available in the first and fourth interviews on household assets and income. Of the assets data, balances in checking and savings accounts are considered the most satisfactory, so it is natural to consider their sum, a measure of liquid assets, and examine the change in liquid assets between interviews four and one. Even though this asset-change variable does not quite match the timing of the consumption-change in Eq. (2), it can still be used as the dependent variable in Eq. (2), keeping the same independent variables. This yields a coefficient of $-0.33 (0.42)$ on COLEXP, which, although insignificant, suggests that perhaps as much as one-third of college expenditures might come out of liquid assets.\textsuperscript{19} Using instead the change in income between interviews four and one as the dependent variable yields a coefficient of only $0.02 (1.24)$ on COLEXP. This insignificant result might be taken as evidence that labor supply does not increase much in order to fund college expenditures. However, the reference period for income covers the entire year preceding the interview; taking the change in annual income between interviews that are only 9 months apart does not match the timing implicit in Eq. (2).\textsuperscript{20} In any case, these results must be qualified because the assets and income data in the CEX are considered less reliable than the expenditure data and are often missing.

The CEX does not contain satisfactory data on other resources that are potentially important in funding college, such as loans, contributions from relatives, and other informal resources. However, such data is not well measured by any household data set. One virtue of the consumption-based approach of this paper is that it does not need explicit and comprehensive measures of household resources to test the null hypothesis of consumption-smoothing. The test implicitly takes into account all of the resources available to the household.

Table 6 investigates whether the main results above vary across certain salient subsets of households. Perhaps households with low levels of income or assets have more trouble smoothing their consumption. Since the assets data is less well

\textsuperscript{19}Since durable goods are also assets, total consumption (including durables) was also used as the dependent variable in Eq. (3). This led to a coefficient of $-0.15 (0.11)$ on COLEXP, about twice the size of the coefficient for nondurables, though insignificant.

\textsuperscript{20}The change between interviews four and one in the number of weeks worked was also used as the dependent variable. The coefficient on COLEXP was positive for both the head’s and the spouse’s weeks; not significant for the head but significant at the 10% level for the spouse. However, as with income the reference period for weeks worked is 1 year.
Heterogeneity in the response of consumption

<table>
<thead>
<tr>
<th>Row</th>
<th>Consumption group</th>
<th>Nondurables</th>
<th>Strictly nondurables</th>
<th>Food</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel A: low-income households</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) $C_{t+1} - C_t$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COLEXP</td>
<td>0.102* (0.055)</td>
<td>0.057* (0.031)</td>
<td>0.008 (0.020)</td>
<td></td>
</tr>
<tr>
<td>COLEXP*I_low</td>
<td>$-0.112$ (0.104)</td>
<td>$-0.085$ (0.062)</td>
<td>$-0.039$ (0.024)</td>
<td></td>
</tr>
<tr>
<td>(2) $C_{t+2} - C_t$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COLEXP</td>
<td>$-0.062$ (0.048)</td>
<td>$-0.062**$ (0.032)</td>
<td>$-0.038**$ (0.017)</td>
<td></td>
</tr>
<tr>
<td>COLEXP*I_low</td>
<td>$-0.099$ (0.231)</td>
<td>$-0.040$ (0.109)</td>
<td>0.052 (0.055)</td>
<td></td>
</tr>
<tr>
<td>Panel B: starting households</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) $C_{t+1} - C_t$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COLEXP</td>
<td>0.118** (0.055)</td>
<td>0.054 (0.034)</td>
<td>0.007 (0.021)</td>
<td></td>
</tr>
<tr>
<td>COLEXP*I_starter</td>
<td>$-0.211**$ (0.098)</td>
<td>$-0.082*$ (0.043)</td>
<td>$-0.016$ (0.031)</td>
<td></td>
</tr>
<tr>
<td>$I_{starter}$</td>
<td>132.7 (112.6)</td>
<td>101.5 (67.0)</td>
<td>$-31.8$ (42.6)</td>
<td></td>
</tr>
<tr>
<td># starter</td>
<td>220</td>
<td>224</td>
<td>224</td>
<td></td>
</tr>
<tr>
<td>(4) $C_{t+2} - C_t$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COLEXP</td>
<td>$-0.082$ (0.061)</td>
<td>$-0.056$ (0.039)</td>
<td>$-0.038*$ (0.020)</td>
<td></td>
</tr>
<tr>
<td>COLEXP*I_starter</td>
<td>0.070 (0.108)</td>
<td>$-0.050$ (0.049)</td>
<td>0.020 (0.035)</td>
<td></td>
</tr>
<tr>
<td>$I_{starter}$</td>
<td>$-136.7$ (134.2)</td>
<td>33.0 (82.9)</td>
<td>7.4 (42.6)</td>
<td></td>
</tr>
<tr>
<td># starter</td>
<td>134</td>
<td>137</td>
<td>137</td>
<td></td>
</tr>
</tbody>
</table>

Notes. The data are drawn from the CEX from 1980 to 1993. The dependent variable is $C_{t+1} - C_t$ or $C_{t+2} - C_t$, as indicated. $C_t$ is real household noneducational consumption in quarter $t$. COLEXP is real total college expenditure in quarter $t+1$. $I_{low}$ is an indicator variable for households with income in the bottom quartile of the income distribution. $I_{starter}$ is an indicator for households with children first starting college. All regressions also include a full set of month dummy variables and controls for age and changes in family size between the indicated quarters. Heteroscedasticity-corrected standard errors in parentheses.

*Significant at the 10% level.
**Significant at the 5% level.

measured, Panel A investigates low income households. An indicator variable $I_{low}$ was created identifying the households with income in the bottom quarter of the income distribution, and interacted with COLEXP. The results for Eq. (2) for the fall appear in row (1). The interaction terms are negative, though not significantly so. For the low-income households, the point estimate for the total response of strictly nondurables is only $-0.028$ ($=0.057 - 0.085$), for a consumption decline of about 3 cents per dollar. In row (2) are the results for Eq. (3), for the following winter and spring. The interaction terms are negative for nondurables and strictly nondurables, though insignificant with large standard errors. The results are similar on instrumenting or on using the bottom half of the income distribution. In sum, the consumption of lower income households might be somewhat more distorted.
by college expenditures than that of higher income households, but not signifi-
cantly so.\textsuperscript{21,22}

Numerous surveys have suggested that parents know rather little about college
costs and financial aid before their children enter college, even as late as the senior
year of high school (GAO, 1990). Consequently, it might be that the consumption
distortion is greater for households sending children to college for the first time.\textsuperscript{23}
To investigate this possibility, ideally one would identify households whose first
child ever to go to college is entering the first year of college. Unfortunately, this
identification is not possible in the CEX, which is not intended to trace family
dynamics. Instead one can pick out the households that have some child entering
the first year of college, but no other children already in college at the time. (Note
that it remains possible that older children have already graduated from college.)
About 220 such ‘starting’ households were identified in the sample.

Panel B of Table 6 reports the results on adding separate intercept and
interaction terms for these starting households. Row (3) displays the results for Eq.
(2), for the fall. The interaction term for nondurables is significantly negative,
implying that starting households have more trouble smoothing their consumption.
However, their marginal response is only about $-0.09$, i.e. starting households’
nondurable consumption drops by less than 10 cents for every additional dollar of
college expenditures. The interaction term for strictly nondurables is only
marginally significant (at the 10\% level). On the other hand, the starters’ intercept
term is positive for both nondurables and strictly nondurables, though insignificant.
Starting households might be incurring fixed costs that nonstarters no longer
incur.\textsuperscript{24} Including this effect the total (as opposed to marginal) response of starters’
consumption is about zero at the mean level of COLEXP. The results for Eq. (3)
are in row (4). The interaction terms are now all insignificant. However, this might

\textsuperscript{21}An alternative indicator was created for households with low-education heads. The results are
similar to those for low-income households, with the interaction terms negative but insignificant and small.

\textsuperscript{22}Some studies have found poor people to be less good at consumption-smoothing than others, e.g.
Dynarski and Gruber (1997). Some of these findings can be explained by liquidity constraints (Zeldes,
1989; Souleles, 1999), whereas here liquidity constraints are not an issue because net income is
decreasing. Also, the successfulness of smoothing might vary with the context. The poor might do a
relatively better job in the case of paying for college because they can foresee the costs in advance and
the costs are positively correlated with their resources.

\textsuperscript{23}The NPSAS survey cited above has some mixed information on this point. Parents’ stated reliance
on current income and previous savings is not monotonic in the grade of the student (college freshman
to senior and beyond), but does not vary much with it anyway. Use of current income does decrease
with the number of other children in college. Use of previous savings increases if there is one other
child, though then decreases with more than one child. The largest effect is that parents with other
children already in college are much more likely to be saving in general (as opposed to saving for
education in particular).

\textsuperscript{24}Removing spending on trips from the dependent variable reduces the magnitude of $I_{\text{nonst}}$, though it
remains positive. Instrumenting does not change the results here or in Panel A.
be due to the small sample size; only about 130 starting households remain in the sample. In sum, while the consumption of starting households is somewhat more distorted by college expenditures, the size of this extra distortion does not appear to be notably large or persistent.

6. Conclusion

The main finding of this paper is that households sending their children to college appear to do a relatively good job smoothing their consumption well into the academic year, despite large college expenses. Further, households do not sharply cut their consumption in the 6–9 months before the academic year starts. This suggests that whatever saving they do for college has been fully underway at least this many months in advance of their college expenditure. There is, however, some evidence of a delayed decline in consumption in the following winter and spring, and of a decline even in the fall for households with children first beginning college, but the magnitudes of these declines are relatively small. In short the results are broadly consistent with the Life-Cycle Theory, and more generally with any forward-looking theory that requires consumption-smoothing in the face of predictable decreases in income. This consistency is especially noteworthy considering that the test in this paper should be relatively powerful in detecting violations of consumption-smoothing.

It is important to stress, however, that these results do not imply that households find it easy to pay the high cost of college, but only that they are rationally meeting this cost. Even if the slopes of their consumption paths are not much distorted, their levels might have been set rather low in order to accumulate sufficient savings. On the other hand, one might expect households to do a relatively good job smoothing consumption in the particular case of paying for college. They should foresee the potential costs of college many years in advance, and they usually have some access to guaranteed or subsidized loans and means-tested financial aid.

This paper might usefully be extended in a number of ways. First, it would be

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25But note that households also know in advance that their income will decline on retirement, and yet there is some concern about the adequacy of their savings for retirement.

26Though recall that many households are at the borrowing limit of the guaranteed loans. There is also some concern that many households, especially minorities, are ‘unduly’ hesitant to take out loans (Miller and Hexter, 1985, 1985a).

27The relative importance of loans and aid in promoting consumption-smoothing remains an open question. Also open is the counterfactual question on the extent to which other smoothing mechanisms would become more important in response to a reduction in loans and aid. Note that the results here do not deny a potential role for policies that promote education loans in response to liquidity constraints. Even though liquidity constraints are not an issue in the high-frequency context of this paper, they can still be quite important to the longer-run decision to attend college and invest in human capital.
interesting to examine the response of consumption over longer periods of time. For instance, given the evidence that households might be saving at least 6–9 months in advance of college, one might try to determine how early they started seriously saving. However, such a longer-run point of view will have to take more explicitly into account the endogeneity of college expenditures. Second, it would be interesting to examine the effect of college expenditures on household portfolios. For example, one might try to better identify the types of assets households draw on to pay for college, especially the role of loans. These extensions will require additional data beyond that available in the CEX. A final extension might investigate more generally the effects on life-cycle savings and consumption of other consumption ‘needs’, such as other aspects of child-rearing or other large expenditures. Do households adequately save in advance of such predictable expenditures, or does their consumption suffer as a result?28

Acknowledgements

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Appendix A

For college students living at home, COLEXP includes all payments for college expenses made by the household. College students living away are not counted by the CEX as part of the ‘consumer unit’, and so are dropped from the data set. Nonetheless, the CEX records the educational expenses incurred by the household for such students. COLEXP includes all such expenses with one exception: cash contributions given directly to a student living away (as opposed to payments made directly to a college or any other third party) are recorded only once, with an annual reference period, and so cannot be used in the quarterly analysis of this

28For example, Engelhardt (1996) examines the effects on food consumption of saving for a down-payment on a house. Note that the timing of most other large expenditures is more endogenous than the timing of college expenditures.
A child is taken to be starting college if it is between 16 and 19 years old, inclusive, and appears to have moved from high school into college in the fall. A household with such a child is taken to be a ‘starting’ household if it does not have any ‘nonstarting’ members already in college, and does not make any college expenditures in any interview before the fall. (Since the CEX does not keep track of children after leaving the household, one cannot tell whether some older children no longer living with their parents have already graduated from college.) Average state tuition and fees \( \text{STATEEXP} \) are calculated using data from various issues of the *Digest of Education Statistics*. \( \text{STATEEXP} \) is a weighted average across private, public 4-year, and public 2-year institutions. When values are missing in the *Digest*, they are extrapolated from adjacent years in proportion to the corresponding national growth rate in those years. When the CEX state variable is missing, \( \text{STATEEXP} \) includes the average expense in the household’s census region instead. If the region variable is also missing, then the average national expense is used instead.

To improve the measurement of consumption, a household was dropped from the sample if there are multiple consumer units in the household, if the household lives in student housing, or if the head’s occupation is farming/fishing. In aggregating expenditures into consumption groups (food, strictly nondurables and nondurables), if any component of a group was topcoded or missing its cost, the whole group was set to missing for the quarter. So too if the household lacks food expenditures in any month of the quarter. If any component of a consumption group was missing its date or dated before the reference period, that group was dropped for all interviews for the household at issue. A nonnegligible number of expenditures are dated in the month of the interview, i.e. the month after the reference period. Following the recommendation of the staff at the BLS, for consistency such expenditures were accrued to the following reference period. If any component of \( \text{COLEXP} \) was topcoded, \( \text{COLEXP} \) was set to missing for that quarter. For married households with female respondents, the head of household

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29 The main regressions in the text were re-run including these cash contributions (when not flagged) in \( \text{COLEXP} \), assuming they were made in quarter \( t + 1 \). The pattern of results and conclusions does not change.

30 Preliminary analysis uncovered some anomalies in the routines the Census Bureau used to clean the variable for the highest grade attended, for teen-aged household members. Census flags, kindly provided by the BLS, were used to undo most of these anomalies, but some might remain. In response, this variable is used only in conjunction with the variables for age and college enrollment.

31 Dropping the observations missing state does not change the conclusions. I thank Taejong Kim for his help with this state tuition data.

32 Most of the topcodes are for housing, for which the CEX sets a cut-off at $1000. The main regressions were re-run including the (about 50 additional) topcoded observations at their topcodes. Again, the pattern of results and conclusions does not change.
was taken to be the husband. In computing changes in family size, the artificial changes induced by a member’s moving from age 15 to 16, or from 24 to 25, were suppressed. A handful of other adjustments to the primitive data were made, according to corrections provided in the CEX documentation for various years.

References


