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An Empirical Examination of the Impact of College Financial Aid on Family Savings

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An Empirical Examination of the Impact of College Financial Aid on Family Savings

Abstract - *The system of distributing financial aid dollars using needs analysis formulae implicitly imposes a financial aid tax on assets. Existing studies provide mixed evidence of the influence of this implicit tax on assets on wealth accumulation. This paper attempts to contribute to the literature on this topic by examining the sensitivity of results to various assumptions, specifications, and categories of assets, using more recent data that allows for the incorporation of recent developments in financial aid and college costs. I find much weaker evidence than existing studies that college financial aid has a significant impact on family savings.*

INTRODUCTION

Most colleges and universities in the United States adjust the prices they charge some of their students based on their ability to pay. Middle and lower income families are often eligible for and receive financial aid from federal and institutional sources for their educational expenses. Needs analysis is the mechanism for determining eligibility for financial aid dollars and the amount of award one will receive. Needs analysis formulae attempt to ascertain a family's—usually both the student and his or her parents—ability to pay for higher education expenses. Detailed information on the family's income, assets, and familial composition are provided by the family to the institution to which a student is applying for financial aid. Financial aid directors at the institution use this information and apply needs analysis formulae to the family's financial information to determine how much a family should pay and thus how much financial aid they will receive.

The result is that families who save for their children's higher education expenses are deemed more able to pay these expenses and therefore are charged more and receive less financial aid. Families who do not save as diligently will be expected to contribute less to the educational expenses of their children. As a result, the application of needs analysis leads to a "tax" on family assets. Among families eligible for financial aid, those families with higher assets are charged a higher price (and in some cases a higher percentage of their assets) to attend a college or university. This system of allocating financial aid resources based on needs analysis

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and a family's ability to pay presents a tax on assets and a savings disincentive for middle and lower–income families, by penalizing students and families who prudently save for higher education by reducing their financial aid awards.

Case and McPherson (1986) and more recently Edlin (1993) meticulously calculate the theoretical financial aid tax on assets faced by families who are candidates for financial aid. Edlin (1993) illustrates that while the maximum financial aid tax on assets in any single year is only 5.64 percent, families who face a number of years of financial aid taxes may confront much higher cumulative tax rates on savings.[1] For example, he finds that families who have children in college for a total of 12 years have an effective tax on assets of approximately 57 percent (see Appendix B for a discussion of Edlin's calculation of the financial aid tax on assets).[2] While the assumed interest rate earned on savings may significantly lower this financial aid tax rate (because both income and assets are taxed under the financial aid rules), even a zero nominal interest rate on savings leads to a 44 percent financial aid tax on assets for a family facing 12 years of financial aid taxes. Even a family with one child enrolled for 4 years faces a 21 percent tax on assets (again assuming zero nominal interest earned on those assets). Edlin's (1993) focus in on estimating the financial aid tax rate that families may face under alternative scenarios. He does not attempt to estimate whether families' savings are affected by this tax on their assets.

In a related study, Dick and Edlin (1997) empirically investigate the impact of additional assets on a student's financial aid award. They find that a typical family loses approximately $11,000 in financial aid at average–priced colleges and $15,000 in financial aid at expensive colleges for each additional $50,000 in assets. They estimate that most families face an 8 to 26 percent marginal tax on savings. Again, the focus is on the impact of the savings on one's financial aid award, and not on whether the reduction in the award influences savings.

These sometimes rather substantial taxes on assets may act as a significant deterrent to the accumulation of assets. In fact, Feldstein (1995), using data from the 1986 Survey of Consumer Finances, found that financial aid taxes on assets have a significant adverse effect on the accumulation of financial wealth. His equation of the impact of financial aid on family savings was:

$$[1] \quad A_i = b_0 + (b_1 + b_2(tax)_i + b_3(age)_i + b_4(\#\ children)i)*income_i + \varepsilon_i,$$

where A are family net financial assets, *tax* is the financial aid tax on assets, *age* is the age of the older parent, # *of children* are the number of children under the age of 18 living at home, *income* is parental income, and ε represents the family specific error term for the i^{th} family. Feldstein uses two stage estimation to first estimate predicted assets based on a quadratic in income, and then calculates a family's financial aid tax based on their income and predicted assets (see Appendix B for details of Feldstein's financial aid tax calculation). As a result, his system of equations is identified based on non–linearity in the relationship between income, assets, and the financial aid tax. In addition, his calculation of the financial aid tax ignores the important interaction of the financial aid tax with the federal and state tax rates, and with

[1] This calculation and all subsequent calculations and discussion concern the financial aid tax on parent's assets. The financial aid tax on the student's assets is much higher, at 35 percent a year.

[2] This financial aid tax rate assumes an 8 percent state tax rate, a marginal federal tax rate of 28 percent, and a financial aid tax on income of 47 percent under the Congressional Methodology in place in 1992. See Edlin (1993) for complete details of the calculation and assumptions.

the assumptions surrounding the mix of loans versus grant aid in the financial aid package. Using this specification, he estimates that a family of four, with two children, income of $40,000 (in 1986 dollars), and a family head aged 45, would have saved approximately $45,266 in the absence of the financial aid tax on assets. Because of the high financial aid tax rates on savings, he predicts this same family would only save $22,142.

In a study that is similar in approach to Feldstein's (1995) IV estimation, Kim (1999) finds comparable savings reductions as a result of college financial aid rules. Kim (1999) uses child–spacing and the state–specific average annual costs of four–year private, four–year public, and two–year public college to identify the financial aid tax separately from the asset equation. The strategy behind this identification approach is that two families with the same number of children and same amount of assets may face substantially different tax rates depending on the spacing of their children. Additionally, the identification strategy assumes in–state college tuition only affects family savings through its impact on the financial aid tax on assets, and not on family savings directly. Using data from the 1984 through 1992 Survey of Income and Program Participation, Kim (1999) estimates that family asset accumulation is reduced by 40 to 55 percent. These estimates suggest that there is a huge impact of college financial aid rules on the savings behavior of financial aid eligible families.

On the other hand, Kane (1998) points out that the rather high financial aid taxes calculated by Edlin (1993) are reduced for at least four reasons. First, only parental assets above an asset protection allowance, or threshold level, are included in needs analysis and subject to the financial aid tax. Second, college financial aid taxes are effectively zero for extremely low– and extremely high–income families. Families whose income and assets fall below the income and asset protection allowances face zero marginal financial aid taxes. Similarly, families whose income and assets are high enough that their expected family contribution (EFC) exceeds the cost of attendance at their institution also face zero financial aid taxes as they are ineligible for financial aid. Third, Edlin (1993) and Feldstein (1995) assume that all financial need, the gap between the cost of attendance and a family's EFC, is met. Dick and Edlin (1997) point out that is often not the case as many institutions cannot afford to meet the full financial need of all of their students. Fourth, the effective marginal tax on savings was reduced with the 1992 Higher Education Reauthorization Act, when home equity was excluded from the federal needs analysis formula. In practice, a small, but increasing, number of private institutions now eliminate or reduce a family's assets held as home equity in determining eligibility for institutional grant aid. Additionally, a significant portion of family assets is often held in the form of retirement assets. The market value of retirement assets is often difficult to determine, and they are normally excluded from the asset base in determining financial aid.

Using the National Postsecondary Student Aid Survey of 1992–93, Kane (1998) examines the net worth of families with undergraduate students. If families were acting strategically and reducing their asset holdings in response to college financial aid rules, then one would expect to see a "stacking up" of family assets at the asset protection allowance levels. Kane (1998) does not find any evidence of family net worth clustering just below the asset protection allowance levels.

In addition, the growing popularity of state sponsored pre–paid tuition plans also seem to provide *prima facie* evidence that families' savings are not adversely affected by financial aid taxes. By the fall of 1999, 21 states had pre–paid tuition plans. By far the most popular state plan

is in Florida with over 500,000 enrollees and over $3.5 billion is assets (Jennings and Olivas, 2000, p. 18). The Higher Education Amendments of 1992 required that state pre–paid tuition accounts be treated as "other financial assistance," and, thus, carry an implicit 100 percent tax on the accumulated value of the plan. While a student whose parents have $10,000 in financial assets may lose up to $564 per year in financial aid (5.64 percent), a student with $10,000 in prepaid tuition loses aid dollar for dollar. This dollar for dollar reduction in financial aid for each dollar of prepaid tuition represents a 100 percent tax on those assets. Despite this high tax rate, many of these state pre–paid tuition plans are extremely popular. While there is little information concerning the enrollees in these plans, it is probably safe to assume that some portion of them may be eligible for financial aid.

Long (2004) estimates a system of seven equations incorporating uncertainty about the probability of attendance, college costs, expected family contributions, future family income, student contributions, and ultimately predicted family assets, using the Survey of Income and Program Participation for 1990 and 1993. Based on various assumptions and predicted values imbedded in the above estimates, he produces seven different measures of the financial aid tax. With these different tax rates, he estimates 14 different effects of financial aid on family savings and finds mixed results. In general, he does not find significant evidence that financial aid rules substantially reduce family savings. Additionally, his results illustrate the sensitivity of these types of studies to the underlying assumptions that are necessary to carry out the tests of the relationship between financial aid taxes and family savings.

Finally, Dick et al. (2002) take a different approach and use realized financial aid tax rates based on actual financial aid awards, rather than estimated or expected financial aid tax rates, using the 1986–87 and 1995–96 NPSAS data. They then use these actual financial aid tax rates to simulate the family savings and enrollment choices that families would have made under different financial aid rule scenarios. They estimate that families would have saved approximately $4,000 to $5,000 more per household under alternative financial aid regimes that do not explicitly tax family savings. In particular, they estimate that moving from a financial aid system that meets full need to no financial aid system at all would increase family savings by 29 percent among families with college aged children, versus Feldstein who estimated an increase in savings of 50 percent under this scenario. Dick et al. (2002) further point out that their estimate understates the magnitude of the difference between their result and Feldstein's because their simulation represents the reduction in savings for families who face the financial aid tax with certainty versus Feldstein's (1995) estimate which includes many families who will not even send their children to college.

The evidence provided by Long (2004) and Kane (1998) suggests that financial aid taxes do not provide significant savings disincentives. On the other hand, the huge effects found in the studies by Feldstein (1995) and Kim (1999) imply that families do indeed reduce their savings in anticipation of financial aid, while the results of Dick et al. lie in the middle ground with financial aid rules reducing family savings but by significantly less than estimated by Feldstein (1995) and Kim (1999). This study will attempt to contribute to the discussion by examining the savings behavior of families with pre–college aged children. The primary difference between this study and the existing empirical work is that I carefully select the sample to include only those families with the most consistent treatment of family income and assets within the needs analysis formu-

lae.[3] Because family income, and not assets, is a more significant determinant of expected family contribution, I carefully construct a sample of families that are as homogeneous as possible in their needs analysis treatment, particularly with regards to non–custodial parental income. Additionally, the data set I use, the National Longitudinal Survey of Youth 1997, utilizes more recent data than existing studies. This may be important for two reasons. First, the 1992 Higher Education Reauthorization Act made two substantial changes to needs–analysis. One change was the elimination of home equity from the asset base in determining financial aid in the federal needs–analysis methodology. This change substantially reduced the assets subject to the financial aid tax in determining eligibility for federal funds for most families, not just because it took home equity out of the base, but also because the elimination of home equity from the asset base dropped the taxable net worth of many families below the asset protection allowance and thus reduced their financial aid tax on assets to zero. The second change produced by the 1992 Reauthorization Act was the increase in the income threshold from $15,000 to $50,000 to qualify for the Simplified Needs Test (SNT) in determining financial aid. Families with less than $50,000 in income, who also file a 1040EZ or 1040A tax form, do not have their assets assessed in determining financial aid. This change in policy also dropped the financial aid tax on assets to zero for many families. While Long (2004) examines 1993 data in an attempt to capture the influences of these changes on family savings, it may have been too short a time period to adjust assets and savings behavior in response to these changes. Later data may provide greater insight into whether families responded to these incentives.

The second reason that more recent data may yield different results from earlier studies is the escalating costs of attending college since the mid–1980s. From academic year 1985 to 1997 average tuition and fees at public four–year colleges increased by 61 percent, while average tuition and fees at private four–year colleges increased by 56 percent, in real terms (The College Board, 1998, p. 7). As tuition costs grow relative to family income more families become eligible for financial aid. Families that may not have faced a tax on their assets when college costs were lower may now face a substantial tax on their assets.

Finally, although I attempt to replicate the IV approach of Feldstein (1995), I also test for and show the sensitivity of results to various specifications of the regression equation and across various forms of asset holdings. In a final test of the impact of the financial aid tax on assets I present reduced form estimates of the effect of child spacing on family net worth. As Edlin (1993) and Kim (1999) point out, the number of years that a family is subject to the financial aid tax is a greater component of the total financial aid tax than differences in income or assets, for financial aid eligible families. This approach does not rely on any of the estimation and identification assumptions used in the previous studies by Feldstein (1995), Kim (1999), and Long (2004). Because child spacing plays such an important role in determining the costs of attendance and the financial aid tax on assets for families eligible for financial aid, this reduced form regression provides a test of the relationship between the financial aid tax on assets and family savings. This test does, however, rely on the assumption that child spacing is exogenous in determining family savings. This assumption is tested using families who are not eligible for financial aid based on their income.

[3] See Appendix A for an outline of financial aid needs analysis.

DATA

The data set used in this study is the National Longitudinal Survey of Youth, 1997 (NLSY97). This is a national data set of 12 to 16 year–olds in 1997. This data set provides a national sample of families with pre–college aged children. Both the child (or in some cases more than one child in a family) and the parents were interviewed. From the parent survey one can garner information on family income and asset levels, and age of the parents. From the household screeners one can identify household composition and child spacing.

Because the NLSY97 was designed to survey youths aged 12 to 16, and does not necessarily provide a representative sample of families, it is important to compare the income and asset variables from the NLSY97 to nationally representative data. Table 1 provides summary measures of the households from the NLSY97 to families from the Survey of Consumer Finances of 1995 (SCF95). While the NLSY97 is taken two years later than the SCF95, this benchmarking suggests that the households from the NLSY97 appear to be comparable in terms of income and assets to the SCF95.

I next attempt to pare the data set down to those families that are likely to be eligible for financial aid from at least some of the colleges and universities in the United States, and for whom the financial aid rules are most clear cut. Table 2 outlines

TABLE 1
COMPARISON OF NLSY97 TO SURVEY OF CONSUMER FINANCES, 1995
(all values are in thousands of nominal dollars)

	NLSY97	SCF95
Before–tax family income		
age of head 35–44	55.2[a]	48.3[b]
age of head 45–54	69.0[a]	64.8[b]
Family net worth		
age of head 35–44	146.4	144.5
age of head 45-54	278.9	277.8
Financial assets as a percentage of total assets	35.6%	34.1%

[a]1996 income
[b]1994 income

TABLE 2
NATIONAL LONGITUDINAL SURVEY OF YOUTH, 1997 COHORT SAMPLE CONSTRUCTION

All individuals	9,022
Number of separate households identified	6,840
Less:	
Not living with 2 biological parents	3,541
Household members (other than parents) who are older than 18	1,051
Household members under age 18 who are not full siblings	35
Self–employed and/or farmers	285
Older parent is younger than 40 or older than 50	752
Income less than zero or greater than $150,000	285
Non–reported household net worth (created variable) or net financial assets greater than $500,000	134
Selected households	757

the exclusions made to the sample. For example, from the 6,840 separate households identified in the NLSY97, 3,541 are excluded because one of the children was not living with both of his/her biological parents. This may be important as the treatment, in determining financial aid awards, of non–custodial parent's income and assets varies tremendously across institutions. Additionally, another 1,051 families are eliminated from the sample because there is a sibling or household member over the age of 18 (other than the parents). This excludes families with college–aged children and/or other adults who may either lay claim to the educational resources of the family or be able to provide additional resources. An additional 35 families are excluded because of the presence of a half–sibling in the household, for reasons cited above. The remaining families consist of full–siblings living with their two biological parents. From this set of homogeneously constructed families, families whose head is self–employed and/or a farmer are excluded because their asset accumulation behavior may be dramatically different from non–self–employed heads of households. Similarly, only families whose older parent is between the ages of 40 and 50 are included in the sample, in order to avoid problems of properly specifying the relationship between assets and the age of the older parent. This is also the approach followed by Feldstein (1995), and will thus allow for easier comparison of results.[4] Families who report income less than zero or greater than $150,000 are excluded from the sample. Similarly, families who did not report household net worth, or who reported net financial assets greater than $500,000 are also excluded from the sample. The income threshold is used in order to include those families who may be eligible for financial aid, based on income, from at least some of the most expensive institutions in the country. This threshold will be eliminated in one specification to check the sensitivity of the results to this income cut–off. The asset threshold is used cautiously as one is hesitant to select based upon the endogenous variable in an equation, but the excessively high level of financial assets relative to income and the clear ineligibility of these families for financial aid warrants their elimination. The remaining sample, used in this study, contains 757 families. Table 3 contains summary measures for selected variables from the final sample.

Following the calculations of Edlin (1993), the expected financial aid tax on assets is calculated as the ratio of the return on assets assuming no financial aid tax on assets to the return on assets incorporating the financial aid tax on assets.[5] This calculation incorporates all of the marginal taxes on savings, including the marginal federal income tax rate, the state tax rate, and the financial aid tax on assets.[6] Additionally, some assumptions concerning a family's estimated higher education expenses are necessary. In estimating the financial aid tax on assets, I follow the Feldstein (1995) approach and assume that for families with expected estimated family contributions (EFC) exceeding $19,360 per concurrently enrolled child (the average private, four–year tuition, fees, room, and board for the 1997–98 academic year) or less than zero, the expected financial aid tax rate is zero. If your EFC, divided by the number of children

[4] The following results are sensitive with respect to restrictions on the parent's age. This is likely due to difficulty in estimating the relationship between income and assets for different age groups. The limitations imposed here minimize this problem.

[5] See Appendix B for calculations of the financial aid tax on assets.

[6] The state income tax rate used is the average used by the Federal Methodology (FM) in calculating a family's available income. The assumed estimated state tax rate is 4 percent for family income less than or equal to $15,000, and 3 percent for family income greater than $15,000 as used in the FM.

TABLE 3
SELECTED VARIABLE SUMMARY MEASURES

	Mean	Minimum	Maximum
Financial Aid Tax	17.9%	0.0%	68.1%
Feldstein Financial Aid Tax	28.8%	0.0%	86.0%
Parental Income	$56,526	$0	$139,500
Net Financial Assets	$41,489	–$71,700	$460,500
Financial Assets	$45,039	$0	$460,500
Taxable Assets	$73,935	–$119,500	$1,242,500
Net Worth	$154,146	–$72,500	$2,145,137
Number of Children	2.2	1	8
Age of Older Parent	43.9	40	50
No. of Financial Aid Tax Years	6.9	0	20
Family Contribution	$10,064	–$750	$43,747
Available Income	$22,985	–$29,965	$78,513
Adjusted Available Income	$27,235	–$29,965	$102,297
No. of Observations	757		

Note: The financial aid tax, family contribution, available income, and adjusted available income were all calculated using net financial assets.

concurrently enrolled, is less than zero or above the average cost of attendance, then the accumulation of additional assets does not affect your financial aid award, and therefore has a financial aid tax of zero. In estimating the financial aid tax for this paper, the financial aid tax also goes to zero if the individual qualifies for the Simplified Needs Test with family income less than $50,000. It is also assumed that all of a student's need (the difference between the full sticker–price of attendance minus the EFC) is met with financial aid, and some portion of financial aid comes in the form of loans. As an individual's eligibility for a Pell Grant declines dollar for dollar with an increase in EFC, up to the maximum of the Pell award ($2,700 in 1997), the impact of additional assets on financial aid varies across EFC levels. For this analysis I assume that an increase in EFC up to $2,700 reduces grant aid from the Pell program. For EFC greater than $2,700, I assume that the financial aid award is reduced in equal proportions of loans and grants, and that loans account for one–third of financial aid above the Pell award, and that student loans carry a 50 percent subsidy value due to their favorable terms.[7]

The Feldstein (1995) financial aid tax calculation varies from the financial aid tax used in this paper for a number of reasons. First, Feldstein's (1995) tax rate does not account for the $50,000 income threshold for the Simplified Needs Test, as this was not in place in 1986 when he estimated the impact of the tax on assets. Second, his analysis does not account for the interaction of federal and state taxes on the financial aid tax. Third, his calculation assumes that all financial aid is in the form

[7] Feldstein (1995) also assumes that all of a student's need is met with financial aid. He makes the additional implicit assumption that the financial aid is entirely grant aid and contains no loans.

of grants and not loans. Fourth, Feldstein (1995) assumed that children were spaced two years apart in age, where the actual spacing in this data is closer to three years apart. The end result is that the financial aid tax calculation used in this paper is lower than the Feldstein (1995) replicated tax rate applied to this data set.

Using the 1998–1999 federal methodology (FM) for determining the EFC and a family's expected eligibility for federally sponsored financial aid, I examine the impact of the expected financial aid tax on family savings.[8] Because the marginal financial aid tax rate on assets is a function of assets, two–stage regression estimation is used. In the first stage, actual family assets are regressed against income and income–squared. The coefficients from this regression are used to estimate family assets. This fitted value is then used in the formula to determine the marginal financial aid tax. Similar to Kim (1999), I use actual chronological spacing of children to further identify the expected financial aid tax on assets. Child spacing is assumed to be exogenous to the asset accumulation equation and to influence family savings only through its impact on the financial aid tax. This assumption is tested later in the reduced form regressions of assets against child spacing for those not eligible for financial aid. In the second–stage, family assets are regressed against family income, number of children in the family, the age of the older parent, and the financial aid tax rate on assets.

The effect of the financial tax on family savings is tested using four different measures of family wealth: 1) financial assets, which includes cash, stocks, bonds, mutual funds, and other financial instruments; 2) net financial assets, which includes all of financial assets above less any financial debt (excluding mortgage debt); 3) taxable assets, which include all of number 1 above, financial assets, plus home equity, less any retirement assets (this is the asset base that is used by most private college and universities); and 4) net worth, which includes all assets of the family less any debt.

RESULTS

Table 4 presents the results of the second–stage regression estimation of the asset accumulation equation. For comparability, I specify the first– and second–stage regression equations in Table 4 to match the specification with the strongest results in the Feldstein (1995) paper. In this table, assets are defined as net financial assets. Specification (1) presents the asset accumulation equation and financial aid tax that most closely matches Feldstein's (1995) results. The accumulated assets are an increasing function of income, age, and number of children, and a decreasing function of the financial aid tax on assets. For example, for a family with a 44 year–old older parent, two children, and a financial aid tax on assets of 28.8 percent, a dollar increase in income results in a 1.23 dollar increase in net financial assets. Additionally, evaluating the savings disincentives of the financial aid tax for a family with income of $56,500 (approximately the mean in the sample) and the above characteristics results in a statistically significant reduction in financial assets of $6,118. In the absence of a financial aid tax the above family would be predicted to accumulate $50,310 in net financial assets, while accumulating only $44,192 as a result of the financial aid tax on assets.

Specification (2) of Table 4 re–calculates the financial aid tax adjusting for actual

[8] The Federal Methodology (FM) and the Institutional Methodology (IM), used by many private institutions to calculate the financial aid tax on assets, are quite comparable. The primary difference between the two methodologies is the exclusion of home equity from the asset base in the FM, and its inclusion in the asset base in the IM.

TABLE 4
REPLICATION OF FELDSTEIN'S FINANCIAL AID RESULTS

Dependent Variable = *Net Financial Assets*	(1)	(2)	(3)	(4)
Intercept	–25,230.36***	–25,636.90***	–15,9689.56***	–1,728.77
	(5,947.39)	(5,965.94)	(40,999.52)	(7,478.06)
Income	–1.365**	–1.358**	1.277***	–2.122***
	(0.660)	(0.662)	(0.094)	(0.702)
*Income*Number of Children*	0.097*	0.094*		–0.078
	(0.051)	(0.051)		(0.080)
*Income*Age of Older Parent*	0.057***	0.055***		0.055***
	(0.014)	(0.014)		(0.013)
*Income*Financial Aid Tax*	–0.376**	–0.293*		1.482**
	(0.185)	(0.168)		(0.704)
Number of Children			4,361.46	
			(2,782.70)	
Age of Older Parent			2,876.08***	
			(886.11)	
Financial Aid Tax			–21,744.26*	
			(11,268.64)	

Note: *** (**,*) indicates that the coefficient is significantly different from zero at the 1 percent (5, 10) level.
Specification (1): replication of Feldstein (1995) using NLSY97 data.
Specification (2): Feldstein (1995) specification with actual child spacing used in calculating the financial aid tax.
Specification (3): actual child spacing and linear specification.
Specification (4): includes high income (>$150,000) families and eliminates EFC families cap in calculating the financial aid tax rate.

child spacing versus the assumed two year child spacing used above and results in a slight reduction on the coefficient of the financial aid tax on savings interacted with income from –0.376 to –0.293. This translates to a decrease in assets of $4,768 for those with the average characteristics outlined above.

In order to test the robustness of Feldstein's (1995) approach to estimating the impact of the financial aid tax on net financial assets, I specify the equation as a simple linear relationship between net financial assets and income, number of children, age of the older parent, and the financial aid tax (specification (3) in Table 4). Once again the coefficient on the financial aid tax is negative and significant, indicating that families who face a higher financial aid tax save less. The estimated impact is that families who face the average financial aid tax, as calculated by Feldstein (1995), but using actual child spacing, save $6,262 less than they otherwise would in the absence of this tax.

In a final check of the sensitivity of the results to the specification of the equation, in specification (4) of Table 4 I include in the sample higher income families (I no longer cap family income at $150,000), and no longer cap tuition at the average for private four–year colleges. Essentially I allow the financial aid tax rate to climb all the way up the income distribution without reverting back to zero. As these families in fact are not likely to face a financial aid tax on their assets because their calculated EFC per concurrently enrolled child exceeds the expected cost of attendance, one would expect the impact of the tax on family assets to decline using this specification. In fact, the effect of the financial aid tax on assets increases using this approach. This finding sug-

gests that the result is being determined, at least in part, by the specification of the relationship between assets, income, and the financial aid tax, and the assumptions governing the estimation of the expected financial aid tax.

In summary, the estimation approach and financial aid tax calculation followed by Feldstein (1995), and matched closely by Kim (1999), applied to the more recent prospective college students in this data set leads to results that are qualitatively similar. Families appear to save less in terms of net financial assets in response to a higher financial aid tax on assets; however, the magnitudes of the effects are generally smaller. While Feldstein (1995) and Kim (1999) find effects that suggest a 40 to 60 percent reduction in savings for the average financial aid recipient, I find effects that suggest approximately a 15 percent reduction in savings.[9] The results found here, while not directly comparable with Dick et al. (2002), are more in line with the order of magnitude found in their study.

As a further test of Feldstein's (1995) approach on more recent cohorts of families I estimate the impact of his financial aid tax, using actual child spacing in each case, on varying categories of assets. Net financial assets may not be the appropriate measure of assets in this type of analysis, as financial debt is not included in needs analysis in determining the asset base; therefore, the first asset base investigated in Table 5 is financial assets (rather than financial assets net of financial debt). Financial assets are simply net financial assets as defined above after adding back financial debt. This equation is estimated using a Tobit regression, as financial assets are censored at zero. The results change dramatically. The coefficient on the financial aid tax interacted with income is now a positive .331 and significant at the 10 percent level. This suggests that families who face a higher financial aid tax actually have greater financial assets than those who face a lower financial aid tax. This result, coupled with the finding that net financial assets are lower for high tax families suggest either that families who face a higher financial aid tax have higher financial assets and even higher financial debt, or that the results are quite sensitive to the measurement of assets, or both.

TABLE 5
REPLICATION OF FELDSTEIN'S FINANCIAL AID RESULTS VITH VARYING ASSET BASE

	Financial Assets	*Taxable Assets*	*Net Worth*
Intercept	–103,000.26***	–14,165.72*	–41,474.09*
	(6,228.81)	(7,995.59)	(22,351.15)
Income	–0.974	0.168	–0.102
	(0.672)	(0.863)	(2.41)
*Income*Number of Children*	0.027	0.065	–0.052
	(0.052)	(0.067)	(0.188)
*Income*Age of Older Parent*	0.065***	0.029	0.085*
	(0.014)	(0.018)	(0.051)
*Income*Financial Aid Tax*	0.331*	–0.029	–0.262
	(0.171)	(0.220)	(0.614)

Note: *** (**,*) indicates that the coefficient is significantly different from zero at the 1 percent (5, 10) level.
All three specifications use Feldstein's (1995) specification with actual child spacing across varying asset bases.

[9] It is interesting to note that Long (2002) in an attempt to replicate Feldstein's (1995) results with the 1986 Survey of Consumer Finances data estimated a coefficient of –.36, and was unable to replicate the –1.4 coefficient found by Feldstein (1995). Long attributes this discrepancy to the tremendous sensitivity of the results to sample construction, the financial aid tax calculation, and specification.

Neither financial assets nor net financial assets may be accurately measuring the asset base that is most applicable in needs analysis. The "taxable assets" captured by needs analysis includes cash and other financial assets, and home equity, but excludes retirement assets and debt. I include home equity among the taxable assets even though it is excluded from the asset base in the federal needs analysis methodology because it is included among the asset base when applying for financial aid at most private institutions. One should consider taxable assets in this analysis as the upper bound asset base taxed in financial aid, and financial assets as the lower bound. When taxable assets are used as the dependent variable, the coefficient on the financial aid tax interacted with income is negative but negligible in magnitude and not significantly different from zero. The financial aid tax does not appear to have a significant impact on taxable assets.

Finally, if the exercise is truly to examine the impact of the financial aid rules on family asset accumulation, then the appropriate measure of savings should be net worth. In specification (3) of Table 5, the dependent variable is net worth. In this specification, the coefficient on the financial aid tax interacted with income is once again negative and similar in magnitude to the results of Table 4, where the dependent variable was net financial assets. This result translates into a $4,263 reduction in assets for a family with $56,500 in income and facing a 28.8 percent financial aid tax. This reduction in savings represents an average decrease in net worth of approximately 2.8 percent, although this effect is not significantly different from zero.

Edlin (1993) outlined a calculation of the financial aid tax on assets that incorporated the interaction of the financial aid tax with state and federal taxes and allowed for consideration of subsidized loans as a component of financial aid. These changes in the estimation of the expected financial aid tax on assets results in a reduction in the estimated tax on assets. Specifically, the Feldstein (1995) calculation of the financial aid tax applied to these data has a mean tax rate of 28.8 percent, while the Edlin (1993) calculation of the financial aid tax applied to these data has a mean value of 17.9 percent (see Appendix B for details of these calculations).

Table 6 examines the impact of the Edlin (1993) calculated financial tax on net financial assets under various specifications in order to test the sensitivity of the previous results to the calculation of the financial aid tax and to specification of the equation. Specification (1) of Table 6 replicates specification (1) of Table 4, and is essentially a test of the sensitivity of the results to changes in the assumptions surrounding the calculation of the expected financial aid tax. The coefficients on the other regressors remain largely unchanged from the previous specification. On the other hand, the coefficient on the financial aid tax interacted with income decreases dramatically from –.376 to –0.096, and is no longer significantly different from zero, at conventional levels. Specification (2) of Table 6 allows the regressors to enter the regression linearly, rather than interacted with income. This specification is a replication of specification (3) of Table 4, but using the Edlin (1993) financial aid tax calculation. Once again the coefficient on the financial aid tax is negative, but it is no longer significantly different from zero. Using the Feldstein (1995) financial aid tax the coefficient on this tax was –21,744, while under the Edlin (1993) calculation the coefficient dropped to –4,653. As an additional test of this result I include among the regressors the responding parent's race and the highest degree attained by either of the parents. While the coefficient on the financial aid tax increases, it still is not significantly different from zero.

TABLE 6
REGRESSION RESULTS USING EDLIN FINANCIAL AID TAX

Dependent Variable = *Net Financial Assets*	(1)	(2)	(3)	(4)
Intercept	–27,978.32***	–165,822.97***	–143,483.38***	–42,031.56
	(5,932.27)	(41,733.12)	(41,694.30)	(39,213.30)
Income	–1.380**	1.251***	1.100***	1.083***
	(0.677)	(0.100)	(0.109)	(0.100)
*Income*Number of Children*	0.079			
	(0.054)			
*Income*Age of Older Parent*	0.056***			
	(0.014)			
*Income*Financial Aid Tax*	–0.096			
	(0.226)			
Number of Children		3,739.13	2,858.54	375.53
		(2,878.08)	(2,877.03)	(2,619.23)
Age of Older Parent		2,942.98***	2,653.16***	538.19
		(903.70)	(900.58)	(853.37)
Financial Aid Tax		–4,653.57	–6,475.49	–38,215.51
		(13,912.16)	(13,937.20)	(28,300.40)
*Financial Aid Tax*Likely to Attend College*				30,657.99
				(28,840.20)
Black			–15,386.77*	–20,209.61*
			(7,993.32)	(7,424.47)
Asian			8,084.94	2,633.22
			(21,217.20)	(17,101.80)
Other Race			–11,391.33	–14,150.54
			(9,001.32)	(8,757.48)
Parents' Highest Degree:				
Associates Degree			–14,040.41*	–14,846.57*
			(8,378.47)	(8,086.67)
College Degree			14,663.12**	17,790.38***
			(6,815.13)	(6,629.48)
Graduate Degree			18,128.08**	15,058.48*
			(8,936.87)	(8,630.67)

Note: *** (**,*) indicates that the coefficient is significantly different from zero at the 1 percent (5, 10) level.

One of the underlying assumptions of the previous analyses is that every family expects their children to attend college. Of course, this assumption may grossly overstate the actual expected enrollment probabilities of families. Fortunately, the NLSY97 asked both the student and the responding parent to estimate the "percent chance" that the child will have a four–year college degree by age 30.[10] Parents and students who responded that the child had a 50 percent or more chance of obtaining a four–year college degree by age 30 (39 percent of the chosen sample)

[10] Recall that the NLSY97 is a survey of youth aged 12–16, from which I am using the parent survey. Parents were asked to estimate the probability that the surveyed child will attend college. I assume in this specification that all of the children in the family have the same probability of attendance.

were defined as being "likely to attend college." This dichotomous probability variable was interacted with the financial aid tax (specification (4), Table 6). One would expect that if there were a savings disincentive effect of financial aid that it should be larger for those who have a higher expected probability of attendance. In fact, the coefficient on the interaction of the financial aid tax and the likely–to–obtain–a–college–degree dummy variable is positive, suggesting that those families where the expectations of attendance are highest are more likely to save in response to higher financial aid taxes than those who do not think their children are likely to attend college, although this effect is not significant. Similar results emerge when the likelihood of obtaining a four–year degree, as expressed by both the student and the parent, is increased to 75 percent, and again when it is increased to 90 percent.

These results suggest that estimates of the impact of the financial aid tax on accumulated assets are sensitive to the calculation of this tax and the assumptions underlying that calculation.

In Table 7, I turn to testing for the robustness of these results to changes in the measurement of the asset base. Earlier studies on the impact of financial aid rules on assets had an easier time determining the appropriate asset base and financial aid tax as the federal government and private institutions usually used the same asset base and needs analysis methodology, as outlined above. In 1992, the federal government adopted the Federal Methodology (FM) of allocating federally funded financial aid dollars, which deviates from the Institutional Methodology (IM) that most private institutions use to determine eligibility for institutional financial aid dollars. The financial aid tax calculation is quite similar under both the FM and the standard IM, but the asset base varies across these methodologies. In particular, the FM excludes home equity from the asset base, while the standard IM includes home equity. Further complicating the appropriate calculation of financial aid taxes and their impact is the trend toward institution–specific application of needs analysis, in which individual colleges either slightly or significantly alter the needs analysis formula in an attempt to achieve institutional objectives. Table 7 examines the impact of the financial aid tax on "taxable assets." Taxable assets, in this paper, are defined as cash, checking, stocks, bond, mutual funds, other financial assets, and home equity. Taxable assets do not include financial debt or retirement assets.

Specification (1) of Table 7 is a regression of taxable assets against income and income interacted with number of children, age of the older parent, and the financial aid tax. The coefficient on income interacted with the financial aid tax is positive, but not significantly different from zero. Specification (2) of Table 7 allows the regressors to enter the equation linearly. Again the estimated impact of the financial aid tax on assets is positive, but not significantly different from zero. Additionally, adding controls for the parent's race and educational attainment does not qualitatively alter this conclusion. The impact of the financial aid tax on assets remains insignificantly different from zero. Finally, incorporating the interaction of the likelihood of attending with the financial aid tax, I once again find that those who are more likely to send their children to college actually save more in response to a higher financial aid tax, although the effect is not significant. These results suggest that the tax on assets from college financial aid does not appear to have a significant impact on family savings as measured by taxable assets.

As a final reduced form estimate of the impact of financial aid on family savings, I regress various categories of assets against the number of years that a family will have children enrolled in college (financial aid tax years). The underlying assumption here is that if there is an impact of financial aid on savings,

TABLE 7
REGRESSION RESULTS USING EDLIN FINANCIAL AID TAX

Dependent Variable = *Taxable Assets*	(1)	(2)	(3)	(4)
Intercept	–14,612.93**	–113,121.66**	–87,242.71*	–19,314.68
	(7,562.73)	(52,994.90)	(52,826.00)	(59,356.40)
Income	0.163	1.553***	1.396***	1.614***
	(0.863)	(0.127)	(0.138)	(0.151)
*Income*Number of Children*	0.055			
	(0.069)			
*Income*Age of Older Parent*	0.029			
	(0.018)			
*Income*Financial Aid Tax*	0.082			
	(0.288)			
Number of Children		3,848.64	2,922.75	299.57
		(3,653.39)	(3,643.79)	(3,962.63)
Age of Older Parent		2,038.06**	1,767.35*	289.89
		(1,147.58)	(1,141.03)	(1,291.73)
Financial Aid Tax		7,504.03	2,115.48	–5,310.03
		(17,632.62)	(17,628.70)	(42,710.90)
*Financial Aid Tax*Likely to Attend College*				23,068.05
				(43,530.50)
Black			–29,351.06***	–36,913.49***
			(10,127.60)	(11,236.20)
Asian			3,096.30	–20,165.64
			(26,882.00)	(25,886.60)
Other Race			–14,430.89	–21,186.90
			(11,405.20)	(13,256.70)
Parents' Highest Degree:				
Associates Degree			–23,329**	–40,282.47***
			(10,614.90)	(12,239.20)
College Degree			19,078.78**	17,904.13*
			(8,634.30)	(10,034.80)
Graduate Degree			10,247.19	–11,983.94
			(11,323.70)	(13,064.90)

Note: *** (**,*) indicates that the coefficient is significantly different from zero at the 1 percent (5, 10) level.

then families who face a longer window of financial aid, because their children are further apart in age, will have lower accumulated assets. This assumption is only valid if child spacing does not affect savings directly, and only influences savings through its impact on the financial aid tax. To test this assumption I create a dummy variable for "middle–income" ($50,000 to $100,000; recall that for families with income less than $50,000 the tax on assets is zero using the Simplified Needs Test). The middle–income indicator variable is interacted with the financial aid tax years variable. The results, in Table 8, indicate that child spacing, in terms of the number of financial aid tax years to which a family is subjected, does not appear to have a significant effect on net financial assets, for those families who are not likely to have their assets taxed by financial aid, either because their income is too low (less than $50,000) or too high (greater than $100,000). Similarly, even for families for

TABLE 8
REDUCED FORM REGRESSION OF THE IMPACT OF THE NUMBER OF TAX YEARS ON ASSETS

	Net Financial Assets	*Taxable Assets*	*Net Worth*
Intercept	–149,716.04***	–93,540.81	–26,4050.85*
	(42,517.49)	(53,910.49)	(15,2315.48)
Income	1.095***	1.387***	3.67***
	(0.113)	(0.144)	(0.406)
Number of Children	–1,467.39	–1,646.15	3,467.6
	(5,663.30)	(7,180.84)	(20,288.33)
Age of Older Parent	2,709.09***	1,827.10	5,183.12
	(906.33)	(1,149.19)	(3,246.86)
Financial Aid Tax Years	1,795.11	1,892.04	699.83
	(2,109.61)	(2,674.90)	(7,557.51)
*No. Tax Years*Middle Income*	–194.32	220.73	–1,657.86
	(766.01)	(971.27)	(2,744.17)
Black	–15,465.09*	–29,390.13***	–58,908.75**
	(8,048.24)	(10,204.84)	(28,832.16)
Asian	8,394.84	3,385.83	–13,871.76
	(21,301.52)	(27,009.47)	(76,310.96)
Other Race	–11,080.37	–14,159.16	–15,791.05
	(9,035.49)	(11,456.64)	(32,368.92)
Parents' Highest Degree:			
Associates Degree	–13,646.03	–22,872.78**	–70,937.32**
	(8,430.29)	(10,689.27)	(30,200.83)
College Degree	14,569.73**	18,983.04**	4,659.35
	(6,844.41)	(8,678.43)	(24,519.53)
Graduate Degree	18,008.33**	9,882.11	–46,769.76
	(8,963.07)	(11,364.82)	(32,109.49)

Note: *** (**,*) indicates that the coefficient is significantly different from zero at the 1 percent (5, 10) level.

which child spacing is likely to have the largest effect in terms of their financial aid tax on assets there does not appear to be a significant impact of child spacing on net financial assets. Similar results were found for the impact of the number of financial aid tax years on taxable assets and family net worth. For families that are not likely to have their assets taxed under the financial aid system, child spacing and, thus, the number of tax years does not appear to have a significant impact on asset accumulation. For those middle–income families for which the number of financial aid tax years is likely to have a substantial impact on their financial aid tax, there is no significant difference in the impact of child spacing on family assets.[11]

Because some assets are considered in calculating financial aid while others are excluded from the asset base, as outlined above, there may be an incentive for families to reallocate their wealth toward those assets that are exempt from the asset base in determining a family's financial aid. To investigate this possibility I calculated the ratio of assets that are at least sometimes excluded from the asset base (home equity and retirement assets) to total assets (net worth). This percentage of assets that are protected from financial aid consideration was regressed on income, number of chil-

[11] Similar results were found when middle–income was defined to be from $50,00 to $90,000, $50,000 to $110,000, $50,000 to $120,000, and even $50,000 to $130,000.

dren, age of the older parent, and the financial aid tax (results are not shown). The financial aid tax did not appear to have a significant impact on the percentage of a family's wealth (nor on the log odds ratio) that was allocated to the assets that are sometimes excluded from the asset base in determining financial aid.

CONCLUSION

The system of distributing financial aid dollars based on expected family contributions as calculated using needs analysis formulae implicitly imposes a financial aid tax on assets. As illustrated in Case and McPherson (1986) and Edlin (1993), these tax rates can reach quite significant levels if a family has a number of children and these children are spaced apart in age. Feldstein (1995) and Kim (1999), and to a lesser degree Dick et al. (2002), find that these financial aid taxes create a significant savings disincentive, such that families facing higher financial aid taxes accumulate less in financial assets than comparable families facing lower financial aid taxes. Kane (1998) and Long (2004), however, do not find convincing evidence that college financial aid influences family savings.

This paper uses a more recent data set from 1997 and examines the sensitivity of the impact of financial aid on family savings to the construction of the financial aid tax, the specification of the relationship between assets and familial characteristics, and the measurement of family savings. When replicating Feldstein's (1995) results, with the more recent data, I too find that a higher financial aid tax reduces net financial assets; however, the impact I find is substantially smaller than the effect estimated by Feldstein (1995) and Kim (1999) and more in line with the estimates of Dick et al. (2002). Additionally, I find that the results are sensitive to alternative estimates of a family's financial aid tax, and various measures of family wealth. In fact, when using other specifications and more plausibly exogenous sources of variation in the marginal tax rates across families, I do not find a significant relationship between the financial aid tax and family savings. At the very least, this study, like Long (2004), points out the sensitivity of estimates of the impact of financial aid rules on asset accumulation to the litany of assumptions that is necessary to calculate the expected financial aid tax on assets, and to measurement of the appropriate asset base.

If in fact families are not responsive to the tax on assets imbedded in the financial aid system, it may because they are not familiar with the arcane calculations that underlie needs analysis. It may also be because these arcane calculations tend to change over time. As outlined above, needs analysis formulae underwent a significant change with the Higher Education Reauthorization Act of 1992. The Institutional Methodology of needs analysis changed dramatically again in 2001. The primary changes involved the calculation of the Income Protection Allowance, the Asset Protection Allowance, and the treatment of concurrently enrolled students in college. Under the new IM it is no longer the case that the family's contribution per child was simply the total EFC divided by the number enrolled in college. Now a family with two children enrolled is expected to pay 60 percent of their calculated EFC per child. In short, while child spacing is still a significant factor in determining how much a family ultimately pays for college, its effect has been reduced. Whether families have been influenced or not by the more recent developments in financial aid remains an open question.

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APPENDIX A—NEEDS–ANALYSIS

The following provides a brief description of the basic framework for assessing the Expected Family Contribution (EFC) from the parents of a dependent student.

CONTRIBUTION FROM PARENTS' INCOME:

Total Income – actual federal income taxes paid – estimated state income taxes paid – estimated social security taxes – an Employment Expense Allowance – an Income Protection Allowance = Parents' Available Income (AI).

Income Protection Allowance varies by family size and the number of students enrolled in college.

Employment Expense Allowance equals 35 percent of the lesser earned income for married parents, to a maximum of $2,800.

CONTRIBUTION FROM PARENTS' ASSETS:
*Financial Assets (including cash, checking, stocks, bonds, mutual funds) – pension and retirement assets + an adjusted assessment value for a family business or farm – an Asset Protection Allowance = Parents' Taxable Assets.**

Asset Protection Allowance varies by the age of the older parent and by marital status.
Parents' Adjusted Available Income (AAI) = Parents' Available Income + .12 × Parents' Taxable Assets.

PARENTS' CONTRIBUTION FROM AAI:

AAI	*Parents' Contribution*
Less than –$3,409	–$750
–$3,409 to $10,800	22% of AAI
$10,801 to $13,500	$2,376 + 25% of AAI over $10,800
$13,501 to $16,200	$3,051 + 29% of AAI over $13,500
$16,201 to $19,000	$3,834 + 34% of AAI over $16,200
$19,001 to $21,700	$4,786 + 40% of AAI over $19,000
$21,701 or more	$5,866 + 47% of AAI over $21,700

Financial Aid Award = Cost of Attendance – Parent Contribution (assuming that all need is fully met and that the student contribution is zero)

*The data in this paper excludes self–employed parents and so no adjustments were necessary

for family businesses or farms. Additionally, the calculation of Taxable Assets is different for the Federal Methodology (FM), used to determine eligibility for federal funds, versus the Institutional Methodology (IM) of needs–analysis, used to allocate institutional funds at most private institutions, following the 1992 Higher Education Reauthorization Act. In particular, the FM excludes home equity from taxable assets, while the standard IM used by most private institutions includes home equity. This paper includes home equity in the assets labeled "taxable assets."

APPENDIX B—CALCULATING THE FINANCIAL AID TAX ON ASSETS

Feldstein (1995) calculation of the financial aid tax on assets:

$$\textit{Financial aid tax on assets} = 1 - (1 - ((.12 + \textit{return}) * \textit{taxrt}))^{(2x\ (\textit{no. of children}) + 2)}$$

Edlin (1993) calculation of the financial aid tax on assets:

The return on an asset, during the college years, without a financial aid tax is

$$\textit{Rnotax} = (1 + \textit{return} * (1 - \textit{ftaxrt} - \textit{staxrt}))^{yc}.$$

The return on an asset with the financial aid tax is:

$$\textit{Rtax} = (1 + \textit{return} * (1 - \textit{ftaxrt}) * (1 - \textit{taxrt} * 0.83) - \textit{return} * \textit{staxrt} + \textit{return} * \textit{staxrt} * \textit{taxrt} * 0.83 - 0.12 * \textit{taxrt} * 0.83)^{yc}.$$

The return on an asset with the financial aid tax is reduced for two reasons. First, the after tax (both federal and state income tax) income generated by the asset, increases the Available Income (AI) of the parents, which increases their contribution from their income, and decreases their financial aid. Second, increases in the asset base itself, above the Asset Protection Allowance, increase Adjusted Available Income (AAI), which increases the parents' contribution from assets, and decreases their financial aid.

The financial aid tax on assets is therefore

$$1 - (\textit{Rtax} / \textit{Rnotax}).*$$

This paper assumes a 10 percent nominal return on assets, and the financial aid tax rate is adjusted downward by .83 (again following the assumption of Edlin (1993)), for EFC exceeding the maximum 1997 Pell award of $2,700, to account for the fact that not all financial aid is grant aid and some of the aid comes in the form of loans, thus as EFC increases some of the lost financial aid is grant aid but some of the lost aid is loan aid, which must be paid back and only carries a partial subsidy.

ftaxrt = federal marginal tax rate
staxrt = state tax rate
taxrt = financial aid tax
yc = years that the family has a child or children in college

*In the Edlin (1993) paper, he actually presents the tax in terms of a post–college tax on consumption, in which case the tax = (*Rnotax/Rtax*) – 1. In this paper, I use the calculation above which presents the tax as a reduction in the value of the assets.