

Do Increases in Pell and Other Grant Awards Increase College-Going among Lower Income High School Graduates?

Evidence from a 'Natural Experiment'

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December 2008

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In addition, the author thanks Alice Rivlin (Brookings Institution) and Bruce Van Wyk (deceased, formerly of the US Bureau of the Budget) who encouraged the author to contribute to the higher education policy debate prior to authorization and implementation of the Pell Grant program (formerly the Basic Educational Opportunity Grant program), the focus of this analysis.

November 12, 2008

Summary

The potential impact of price-reducing grants to college students on college-going among lower income students has been the focus of numerous research studies and decades of public and private policy debates. The federal Pell Grant program (the largest student grant program that provided roughly \$13B in grants to undergraduates during the 2006/07 academic year) has often been the center of attention of these studies and debates.

The research-based evidence regarding the impact of college prices and student grants on college-going is relatively clear¹. Research studies have consistently demonstrated that the college prices facing potential students affect college-going rates and patterns, particularly among youth from lower income families who have been traditionally underrepresented on America's college campuses. In addition, these studies indicate that large, consistently-funded, well-targeted, simple-to-understand, and widely marketed grant programs are likely to have a significant effect on college-going.

In spite of the Pell program's size and the extensive research directed toward understanding its impact, there is little research-based evidence indicating that the program has altered college-going rates and patterns. This scarcity of evidence has affected policy-making regarding the program's budget, design, and operations.

Several factors have led to this lack of evidence of Pell program effectiveness. Because the program has changed incrementally rather than dramatically since its authorization in 1972, the effects of the resulting small changes in program design, operations, and awards have been difficult to observe or measure. In addition, because the program is a national program, there are few state-by-state variations that could potentially support statistical analyses of the program's impact using geographic differences. Furthermore, the counteracting impact of increasing college tuition and fee charges during much of the program's history has limited the visibility of the program's potentially positive impacts because net-of-grant prices have increased (albeit by less than they would have otherwise increased if Pell awards had not existed).

In response to this limited evidence of Pell program effectiveness, several observers and analysts have suggested that the program should be the subject of a controlled, experimental assessment. Although a controlled Pell experiment has not occurred, an unplanned 'natural experiment' did occur during the 1996-2004 years. Between academic years 1995/1996 and 2001/02, average grant support from all sources received by low income² students enrolled in public two-year and four-year colleges increased more rapidly than did the list prices of these colleges³. As a result of these increases in

¹ For a review of this research see David S. Mundel, "What do we know about the impact of grants to college students?" in Baum, McPherson, and Steele, editors. *The Effectiveness of Student Aid Policies: What the Research Tells Us*" (2008), The College Board.

² 'Low income' students are defined as students from families with incomes below \$30,000 in inflation-adjusted, constant 2005 dollars and 'moderate income' students are defined as students from families with incomes between \$30,000 and \$50,000. 'Lower income' students include both 'low' and 'moderate' income groups of students.

³ See Figures II-E and II-F.

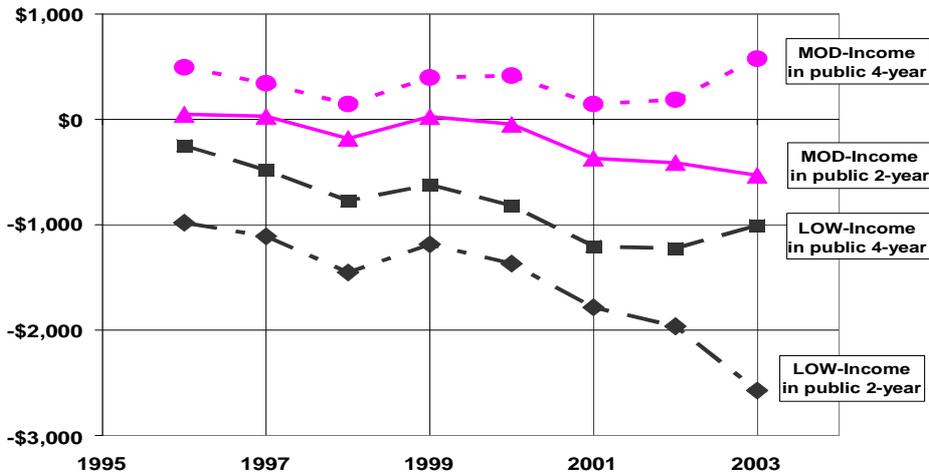
Pell and other grant awards to low income students and relatively stable college list prices, the net-of-grant prices of lower price public colleges⁴ declined steadily and significantly during these years, declining by roughly \$950 to \$1000 (in constant 2005 dollars). Pell awards accounted for a large share of the increases in total grant support received by these students and thus, Pell awards were the source of much of the decline in net-of-grant prices.

Figure I-A

Estimated Net-of-Grant Prices for Low- and Moderate-Income Immediate Enrollees attending public two-year and four-year (non PhD granting) colleges

(constant 2005\$) (for full-time enrollees)

-- based on College Board, Pell operations, and NPSAS data --



Based on the available, research-based evidence of the impact of college prices and grants on college going one would expect that these grant-induced reductions in the net prices would stimulate increased college-going among lower income youth.

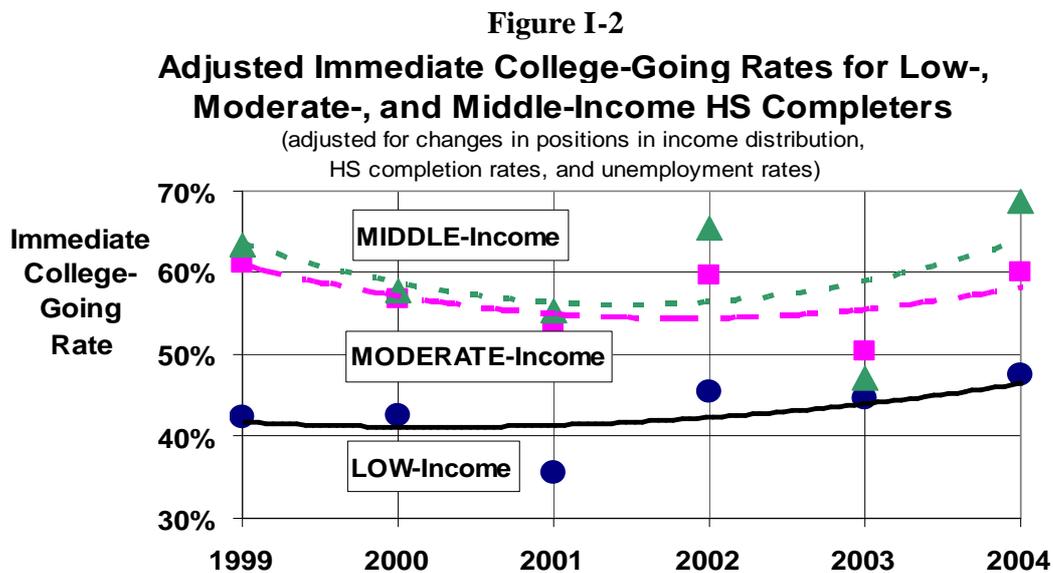
The results of the 1996-2004 ‘natural experiment’ confirm the validity of this expectation -- declines in net-of-grant prices did stimulate increased immediate, post high school college-going among low income youth.

Several non-price factors could have influenced these changes in college-going rates during the years of the uncontrolled ‘natural experiment’. For example, high school graduates’ family characteristics (e.g., the educational attainment of parents) may have changed and the characteristics of high school graduates (e.g., their achievement levels) may have changed. Furthermore, economic conditions (e.g., unemployment) may have changed, stimulating changes in college-going during the ‘natural experiment’. In addition the timing of these grant-induced, increases in college-going is unclear, college-going may have increased somewhat after the price declines occurred because of the long term nature of the decision making processes that impact college-going.

⁴ These lower price colleges are the most likely type of colleges attended by lower income high school graduates who would not otherwise enroll in college

Adjusting the observed college-going rates for the impact of these changes in non-price factors and examining the changes in college-going rates during a somewhat later time period suggests that college-going among low-income high school graduates increased following the start of the declines in net-of-grant prices (see Figure I-2, below).

The pattern of changes in the underlying rate for moderate income youth is less clear, at first the rate declines and then it increases. This less evident impact of net price changes on college-going among moderate income youth may be the result of several factors – including the smaller and less consistent price declines experienced by these youth and their lower price sensitivities.



All of these increases in adjusted immediate college-going rates among low income, high school graduates can not be attributed to increases in Pell awards because awards from other grant programs also increased during experimental period⁵. But, a large share of the increases in total grant awards was accounted for by the Pell program, suggesting that the steady increase in Pell grant awards played a strong role in increasing college-going among low income, high school graduates during the ‘natural experiment’.

⁵ **A brief cautionary note** -- Although this analysis of the results of a ‘natural experiment’ includes adjustments for the potential impact of several experimentally uncontrolled factors, there may be additional, non-examined factors that also influenced changes in college-going rates during the period of the experiment. It is, of course, impossible to rule out the impact of these unknown and unexamined factors that may be responsible, in part, for the observed changes in college-going.

Section I – Introduction

Using a ‘natural experiment’ to improve our understanding of the impact of student grants on college-going

Questions about the potential impact of college prices and price-reducing student grants on the college-going rates and patterns of lower income high school graduates have long been a focus of policy debates and analytic research. These questions arose well before a federal program of direct student grants was recommended to President Johnson in early 1969⁶. These questions continued to be a focus of concern during the congressional deliberations following President Nixon’s formal proposal of a program of direct grants to college students that led to the authorization of the Basic Educational Opportunity Grant (BEOG) program in the Higher Education Amendments of 1972. The subsequent funding and implementation of the BEOG program (later renamed the Pell Program) did little to lessen the uncertainties regarding the program’s impact on college-going among its targeted population, youth from lower income families who have long been underrepresented on the nation’s college campuses.

The results of the several research studies addressing the impact of college prices on college going among high school graduates have been relatively clear⁷ – the list prices of colleges (i.e., tuition, fee, and other charges) affect the college going rates and patterns of high school graduates, particularly youth from lower income families.

The results of research that addresses the impact of student grants on college-going are somewhat less clear. Several carefully done and reliable studies of major student grant programs (such as the Social Security benefits that were previously provided to beneficiaries who attended college and the educational benefits provided to military veterans following WW II) indicate that large (relative to college list prices), well-targeted, simple-to-understand, well-communicated, and consistently funded grant programs are more likely to positively influence college-going rates and patterns of targeted populations.

The research-based evidence regarding the impact of the Pell grant program on the college-going rates and patterns of lower income high school graduates is much less clear. In spite of the program’s size and targeting on these enrollees, there is little research that indicates that the Pell Program, itself, has had a significant impact on college-going among lower income high school graduates.⁸ Available research provides even less evidence regarding the impact of relatively small changes in Pell awards.

⁶ U.S. Department of Health, Education and Welfare, “Toward a long-range plan for Federal financial support for higher education: A report to the President” (1969) [This report is widely known as the ‘Rivlin Report’]

⁷ For a review of the analytic research see David S. Mundel, “What do we know about the impact of grants to college students?” in Baum, McPherson, and Steele, editors. *The Effectiveness of Student Aid Policies: What the Research Tells Us* (2008), The College Board.

⁸ One exception to this lack of evidence can be found in Seftor, Neil S. and Sarah E. Turner, “Back to School – Federal Student Aid Policy and Adult College Enrollment” (2002), *Journal of Human Resources*.

Analysts have described several possible reasons for this lack of demonstrated Pell program effectiveness. Some have argued that the program has not had an impact because it lacks the attributes found in effective grant programs – e.g., the program is complex and hard to understand making it difficult for potential enrollees to predict the level of awards that they may receive. In addition, few program-focused, marketing and information-oriented efforts have been implemented to overcome these difficulties. Several analysts have argued that the program’s potentially observable impacts have been overshadowed by the increases in college prices occurring during much of the program’s history. Analysts have also argued that the program’s impacts, if any, are likely to have been too small to be observable given the inadequacies of available data sources. Furthermore, program effectiveness research has been limited by the program’s national character that has limited geographic differences in award levels and the program’s evolutionary nature that has limited the size of short term changes in award levels and patterns, factors that have reduced the applicability of research techniques relying on program variations or changes.

- This lack of evidence Pell program impact on college-going does not mean that the program is ineffective. It means that the program’s effectiveness is unknown.

A clear implication of several studies that have attempted to assess the impact of Pell program on college-going is that three conditions could increase the visibility of the program’s potential impacts on college-going. First, the level of Pell awards would need to increase dramatically and/or steadily over a relatively short time period. Second, Pell grant increases would need to result in significant declines in the net prices of lower price colleges -- the college alternatives most likely to be chosen by lower income high school graduates who are on the margin between going and not going to college.⁹ And, third, Pell grant awards would need to account for a significant share of the total grant assistance received by targeted, lower income students.

Several researchers have suggested another important requirement is extensive and reliable data on college prices and college-going. Because the impacts of changes in Pell program awards may be small, these data requirements are important. Furthermore, because changes in other parameters – e.g., changes in economic conditions and high school graduation rates – may affect college-going rates, data on these other parameters is needed to ‘adjust’ or ‘correct’ the observed college-going rates to control for the potential impact of changes in these non-price factors.

In other policy domains, highly controlled and rigorously monitored social experiments have been used to create the variations in program characteristics and the extensive data needed to assess the impact of program alternatives. Social experiments were used, with significant success, in the federally supported welfare (income maintenance) and health

⁹ This second condition requires the prices of these ‘most likely to be chosen by otherwise non-enrolling (or marginal) potential students’-schools to be growing more slowly than the Pell awards for which these students are eligible.

insurance experiments conducted during the 1968-1986 years. In the absence of controlled experimentation, researchers have attempted to assess so-called ‘natural experiments’ in several policy domains. These ‘natural experiments’ usually involve either major changes in program characteristics (which support ‘before and after’ comparisons) or non-universal program implementations (which support ‘treatment versus control’ group comparison).

To-date, no controlled social similar experiments have been directed toward understanding the impact of grants to college students. But, to the surprise of many analysts and observers, the conditions and data availabilities needed to assess a ‘natural experiment’ involving the Pell program appears to have occurred during the 1996-2004 years. During several of these years, Pell awards received by lower income students enrolled in lower price public colleges (two-year and four-year, non PhD granting colleges) grew in real terms while the list prices (tuition and fee charges) of these schools remained relatively constant. During these years, Pell awards also represented a large share of the total grant support received by lower income students enrolled in these colleges. In addition, the data needed to support detailed analyses of college going rates and college prices during these years are available, having been collected by large government and private surveys.

- **This ‘natural experiment’ is the focus of this paper. The paper includes both descriptions of the experiment and the analytic approaches used in assessing the experimental results. In addition, the paper includes a review of the experimentally-derived results.**

Plan for the paper

Section II – Establishing that a ‘natural experiment’ involving steadily declining, net-of-grant prices did, in fact, occur -- This section of the paper is focused on assessing the changes in list prices and Pell grant and other grant program awards among lower income students enrolled in public two-year and four-year, non PhD-granting colleges during the experiment. This assessment is needed to identify when and if the real (adjusted for inflation), net-of-grant prices declined for these students and when the enrollment impacts (if any) resulting from these price declines were more likely to have occurred.

Section III – Establishing the baseline immediate college-going rates that occurred during the experiment -- The second step in the analysis involves estimating the baseline college-going rates for potential students from families in different income categories that occurred during the period of the experiment. Because the annual October Current Population Survey (CPS) conducted by the Bureau of the Census provides detailed college-going data for recent high school graduates, this analysis focuses on these ‘immediate post high school completion college going rates’¹⁰.

¹⁰ These immediate college going rates represent the share of graduates in a give year that are enrolled in college in October following their high school completion.

There are two major components of the baseline, college-going rate estimation process reviews in this section of the paper.

First, potential enrollees need to be assigned to income groups in each of the years being examined. To correct for inflation-related changes in reported family income levels in each of the annual Census surveys, potential students need to be assigned to ‘constant dollar’ or ‘inflation-adjusted’ income categories.

Second, the CPS-based, estimated ‘immediate college going rates’ for the various income categories need to be adjusted for undercounts in the number of high school graduates and immediate college enrollees in each income category resulting from the definition of dependent family members used in the CPS. In the CPS, children who are not living with their parents (other than those living in college-provided, on-campus housing) are not included in their parental family units. Because the share of recent high school completers who are omitted from their parental families (i.e., so-called ‘family leavers’) in the October CPS following their completion of high school differs among family income categories and varies over time, these ‘family leaver’ adjustments are necessary to develop accurate college-going rates for each of the constant dollar, income categories.

Sections IV, V, and VI -- Adjusting the baseline estimated rates for changes in non-price factors -- To assess the impact of changes in Pell awards and the resulting changes in net-of-grant prices on changes in college-going rates, the estimated baseline, college-going rates (described in Section III) need to be adjusted to correct for the impact of changes in enrollment-influencing, non-price factors occurring during the ‘natural experiment’. These non-price enrollment-affecting factors include changing family characteristics, changes in the characteristics of high school graduates, and changes in marketplace conditions. These adjusted college-going rates provide estimates of the immediate college going rates that would have been observed had ‘grant-induced’ changes in net college prices been the only changes that occurred during the ‘natural experiment.’ In reviewing these adjustments in college going rates intended to ‘control for’ changes in various non-price factors that occurred during the ‘natural experiment’, it is important to note that at each step of the analysis, the adjustments in the estimated immediate college going rates are cumulative – i.e., the adjustments made at each step are applied to the adjusted estimates that have been developed in prior steps¹¹.

Section IV – Estimating the potential impact of changing family characteristics -- Available research indicates that differences in several demographic factors – parental education and family size -- may affect college going rates. To adjust the observed immediate college going rates for changes in these potentially influential, family characteristics, this step of the analysis addresses changes in a variety of factors – including race, ethnicity, parental

¹¹ In making these cumulative adjustments, the author has implicitly assumed that the effects of the factors that influence college-going are independent and additive and that there are no interactions among the impacts of the several factors. In assessing the validity of the resulting estimated adjustments, readers need to consider whether this assumption is a valid one and that if interactions did occur, their impacts may have been either positive or negative.

education and family size. In addition, the potential enrollment rate impacts of a potentially important factor – changes in an income category’s position in the overall income distribution – are analyzed in detail.

Section V – Estimating the potential impact of changing HS graduate characteristics – Although it is unlikely that many of the factors that directly influence immediate college going rates – e.g., student achievement levels – changed significantly during the short period of the ‘natural experiment’, changes in other characteristics of high school graduates may have influenced apparent college-going rates. For example, if declining high school completion rates resulted from increasing dropout rates among students who would otherwise be unlikely to enroll in college, then the observed college-going rates would appear to increase, regardless of the impact of changes in net-of-grant, college prices.

Section VI – Estimating the potential impact of changing economic conditions – Changes in unemployment rates and wages have also been shown to influence college going rates. For example, during periods of higher unemployment, youth are somewhat more likely to choose to attend college rather than to join the labor force. This section of the analysis provides a further adjustment to the baseline estimated immediate college going rates based on evidence regarding the potential impact of changing unemployment rates during the natural experiment.

Section VII – Conclusions – This final section of the paper presents the results of the experiment – how much, if at all, did college-going among various groups of high school graduates change ‘in response’ to the observed changes in net-of-grant prices facing high school graduates from different income groups.

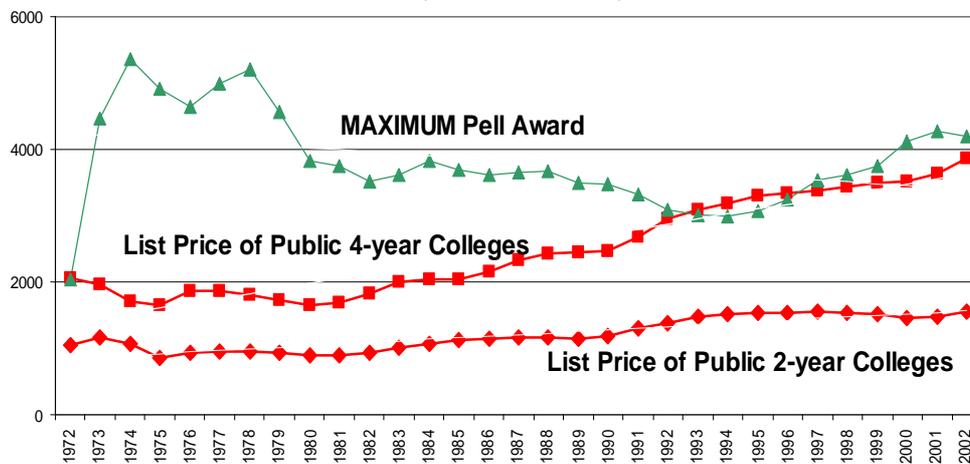
Section II

Did a ‘natural experiment’ actually occur and if so, when?

Many policy makers, analysts, and others believe that Pell and other grant awards received by lower income students were either relatively stable or declining during the 1996-2005 years and that these trends combined with simultaneous increases in college prices to increase the net college prices facing lower income students during these years. These individuals do not believe that a ‘natural experiment’ involving declining net college prices ever occurred¹².

But, net-of-grant prices of important types of colleges actually declined during much of this period. Between academic years 1995/1996 and 2003/2004¹³, the average grant support (from the Pell program and all grant programs) received by lower income students enrolled in public two-year and four-year, non-PhD granting colleges increased (in real terms) more rapidly than did the list prices of these colleges (see Figure II-A, below)¹⁴. As a result, the inflation-adjusted, real net prices of these colleges facing potential lower income enrollees declined during much of this period¹⁵. The net prices facing lower income, students who received Pell awards declined even more rapidly (as suggested in Figure II-B, below)¹⁶.

Figure II-A
List Price of Public Colleges and Maximum Pell Awards
(in constant 2004 dollars)



¹² If this belief was widespread among lower income high school graduates considering college-going, it would tend to limit the impact of grant programs, making it difficult to observe any program effectiveness.

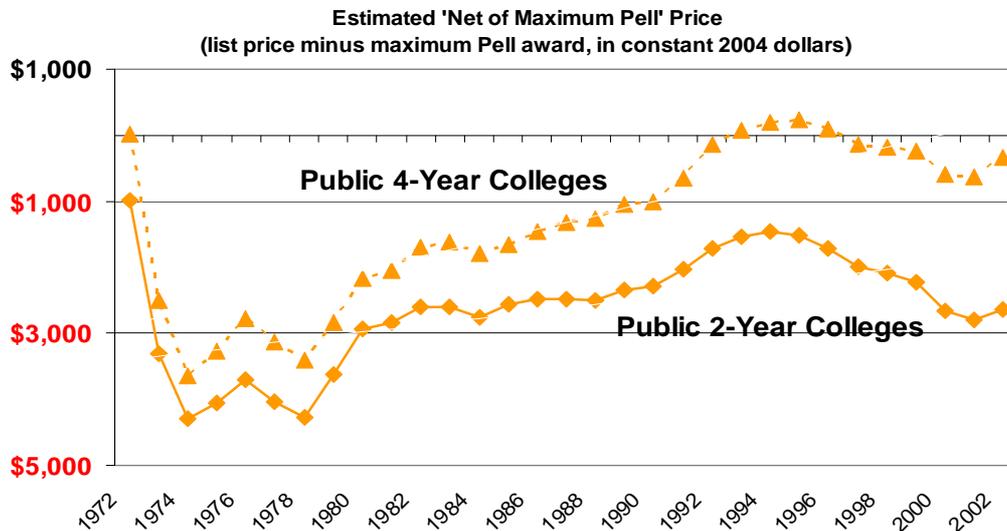
¹³ as documented by the National Postsecondary Student Assistance Study (NPSAS) conducted by the US Department of Education

¹⁴ In addition, the real, inflation-adjusted cost of non educational expenses (e.g., living costs) for lower income students enrolled in these colleges remained essentially constant.

¹⁵ For a review of the NPSAS study results see David S. Mundel, “The Changing Price of College from 1995/6 to 2003/4”, May 2005 (available from the author)

¹⁶ David S. Mundel, “The Changing Price of College for Pell Grant Recipients – 1995/6 to 2003/4”, May 2005 (available from the author)

Figure II-B



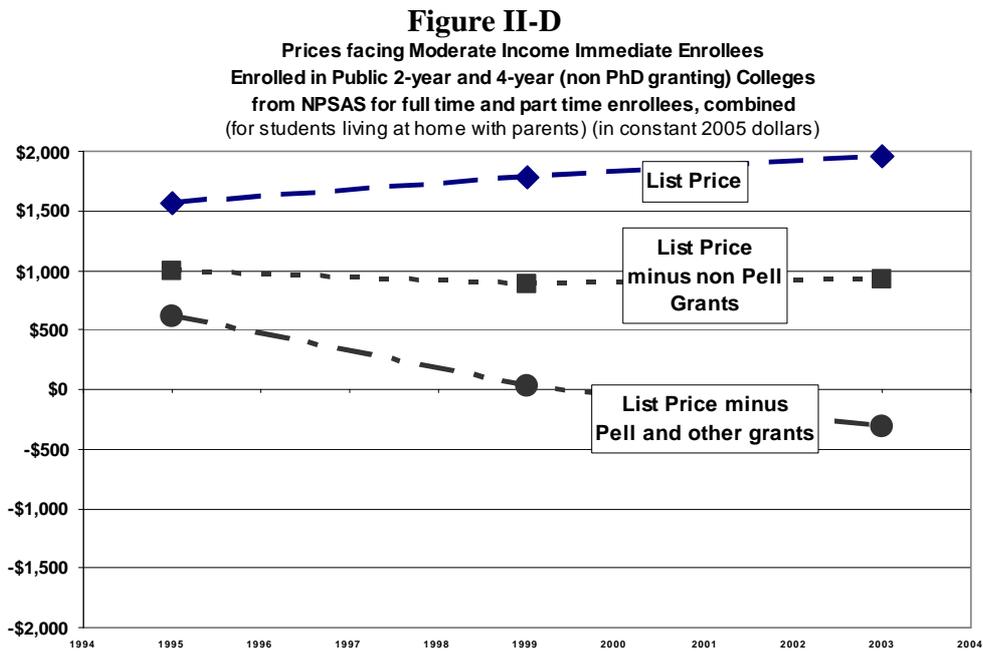
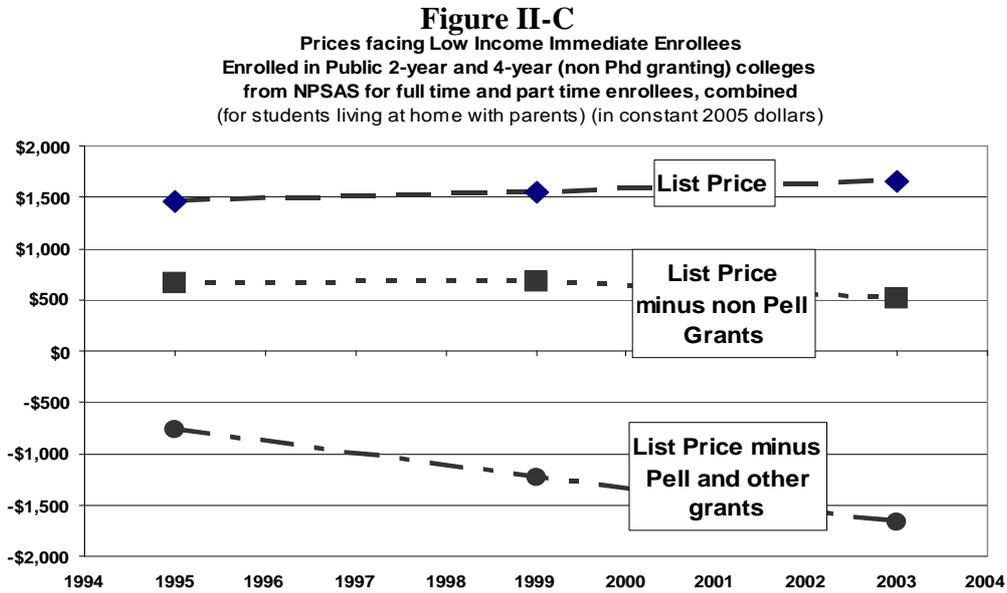
An examination of the net-of-Pell grant price trends prior to the period of ‘natural experimentation’ (prior to 1995) suggests why it has been difficult to observe positive Pell program impacts on college going rates among lower-income youth during much of the program’s history. During most of period preceding the experiment, the inflation-adjusted price of college-going tended to increase while the maximum Pell awards tended to decline, leading to increases in the net-of-grant prices facing program participants. As a result, although Pell awards may have caused college going rates to be higher than they would have otherwise been, positive Pell impacts, if any, were difficult to observe.

Looking at the 1996-2005 years, the three National Postsecondary Student Aid (NPSAS) surveys (conducted by the US Department of Education during three of these years) provide a clear picture of the declines in net prices actually experienced by lower income students¹⁷. These data suggest that net-of-grant prices facing low- and moderate-income, recent high school graduates enrolled in public two-year and four-year (non PhD-granting) colleges declined during these years (particularly for students living at home with their parents -- the most likely enrollment patterns chosen by lower income students

¹⁷ In this analysis, ‘low income’ refers to individuals from families with incomes <\$30,000 (in constant 2005\$) as reported in the October CPS surveys and moderate income refers to individuals from families with incomes between \$30,000 and \$50,000 (in constant 2005\$). “Middle income” refers in individuals from families with incomes between \$50,000 and \$70,000 (in 2005\$).

Because the NPSAS survey is based on family income data from federal and other needs analysis systems, the NPSAS surveys provide different family income estimates than are provided by the annual October CPS surveys (which are based on verbal reports by the responding adult in the family unit). In order to make the family income estimates provided by the two data sources comparable, the overall family income distribution for each NPSAS sample of immediate college goers was created and the NPSAS breakpoints for the low, moderate and middle income categories were set at levels that resulted in the percentage of students in each NPSAS-based category being equal to the CPS-based category. Implicitly, this method assumes that the rank order position of individual students in the two samples are equivalent and that the prices paid and grants received by students in each CPS-based income category are accurately estimated by the prices and grants of students in the comparable NPSAS-based income category.

who would have otherwise not attended college (see Figures II-C and II-D, below).¹⁸ In addition, the NPSAS data indicate that Pell Grant awards represented a significant share of the total amount of grant assistance causing these net-of-grant price declines.

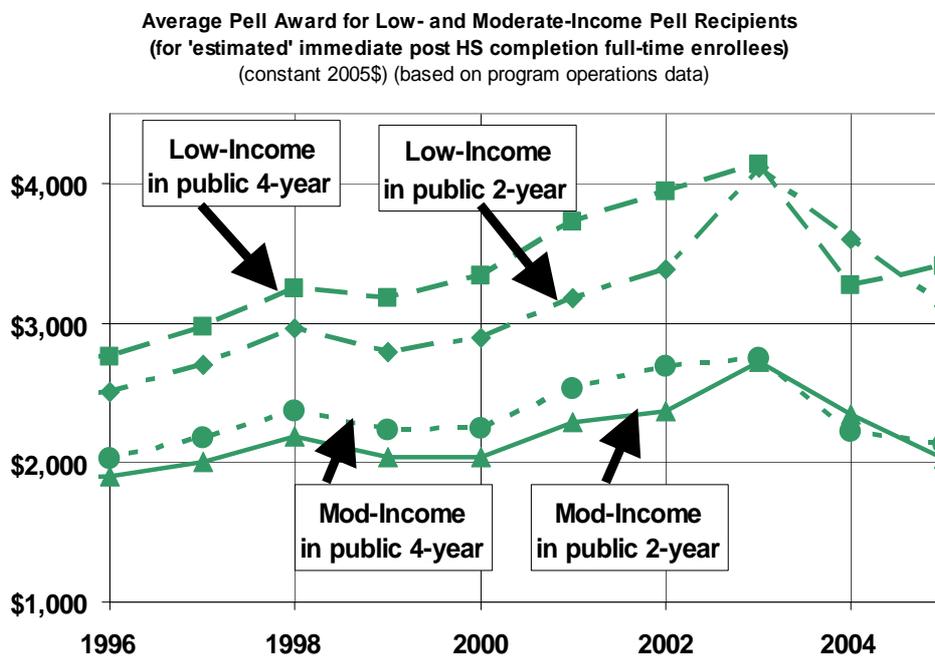


These NPSAS data do not, however, provide a reliable estimate for the exact timing of the net price declines that occurred during the 1996-2005 years, because NPSAS surveys only provide data for the years in which a survey was conducted (academic years 1995/96, 1999/00 and 2003/04).

¹⁸ A similar analysis of middle income students enrolled in these same types of colleges indicates that these students faced essentially constant net-of-grant prices over this time period.

To overcome this limitation, it is necessary to use more detailed, annual data to establish the specific timing of the net-of-grant price declines occurring during the ‘natural experiment’. Two reliable sources can provide these data – Pell grant operations reports¹⁹ (see Figure II-E, below) and the annual College Board price surveys²⁰ (see Figure II-F, below). Data from these two sources (combined with NPSAS-based estimates of the share of total grant support for different types of students accounted for by Pell awards) provide a basis for estimating the annual net prices facing low and moderate income students enrolled in both types of lower price, public colleges needed for the assessment of the results of the ‘natural experiment’.

Figure II-E

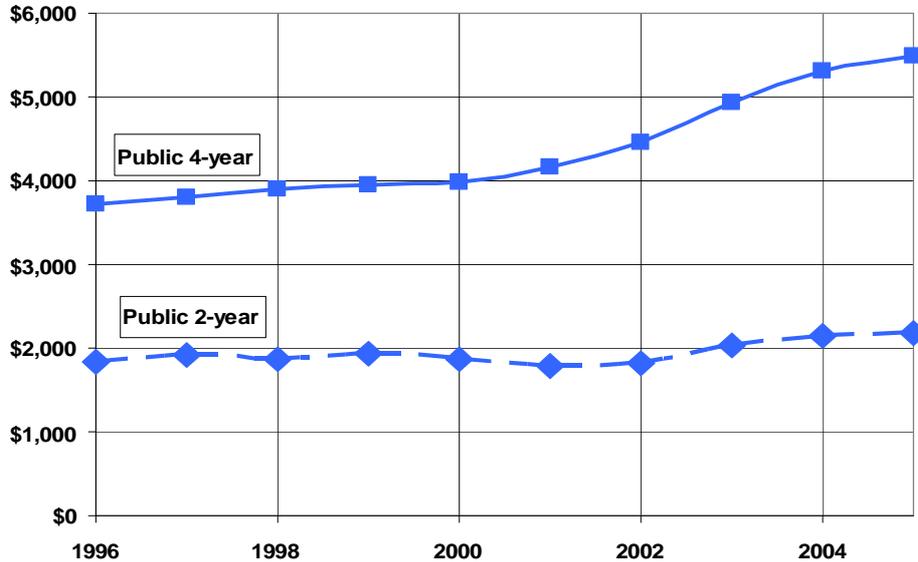


¹⁹ Detailed Pell grant data indicating the average awards received by Pell recipients from various income groups who were enrolled in public two-year and four-year colleges in the year following high school based on program operations data files were provided by the US Department of Education.

²⁰ See College Board, “Trends in College Pricing”, 2006.

Figure II-F

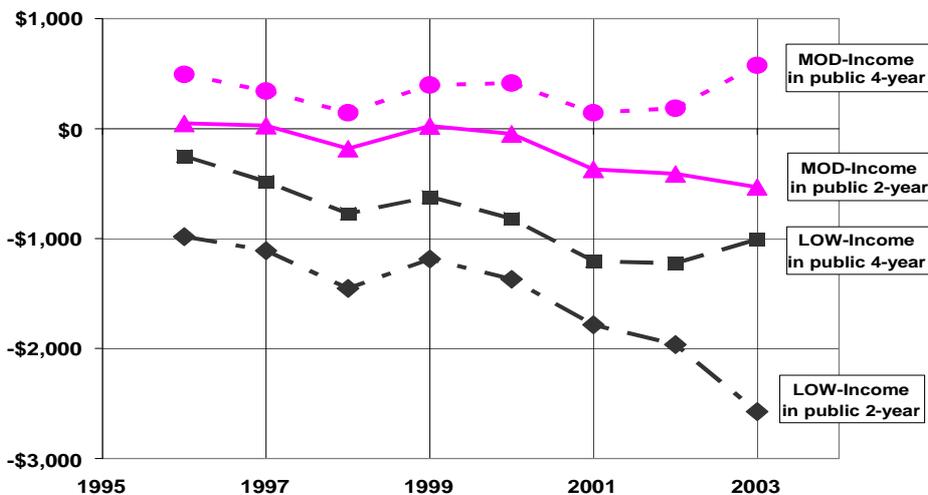
**Average List Prices (Tuition and Fees)
for Public Two- and Four-year (non PhD granting) Colleges**
(constant 2005\$) (based on College Board Trends 2006)



Combining these grant and price data with a NPSAS-based estimate of the share of total grant support accounted for by Pell awards, indicates that a period of declining net-of-grant prices began in 1996 and continued through roughly 2002 (see Figure II-G, below). After 2002, the net price of public 4-year colleges began to increase for both low- and moderate-income students. Subsequently, in 2004, the net price of public 2-year colleges began to increase for both of these groups of students.

Figure II-G

Estimated Net-of-Grant Prices for Low- and Moderate-Income Immediate Enrollees attending public two-year and four-year (non PhD granting) colleges
(constant 2005\$) (for full-time enrollees)
-- based on College Board, Pell operations, and NPSAS data --

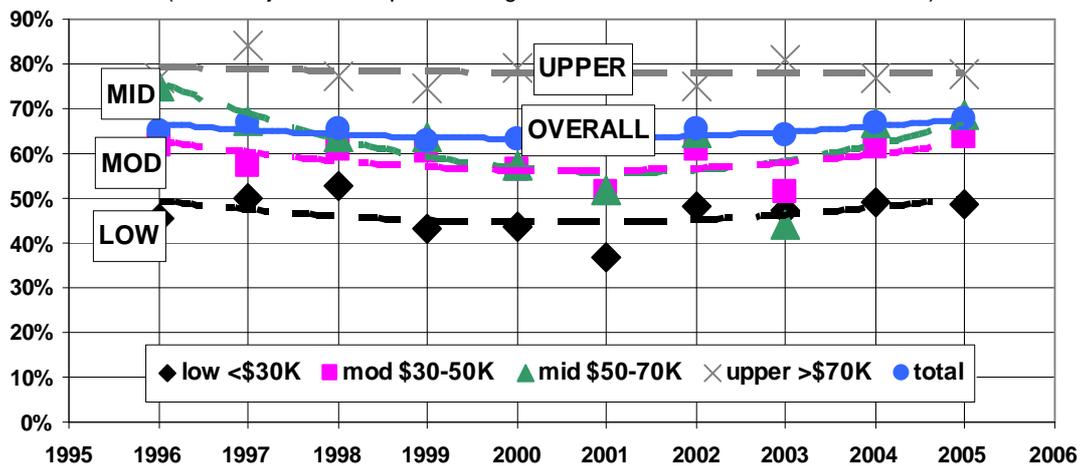


Section III

Estimating the baseline immediate post high school, college-going rates during the ‘natural experiment’

During the 1996-2005 years, the estimated overall immediate post high school completion, college-going rate remained essentially constant (see figure III-A, below)²¹. However the immediate college going rates for low, moderate, and middle income high school completers (from constant-dollar defined income categories) tended to decline during the early years of this time period and increase subsequently. These trends were more pronounced among middle income potential college-goers than among their lower income counterparts.

Figure III-A
Baseline Estimated Immediate Post HS Completion College Going Rates
 see Appendix A for the approach used in developing these estimates
 (Dependent and Leavers Combined)
 (totals adjusted to represent Digest of Education Statistics 2005 totals)



In examining these estimated immediate college-going rates, it is important to note that these rates are not directly derived from the annual CPS data tables published by the Census Bureau²². The rates in Figure III-A, above, are the rates for constant, inflation-

²¹ As noted earlier, this analysis of the changes in college going rates during the ‘natural experiment’ is focused on the immediate post high school completion college going rate (i.e., the ‘immediate college going rate’) because the CPS data on which the analysis is based does not support as accurate assessments of the family income of high school graduates who graduated from high school in earlier years. As noted in Appendix A, the CPS sample provides a basis for creating a series of one-year longitudinal studies that support an approach for establishing the family background of high school graduates who are no longer CPS-defined, dependent family members.

Changes in immediate college going rates are not the only potential grant-induced effects that are of interest to policy makers, analysts and others. But, changes in immediate college-going rates are one of the few impact variables that can be relatively easily, accurately, and consistently measured over time.

²² Appendix A describes, in detail, the methodology and data used in deriving these ‘corrected’ immediate college going rate estimates

adjusted income categories, not the current dollar income categories reported by the Census. In addition, these rates are the overall college-going rates for each income category – including both high school graduates who are dependent family members in the fall following their graduation and high school graduates who are no longer dependent family members of the parental families (primarily as a result of a change in the residency status). These rates are also adjusted to represent the administratively reported numbers of high school graduates reported in Department of Education statistics.

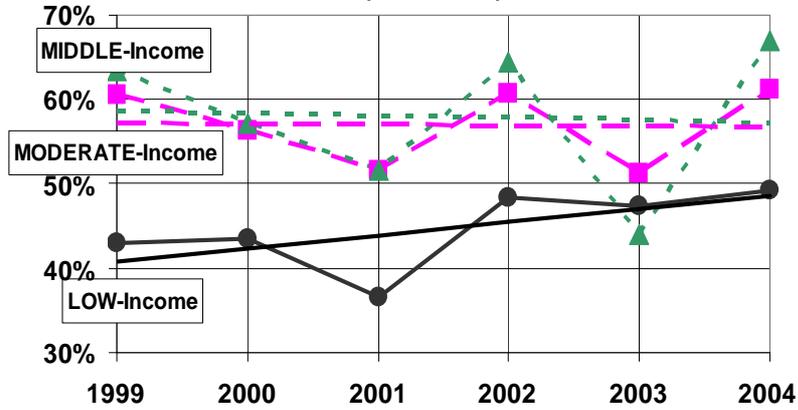
To assess the impact of the 1996-2002 declines in net college prices (described in Section II, above), it is necessary to establish when these declines were likely to have had an effect, if any, on the college going rates of lower income high school graduates. Because college-going is the result of a multi-year process, it is likely that lags exist between price changes, knowledge of price changes, and the impact of these changes on behaviors. In addition, because many high school seniors²³ have limited knowledge about college prices and aid availability it seems unlikely that a small, single year change in net-of-grant prices (such as those occurring during the ‘natural experiment’) would have had an immediate impact on college-going. Furthermore, it is likely that prior year price increases had a greater impact on college-going than did current year price declines during the initial years of the experiment. It also seems likely that the lags between price changes and their impacts became shorter over the period of the experiment, as price declines continued to occur.

Although these assumptions about the structure of lags between price changes and their impact on college-going seem logical, there is no research that suggests they are accurate. Nevertheless, it appears reasonable to assume that the 1996-2002 net price declines would have had an effect, if any, on college-going rates during a overlapping but somewhat later time period, the 1999-2004 years.

Estimated baseline immediate college-going rates during the period of likely impact of grant-induced price declines -- Between 1999 and 2004, the baseline, estimated immediate, post high school completion, college going rates for low income youth tended to increase while the rates for moderate, and middle income youth tended to be essentially constant (see Figure III-B, below). These estimated, baseline rate changes suggest that the impacts of grant-induced changes in net prices on immediate college going rates among low income youth were significant while the changes in net prices had little, if any, impact on college going moderate income youth. But, these estimated, baseline college-going rates have not been adjusted for changes in non-price factors that may be responsible for these observed trends.

²³ Particularly those who are on the edge between going and not going to college as discussed in Mundel, D.S., with Coles, A.S. (November 2004). “An exploration of what we know about the formation and impact of perceptions of college prices, student aid, and the affordability of college-going. The Education Resources Institute (TERI).

Table III-B
Baseline Estimated
Immediate Post HS Completion College Going Rates
(1999-2004)



In assessing a ‘natural experiment’ (as opposed to a more fully controlled ‘real experiment’), it is necessary to account of uncontrolled changes in non-price factors that may have influenced changes in college-going during the ‘natural experiment’. The potential effects of changes in three types of non-price factors are reviewed in the next three sections of this analysis (Sections IV, V, and VI)^{24 25}.

²⁴ Some readers may find it unnecessary to read the next three sections that review, in detail, the possible implications of the changes in experimentally uncontrolled, non-price factors. These readers should skip the next three sections and proceed directly to the conclusions section of the analysis, Section VII.

²⁵ Readers are reminded that the small impact of these uncontrolled, non-price factors does not mean that these factors are not potentially important. Rather, the small impact of changes in these factors indicates that these changes probably played a small role during the period of the ‘natural experiment.’

Section IV

Exploring the potential impact of ‘experimentally uncontrolled’ changes in the family characteristics of high school graduates on immediate college-going rates during the ‘natural experiment’

This section of the paper and the accompanying appendix (Appendix B) include a review and analysis of the potential effects that changes in high school graduates’ family characteristics may have played during the ‘natural experiment’.

In order to control for changes in the family incomes of high school graduates during the ‘natural experiment’, high school graduates were assigned to constant dollar income categories. For example, for each CPS survey year, high school graduates from families with incomes less than \$30,000 (in constant 2005 dollars) were assigned to the ‘low income’ category. In many other studies, researchers have divided individuals into percentile-defined categories -- e.g., individuals whose family incomes are in the bottom 25% or quart of all families, families with high school seniors, or families with entering college students are assigned to the ‘bottom quartile’. The constant (inflation-adjusted) dollar income categorization scheme was used in this analysis because of the role played by measured family income (rather than a family’s position in the income distribution) in the allocation of student grants – the treatment factor being assessed. In addition, constant dollar, income categories tend to create groups of families with similar and essentially constant (in real terms) levels of economic resources.

There is, however, a potential problem associated with this constant dollar income categorization approach. This problem occurs when the real incomes of the families of high school graduates are changing during the period being examined. For example, if the family incomes of high school graduates in the lower part of the income distribution are growing (in constant dollars), then the individuals in the ‘low income’ category (defined as having incomes below a defined constant dollar level) will tend, over time, to represent progressively lower positions within the overall income distribution. These changes in position in the income distribution would not matter if factors other than family income that influence college going rates (e.g., parental education, race, ethnicity, etc.) were not correlated with a family’s position in the overall income distribution. However, many of these factors are probably correlated with its position in the income distribution. In this case, the potential role of changes in a constant dollar income category’s position within the overall income distribution needs to be addressed.

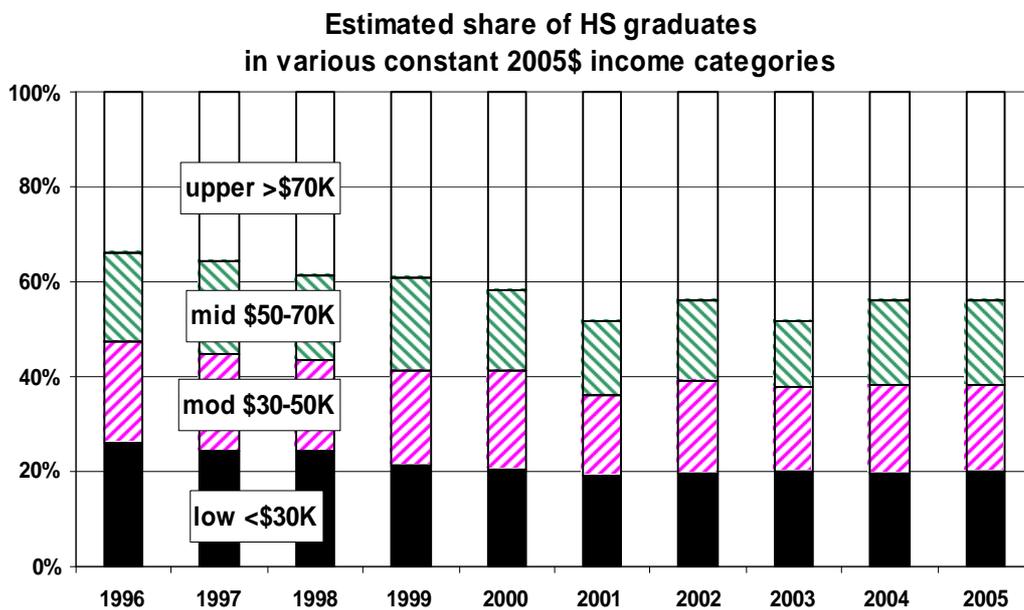
In evaluating the reliability of the baseline enrollment rate estimates derived in Section III, the changing income distribution positions of the constant dollar income categories is not simply a possibility, changes did occur during the experimental period and they represent a potentially important problem.

As reported in a recent Congressional Budget Office study, the real incomes of lower income families with children increased rapidly during the period of the ‘natural experiment’.²⁶

“In 2005, the average annual income of the nation’s poorest households with children (those in the bottom 20 percent, the lowest quintile, of the income distribution) was \$16,800, which was 35 percent higher in real (inflation-adjusted) terms than it had been in 1991. That gain translates to an annualized real growth rate of just over 2 percent. The change was driven by a large increase in earnings during the late 1990’s for the group.”

These changes mean that the income distribution positions of the constant or real (inflation-adjusted) family income group categories used in the analysis of the ‘natural experiment’ changed during the experimental period. For example, while almost 26 percent of the 1996 high school graduates came from families with incomes of less than \$30,000 (in constant 2005\$), by 2001 the share of families of high school graduates included in this category declined significantly, only slightly more than 19 percent of the high school graduates were from families in this income category (see Figure IV-A, below). At the same time, the midpoints of the income distribution positions for the ‘low’, ‘moderate’, and ‘middle’ income categories of high school graduates used in this analysis declined during the 1996-2005 years, particularly during the 1996-2000 years (see Figure IV-B, below).

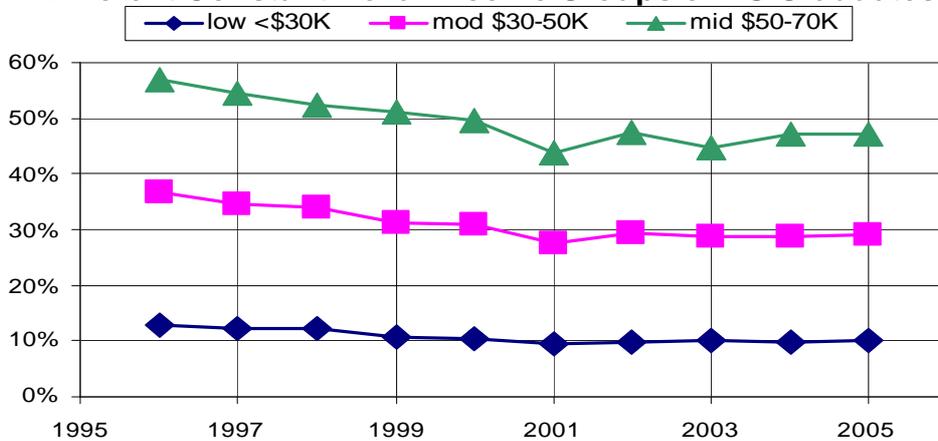
Figure IV-A



²⁶Congress of the United States Congressional Budget Office, “Changes in the Economic Resources of Low-Income Households with Children”, May 2007

Figure IV-B

Midpoints of Position in the Overall Income Distribution for Different Constant Dollar Income Groups of HS Graduates



In addition to these declining income distribution positions of the three, constant-dollar income categories, changes in other family characteristics related to college-going occurred. For example, the share of high school graduates who are Hispanic increased significantly within the moderate and middle income categories (as Hispanic family income grew), while the share increased more slowly among low income graduates (see Figure IV-C, below). The average parental education levels of low income high school graduates also changed, declining during the ‘natural experiment’ while attainment levels of the parents of moderate and middle income graduates remained essentially constant (see Figure IV-D, below).

Figure IV-C

Share of HS graduates who are Hispanic (dependent family members)

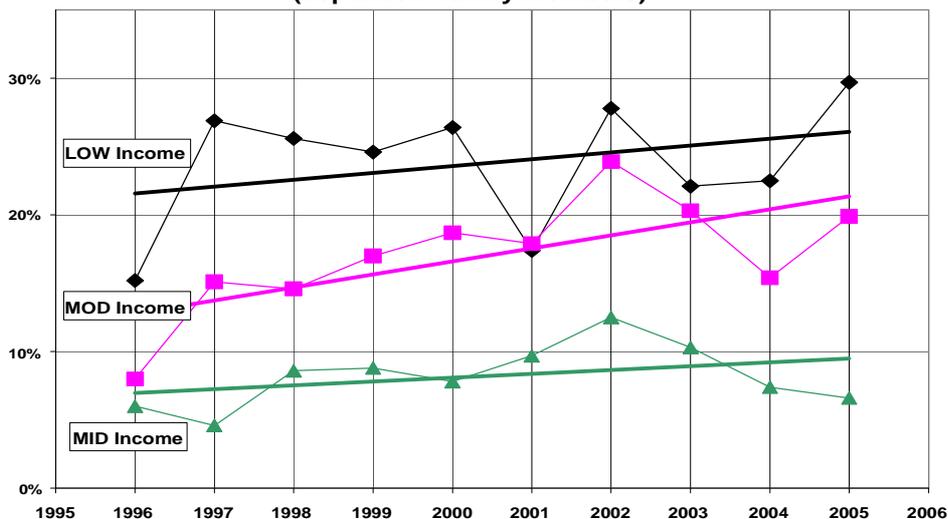
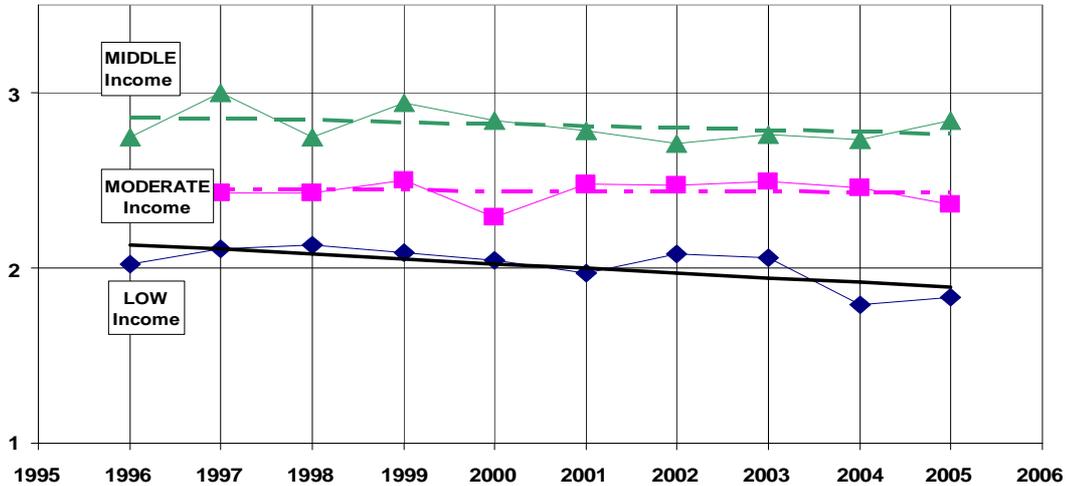


Figure IV-D

Mean education of head of family household
-- primary family head for dependent HS graduates in year N --
[1=less than HS, 2=HS graduate, 3=some college, 4=bachelor's degree]



In general, these shifts in the income distribution positions and underlying family characteristics of low, moderate and middle income high school graduates are likely to have reduced the immediate college going rates of these youth below the levels that would have occurred if the positions and characteristics had remained constant at the 1996 levels during the period of the experiment.

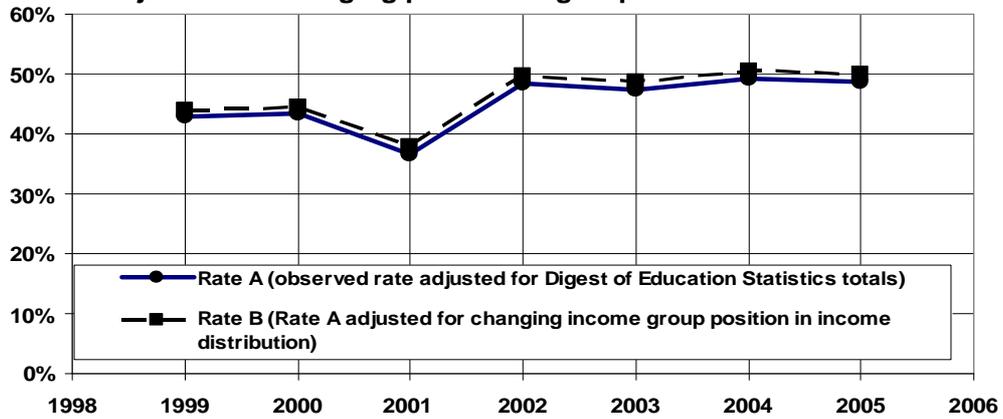
Luckily, for analytic purposes, most of these reductions occurred prior to 1999, when the impacts of declining net-of-grant prices on college-going were likely to have begun to occur. As a result, although the baseline, estimated college going rates during the period of potential experiment impacts were probably lower than they would have otherwise been, the impacts of these family-related factors on the observable impact of the price changes were probably small.

Nevertheless, it is necessary to ‘adjust’ the baseline immediate college going rates for these impacts of uncontrolled changes in the family characteristics of high school graduates in each of the three income categories. Adjusting the baseline, college-going rates for the impacts of changing family characteristics suggests that these changes in the characteristics of families of high school graduates reduced immediate college going rates (particularly among moderate and middle income graduates) during the 1999-2005 years (see Figures III-E1 thru III-E2, below)²⁷. However, the pattern of changes in the income groups’ immediate college-going rates (i.e., the trend lines) during the 1999-2005 years were essentially unaffected by these changes in family characteristics. Appendix B includes a detailed review of the approach taken to make these adjustments.

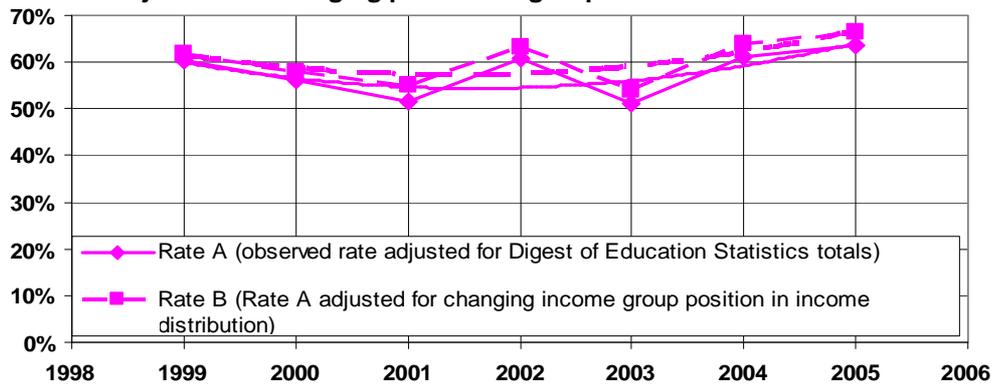
²⁷ This reduction in the baseline, estimated rates means that the college-going for these groups of high school graduates would have been higher had these changes in family characteristics not occurred. In addition the changes in family characteristics also appear to have accentuated the ‘U’ shaped patterns observed in the trends in college-going rates for moderate and middle income high school graduates.

Figures IV-E1 through IV-E3
(as derived in Appendix B)

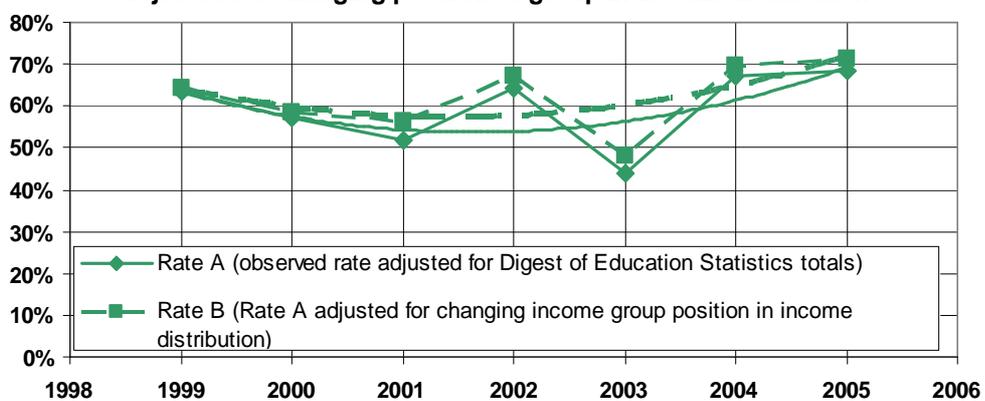
**Estimated Immediate College Going Rate
for Low Income HS Graduates
adjusted for changing position of group in income distribution**



**Estimated Immediate College Going Rate
for Moderate Income HS Graduates
adjusted for changing position of group in income distribution**



**Estimated Immediate College Going Rate
for Middle Income HS Graduates
adjusted for changing position of group in income distribution**



Section V

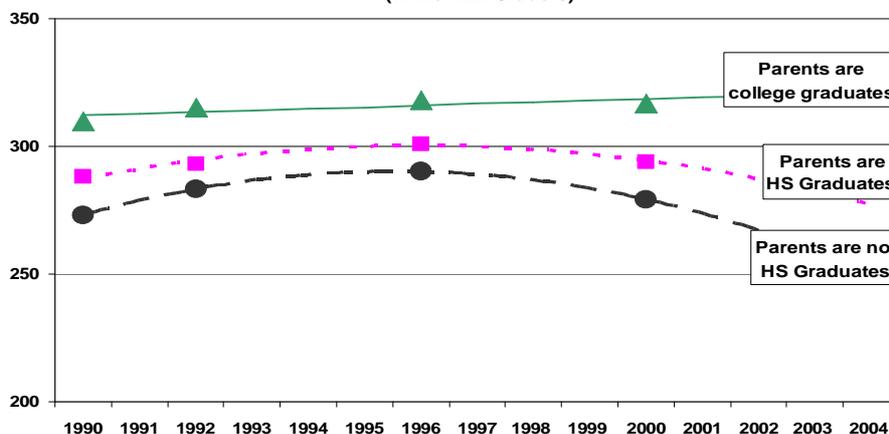
Exploring the potential impact of ‘experimentally uncontrolled’ changes in the characteristics of high school graduates on immediate college-going rates during the ‘natural experiment’

The immediate college going rates of high school graduates may also have been affected by changing characteristics of the high school graduates. This section of the paper reviews the potential impact of changes in these characteristics on college-going during the experimental period and presents an estimate of the potential impact of one factor, changing high school completion rates.

Research has consistently demonstrated that high school student achievement levels affect college-going. Given the shortness of the experiment, one would expect little, if any, changes in high school graduate achievement levels and thus, little impact of this factor on changes in college-going during the experiment. However, data from the National Assessment of Educational Progress suggest that there was some change in the achievement levels of high school seniors whose parents have different educational attainment levels during the period of the natural experiment (see Figure V-A, below). In considering the trends suggested in this figure, it is important to note that these data represent the achievement levels of high school seniors, not high school graduates, and the correlation of parental education and family income is far from perfect.

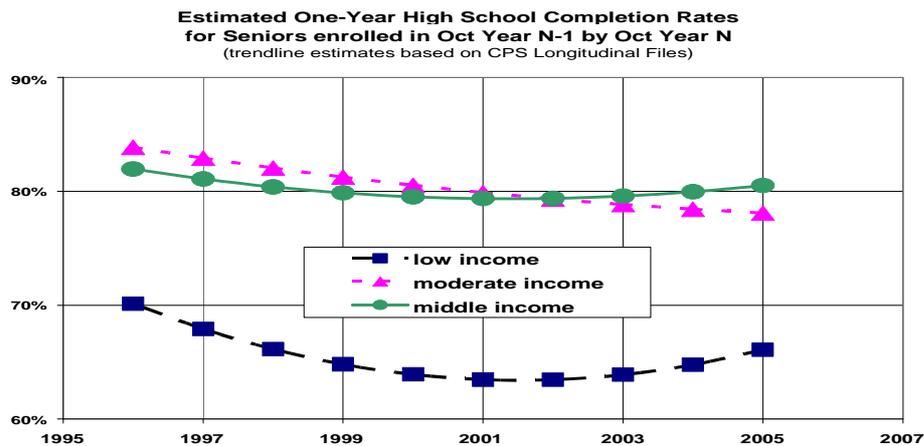
If, as suggested by these data, the achievement levels of high school seniors with less educated parents declined during the years of the ‘natural experiment’ then it is likely that the achievement of low and moderate income seniors also declined. If these possible declines were paralleled by declines in the achievement levels among seniors who completed high school, then the trends in the baseline, estimated immediate college-going rates of lower income high school graduates were probably tilted slightly downward from the rates that would have occurred had achievement levels remained constant during the experiment. Although the direction of the impacts of the adjustment needed to correct for the impact of these changing achievement levels is clear, the extent of the adjustments are difficult to estimate and probably quite small.

Figure V-A
National Assessment Scores for Mathematics
(White 12th Graders)



Changing high school completion rates may also influence the estimated, baseline immediate college-going rates. The CPS data used to create the baseline estimates provide a basis for estimating the share of high school seniors in each October who have completed high school by the following October. The ‘one-year, high school completion rate’ estimates resulting from this analysis indicate that high school completion rates among low and moderate income seniors declined during the period of the ‘natural experiment’ (see Figure V-B, below).

Figure V-B



These declines in the high school completion rates of low- and moderate-income high school seniors may have affected the immediate college-going rates of high school completers in these income categories. For example, if most of the low-income, high school seniors who failed to complete high school would not have attended college had they graduated from high school, then the decline in high school completion rates among these youth would have tended to increase the baseline college-going rates of low income graduates above the levels that would have resulted from constant high school completion rates.

Although available research does not provide an estimate of the share of high school dropouts who would have gone on to college had they completed high school, it is possible to estimate the maximum impact that changes in the high school completion rates may have had on the observed immediate college-going rates. The first step in estimating this maximum impact is to estimate the number of high school seniors in each income category who would have graduated from high school had the category’s high school completion rate remained unchanged at the average rate for the 1996/97 and 1997/98 academic years. Subtracting the number of students actually graduating in each year from the estimated number that would have graduated if the graduation rate had remained constant at the earlier levels provides an estimate of the number of ‘missing’ graduates resulting from the declining high school completion rates. Next, assuming that none of the ‘missing’ graduates would have gone on to college had they completed high school, one can estimate the maximum increase in the immediate college-going rates for each of the income groups that would have resulted from the observed decreases in high school completion rates (see Figures V-C and V-D, below).

Figure V-C²⁸

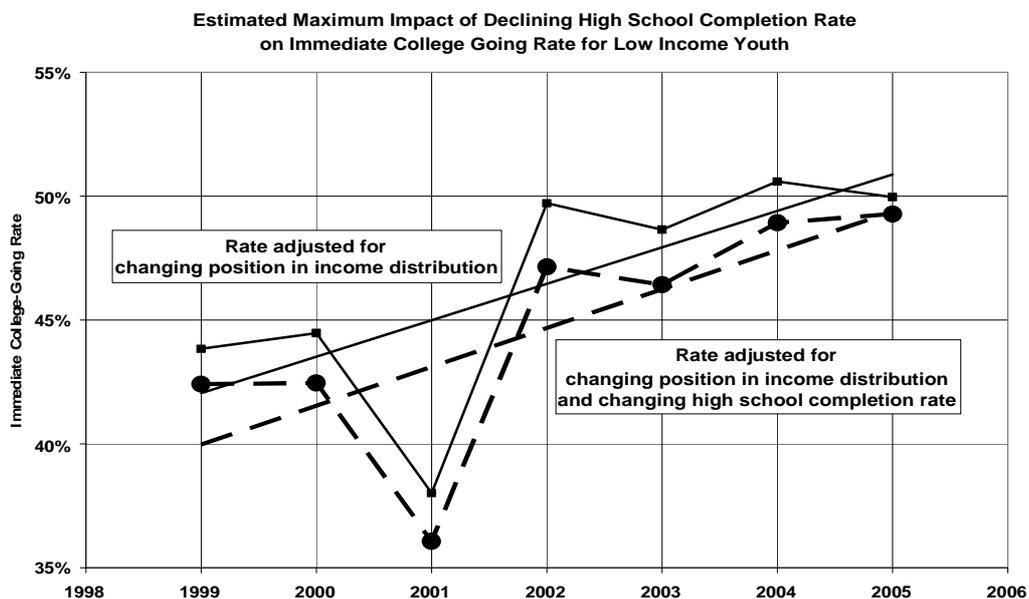
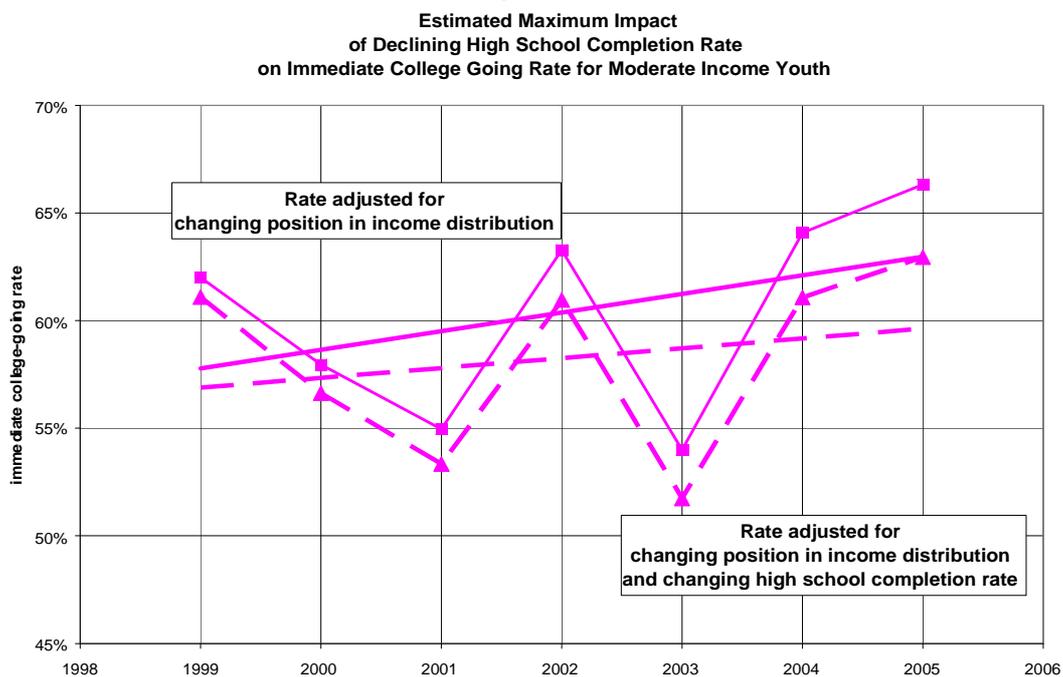


Figure V-D



²⁸ Figures V-C and V-D illustrate the cumulative nature of the adjustments in the baseline, estimated college-going rates – the solid lines represent the baseline rates adjusted for changing family characteristics (as described in Section IV) and the dashed lines represent the baseline rates adjusted for a combination of the impacts of changing family characteristics and changing high school completion rates.

The results of the adjustments for the impact of declines in the high school completion rates of low- and moderate-income high school seniors indicate that the baseline college-going rates were ‘artificially’ increased by the declining high school completion rates of these youth. But, it appears unlikely that these declines significantly altered the trends for the immediate college going rates that occurred during the period of the ‘natural experiment’ when impacts of the net price declines were more likely²⁹.

For middle income youth, the high school completion rates remained essentially unchanged during the period of the ‘natural experiment’. Thus changing high school completion rates had essentially no impact on either the levels or the trends of the observed immediate college-going rates among these youth during the experiment.

²⁹ Note -- In examining the impact of changing high school completion rates on the trends shown in Figures V-C and V-D, it is important to note that the apparent minimal effect of this factor on the patterns of the college-going rate trend lines results from the time period included in the figures. For example, all of the adjustments for changing high school completion rates are based on the assumption that high school completion rates remained at the average of the 1996-97 and 1997-98 academic year rates, prior to the years included in Figures V-C and V-D. For low income youth, most of the decline in the high school completion rates occurred between 1996 and 1999 (see Figure V-B) and these declines influenced the level of the college going rates but not the pattern of these rates during the 1999-2005 years.

Section VI

Exploring the potential impact of ‘experimentally uncontrolled’ changes in economic conditions on immediate college-going rates during the ‘natural experiment’

Not surprisingly, economic conditions did not remain constant during the period of the ‘natural experiment.’ During the early years of the experiment (1996-2000), the overall unemployment rate and the unemployment rates of recent high school graduates declined. Subsequently, these unemployment rates increased (see Figures VI-A and VI-B, below).

Figure VI-A

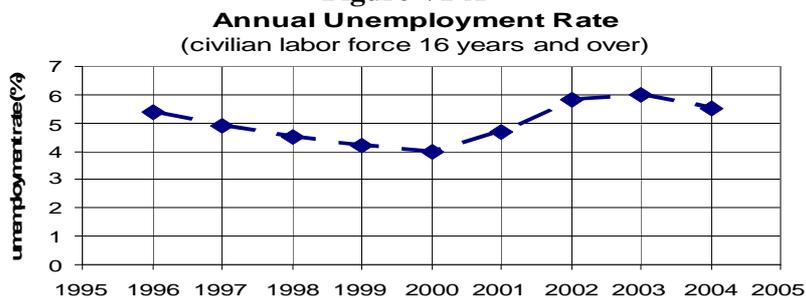
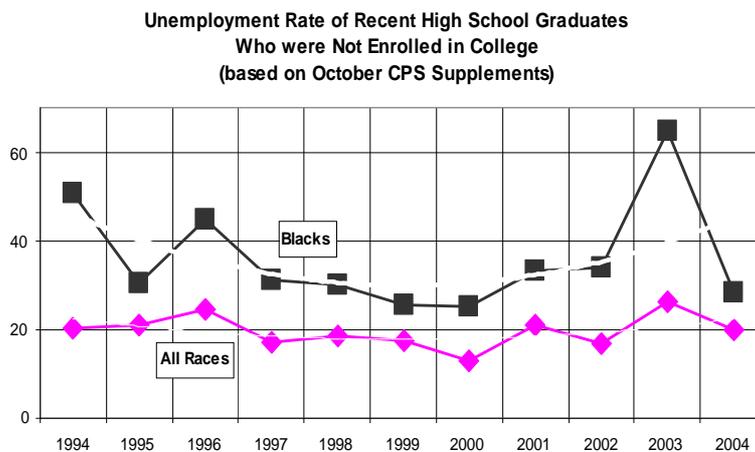


Figure VI-B



Several research studies have addressed the effect of changes in economic conditions (particularly unemployment rates) on college-going. In general these studies report that increases in the overall unemployment rate have a small, but positive impact on college going and decreases in unemployment tend to decrease college-going³⁰. These results suggest that some of the ‘U’ shaped patterns observed in the baseline, immediate college-

³⁰ See for example: Manski, Charles F. and David A. Wise, “College Choice in America”, 1983; Kane, Thomas J., “The Price of Admission”, 1999; Heller, Donald E., “The Effects of Tuition and State Financial Aid on Public College Enrollment”, The Review of Higher Education, Fall 1999; Black, Sandra E. and Amir Sufi, “Who Goes to College? Differential Enrollment by Race and Family Background”, NBER Working Paper 9310, October 2002; and Dynarski, Susan, “Hope for Whom? Financial Aid for the Middle Class and Its Impact on College Attendance”, NBER Working Paper 7756, June 2000.

going rate estimates for low, moderate, and middle income youth during the years of the ‘natural experiment’ (see, Figure III-A, above) may be the result of changes in the unemployment rate.

Both theoretical and empirical studies suggest that the impact of these changes in economic conditions are likely to have a greater impact on college-going among lower income high school graduates – those graduates who are more likely to be considering employment as an alternative to college-going. Because this assessment of the results of the ‘natural experiment’ focuses on these types of potential college-goers, it is particularly important to develop an approach to adjusting the estimated, baseline immediate college-going rates for changing unemployment.

One of the better studies focusing on the impact of changes in unemployment on college-going among lower income youth is a 2003 paper by Bridget Terry Long³¹. The results reported in this paper are particularly relevant for the assessment of the ‘natural experiment’ because the study focused on the college-going decisions of the high school class of 1992, students who graduated from high school at essentially the same time as the beginning of the ‘natural experiment’. Long’s analysis resulted in an estimate that a one percentage point increase in the unemployment rate would result in a 1.03 percentage point increase in college-going among low income youth.³²

Because Long’s analysis provides an estimate for the impact of the unemployment rate on college-going solely for low income youth, assumptions are needed to develop estimates for youth from different income groups. Although available research provides little quantitative evidence related to these needed assumptions, it seems reasonable to assume that college-going among moderate income high school graduates is somewhat less sensitive to changes in unemployment than low income youth (e.g., 25% less sensitive) and that college-going among middle income graduates is significantly less sensitive (e.g., 75% less sensitive). These assumptions underlie the adjustments illustrated in Figures VI-C and VI-D, below.³³

In general, the combination of these assumptions and the observed changes in economic conditions suggests that the increases in unemployment during the 1999-2004 years had only a minor impact on the immediate college going rates of low- and moderate-income

³¹ Long, Bridget Terry, “How Have College Decisions Changed over Time? An Application of the Conditional Logistic Choice Model, *Journal of Economic Literature*, January 2003.

³² The size and direction of the college-going rate changes resulting from these changes in the labor market conditions are both somewhat uncertain. As earnings from student work have come to play an increasing role in the payment of college costs -- more students from all income groups are working; those that work are working longer hours; and those with earnings are paying a greater share of their college costs. As a result, factors which increase the earning potential of college students – such as higher wages and lower unemployment – may increase college going rather than increase the attractiveness of non-college alternatives. Perhaps, one reason that youth labor market conditions may have a small and uncertain impact on college going is that the impacts of changes in these conditions may be both positive and negative and the mix of these impacts may differ among different types of potential students and may also be changing over time.

³³ The accuracy of these specific assumptions is unknown.

high school graduate. In addition, it appears that these changes in unemployment had little, if any, impact on the observed trends of these college-going rates during these years³⁴. Among middle income high school graduates, these changing economic conditions had even less of an impact on college-going rates and trends.

Figure VI-C

**Estimated Impact of Changes in Unemployment
on Adjusted Baseline Immediate College Going Rate
for Low Income High School Graduates**

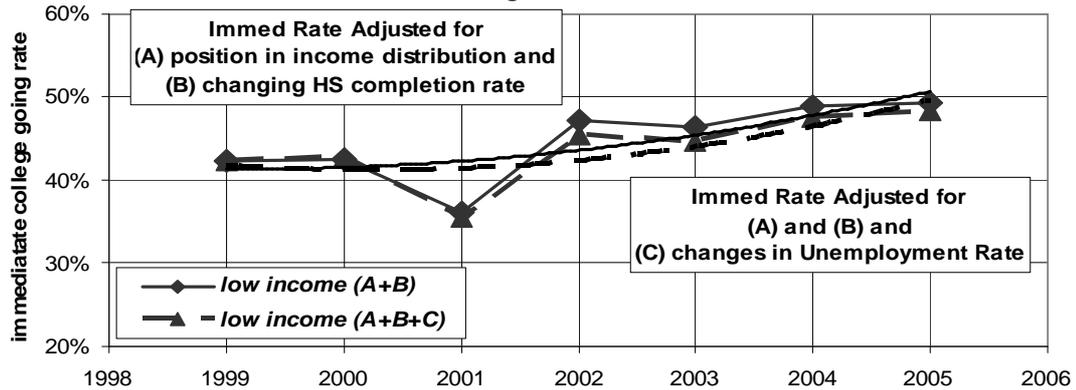
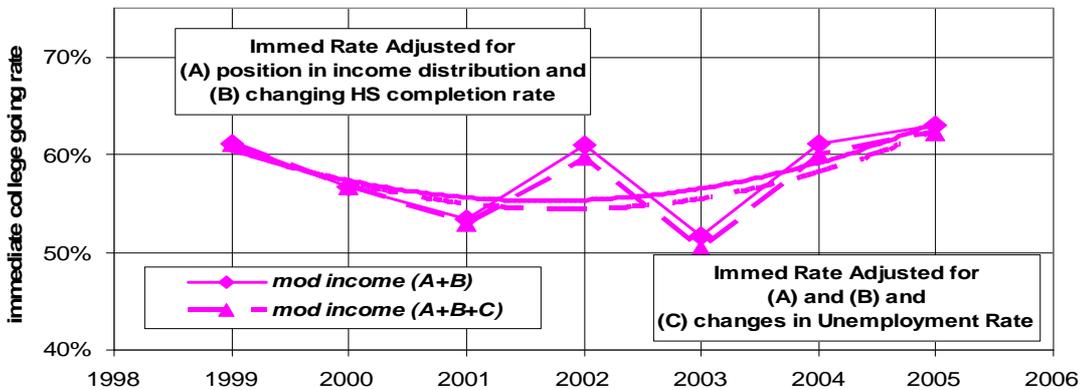


Figure VI-D

**Estimated Impact of Changes in Unemployment
on Adjusted Baseline Immediate College Going Rate
for Moderate Income High School Graduates**



³⁴ The adjustments illustrated in Figures VI-C and VI-D indicate what the college-going rates of the three groups of high school graduates would have been, had unemployment remained constant at the 1999 level during the 1999-2005 years.

Section VII

Conclusion – Results of the ‘Natural Experiment’

A new estimate of the impact of declines in the net college prices on the immediate college-going rates of lower income high school graduates

Changing net-of-grant prices -- Between 1996 and 2002, the net-of-grant prices in lower price, public colleges (two-year and non PhD-granting, four-year colleges) facing lower income high school graduates declined significantly and relatively steadily³⁵. For low income youth (those from families with incomes below \$30,000)³⁶, the average, net-of-grant prices of these colleges declined by roughly \$950 to \$1000. For moderate income youth (those from families with incomes between \$30,000 and \$50,000), the net price declines were smaller and less steadily, declining by roughly \$550-600 for public, two-year colleges and \$300-350 for public four-year (non-PhD granting) colleges³⁷.

These price declines were primarily the result of increases in the grant support received by these students, as list prices remained essentially constant during these years. Most of these increases in grant support resulted from increases in Pell Grant awards as Pell awards accounted for roughly two-thirds of the grants received by low income students and roughly one-half of the grants received by moderate income students.

Changes in the immediate college-going rates of lower income high school graduates ‘associated’ with these declining net-of-grant prices – During the 1999-2004 years (when the declines in net-of grant prices were more likely to have influenced immediate college-going rates), the baseline, estimated immediate post high school completion, college-going rates of lower income youth tended to increase slowly.

But changes in several enrollment-influencing non-price factors may have influenced these trends. Among the more important of these potentially influential changes were: changes in the characteristics of high school graduates’ families; changes in the characteristics of high school graduates, themselves; and changes in economic conditions. Adjusting the baseline, estimated college-going rates for the impact of these changes in these non-price factors suggests that in combination, these changes had little impact on the patterns of changing immediate college going rates of low, moderate, and middle

³⁵ The impact of the declines in the prices of these two types of public colleges are likely to affect overall college-going (rather than simply the patterns of enrollment among types colleges) because these lower price public colleges are likely to be the enrollment choices of youth who would not otherwise become college students.

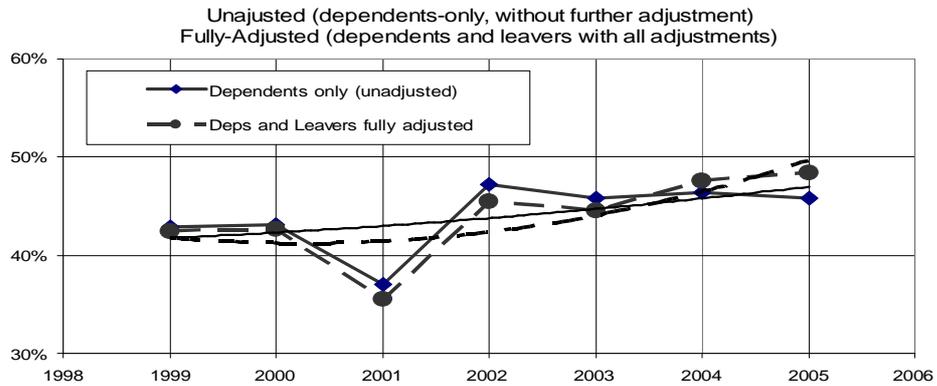
³⁶ All incomes and net-of-grant prices are in constant, inflation-adjusted 2005 dollars.

³⁷ These prices are those paid by students who were enrolled full-time and part-time immediately following their graduation from high school and were living at home with their parents (based on figures II-C, II-D, and II-E, above). These average amounts of grant support depend on both the share of students receiving Pell and other grants and the level of the grants from all sources received by these students, including federal and state government grant programs and grants from colleges and universities.

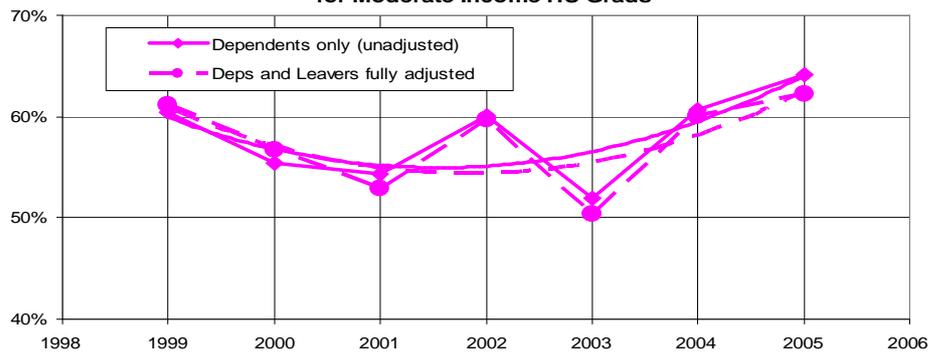
income high school graduates during the 1999-2004 years (see Figures VII-A, B, and C, below).

Figures VII-A, VII-B, and VII-C

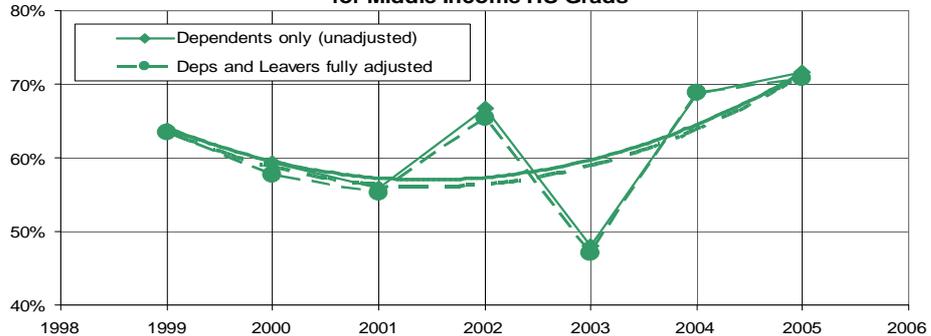
Comparing Unadjusted and Fully-Adjusted Immediate College Going Rates for Low Income HS Grads



Comparing Unadjusted and Fully-Adjusted Immediate College Going Rates for Moderate Income HS Grads



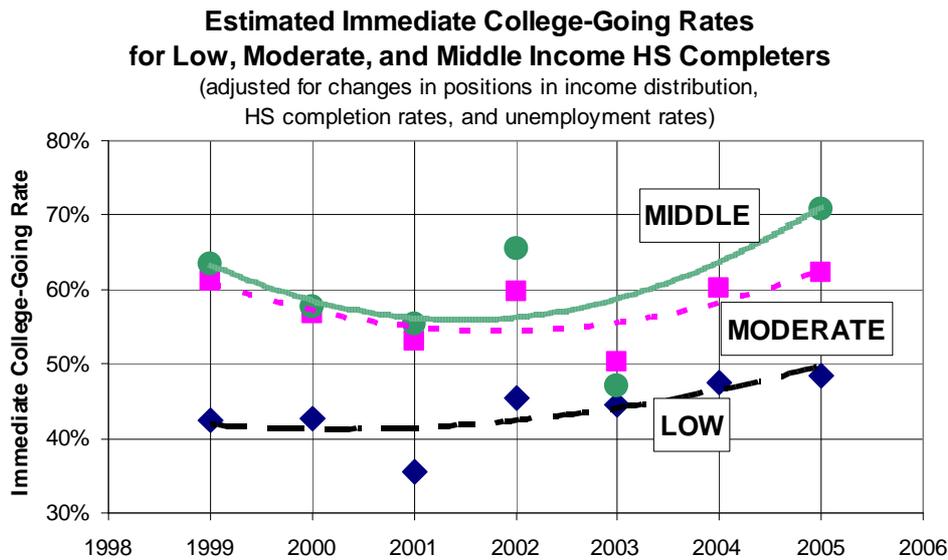
Comparing Unadjusted and Fully-Adjusted Immediate College Going Rates for Middle Income HS Grads



After adjusting the baseline, estimated college-going rates to ‘control for’ (or remove the possible impacts of) changes in these three non-price factors, it is still apparent that the immediate college-going rate of low-income high school graduates increased during the

years following the start of the period of declining net-of-grant prices (see Figure VII-D, below). At the same time, the immediate college going rate for moderate-income high school graduates declined after the beginning of the net price declines and then increased. During these years, the college-going rate for middle income youth (for whom net-of-grant, college prices remained essentially constant) first declined and then increased.

Figure VII-D³⁸



During the 1999-2004 years, the adjusted immediate college going rate for low income youth increased by roughly 6-7 percentage points, while the adjusted rate for moderate income youth remained essentially constant, declining by roughly 0-1 percentage point. During these years, the immediate college going rate for middle income youth increased by roughly 4 percentage points.

The small and relatively consistent, upward trend in the immediate college-going rate of low-income high school graduates appears to be due, in part, to both to the larger price declines experienced by these youth and the relatively higher price sensitivity of these youth. In addition, some of this upward trend may be due to changes in unexamined, non-price factors.

These observations for the period of the ‘natural experiment’ suggest that among low-income high school graduates, a grant-induced decline in net price of roughly \$1000 (for public two-year and four-year colleges, in constant 2005\$) resulted in approximately a 6-7 percentage point increase in the overall, immediate post high school, college-going rate. This experimentally-derived estimate of net-of-grant, price sensitivity is comparable to, but somewhat higher than, the list and net price sensitivities reported in several published

³⁸ Based on Figures VII-A, VII-B, and VII-C, above

studies based on cross-sectional, non-experimental methodologies. These studies reported a roughly 3-5 percentage point increase in college going associated with a \$1000 decline in prices (in constant 2005\$)³⁹.

Clearly the experimentally-derived estimate of the price sensitivity of college-going among low income high school graduates is, on its own, suggestive rather than definitive. The results of the ‘natural experiment’ show an ‘association’ and suggest a causative relationship between changes in college prices and college going. But, fully controlling or adjusting for the effects of all potentially causative factors and uncertainties is essentially impossible in a ‘natural experiment’.

But, the ‘natural experiment’ is not the only source of our understanding of the role of price in influencing college-going. Economic theory strongly suggests that the list and net price of college-going influence college-going rates, particularly among lower income students. In addition, there is a long and rich history of statistical or econometric analyses of cross-sectional and longitudinal data that strongly indicate that college prices influence college-going. Although somewhat more limited, there are a growing number of empirical analyses that strongly indicate that some price-reducing, grants to students also influence college going, particularly among students from lower income families.

- Given the preponderance of this theoretical and empirical evidence indicating the role of list and net college prices in influencing college-going, the results of the ‘natural experiment’ should be seen as providing further support to the view that declines in net-of-grant college prices stimulate measurable and significant increases in college-going among low income students.
- Because a majority of the price declines experienced by low income students resulted from increases in Pell Grant awards, the results of the ‘natural experiment’ also indicate that increases in Pell awards positively influence college-going among these students.

But, it is important to question the validity of the estimate of price sensitivity resulting from the ‘natural experiment’. Specifically, what are the possible sources of the higher price sensitivity estimate that results from the natural experiment?

Clearly, the higher, experimentally-derived estimate may be the result of the impact of unexamined changes in non-price factors. In a ‘natural experiment’ (as opposed to a fully controlled experiment) there are wide variations in treatments (i.e., grant-induced, price reductions) that can potentially affect the experimental ‘subjects’. In addition, there are wide variations in and uncertainties about the actual characteristics of the ‘subjects’ and a clear possibility that changes in many

³⁹ These studies are discussed in: Mundel, David S. “What do we know about the impact of grants to college students?” in Baum, McPherson, and Steele, editors. *The Effectiveness of Student Aid Policies: What the Research Tells Us*. College Board. 2008 and Avery, C. & Kane, T.J. (2004). “Student perceptions of college opportunities—The Boston COACH Program”, In Caroline M. Hoxby, *College Choices*. NBER. Chicago, IL: University of Chicago Press, 355–394. (in comparing these estimates, it is important to note that the Avery and Kane review focused on the sensitivity of enrollment to price changes in 1990\$)

types of unexamined factors and policies may have changed and that these ‘unexamined’ changes may have influenced college-going behaviors.

In addition, the higher net-of-grant, price sensitivity estimate may be the result of focusing the assessment of the experiment on lower income students (who are likely to be more price sensitive) and lower price public colleges (colleges whose prices are more likely to affect youth who are on the ‘margin’ of the ‘attending or not attending’ decision).

Another source of the higher, experimentally-derived estimate of price sensitivity may be that the experiment involved a multi-year period of price declines. A continuity and consistency of price changes would clearly be more likely to affect long term, college going decisions than would a single year price change. In addition, a multi-year continuity of price declines would tend to increase awareness of increasing college affordability among potential enrollees, thus increasing the potential for price stimulated college-going decisions⁴⁰.

⁴⁰ This increase in awareness of affordability may be also affected by the fact that many of the ‘marginal’ enrollees in these lower price public colleges continue to live at home while they are enrolled. Because of this, these enrollees are probably more likely to continue their relationships with high school students from their neighborhoods and thus more likely to communicate with them about the affordability of college-going.

Appendix A

The approach used to develop the estimated, baseline, immediate post high school completion, college-going rates underlying this analysis of the 1996-2005 ‘natural experiment’⁴¹

The analysis of the impacts of the price changes occurring during the 1996-2005 ‘natural experiment’ is based on a set of estimated, college-going rates for high school graduates from different income groups. These estimated college-going rates were derived using a relatively complex methodology and several available data sets. Because this methodology was developed specifically for this assessment and the detailed estimates may be useful for other researchers, this appendix provides a detailed description of the methodology and a set of tables showing the resulting estimates.

In reviewing the data needed to create the baseline, immediate college-going rates groups used in this analysis, it became evident that no single data source would provide all of the needed data. For example, although the annual October CPS surveys provide the needed information for dependent family members who are enrolled in college immediately following their completion of high school, the surveys do not provide the needed information for another important group of high school graduates and college-goers – youth who are no longer dependent family members (as defined by the Census). Basically, information about the parental incomes of high school graduates who live on their own, rather than living with their parents or in on-campus, college housing (so-called ‘family leavers’) is not included in the annual October CPS data files. The utility of the CPS data is also limited by the assignment of families and individuals to current dollar income categories rather than constant dollar (inflation-adjusted) categories required for the analysis of comparable cohorts of high school graduates.

The data used in developing these baseline estimates come from three large and relatively reliable, survey-based data sources: 1) the annual Bureau of the Census October Current Population Surveys (the basic monthly CPS and the accompanying October supplements focused on information about educational attainment and enrollment); 2) a series of short-term, one-year, longitudinal surveys derived from a subset of the populations included in the 1995 through 2005, October CPS data files⁴²; and 3) the National Postsecondary Student Aid Study (NPSAS) surveys conducted by the Department of Education in three academic years during the experiment, 1995/96, 1999/00, and 2003/04.

Although these data sources, in combination, contain extensive information about the family incomes of high school completers and their immediate college going rates and patterns, they do not provide all of the information needed to fully estimate the needed

⁴¹These baseline estimates are the focus of Section III of the body of this paper.

⁴²These longitudinal files are made possible by the sampling design used in the CPS. This design results in roughly half of each year’s sampled households/families being included in the subsequent year’s sample. The consistency of the data format throughout the 1995-2005 years makes it relatively easy to develop this set of longitudinal samples

college-going rate estimates. Thus, to develop the desired series of estimates it is necessary to make a few key assumptions that are described in this appendix.

Using the October CPS data to estimate the number of dependent family members who completed high school in each year and the number of these graduates who were attending college during October in the same year -- The single-year, October CPS files provide data on the high school graduation, college-going, and ‘current dollar’ family income levels for individuals who are dependent family members. Each of the October CPS data files provides detailed information on the included individuals (i.e., those who are dependent family members) including whether they completed high school during the current year (e.g., the year N October survey indicates whether an individual completed high school during year N) and whether they are enrolled in college during the survey month (October of year N). The following CPS data elements were used in developing the baseline estimates of immediate, post high school completion, college-going among dependent family members during the experimental period:

High school graduate enrolled in college = completed high school (peeduca ≥ 39) and currently enrolled in 1st or 2nd year of college (pegrade = 13 or 14)

Not high school graduate, enrolled in high school = did not complete high school (peeduca < 39) and currently enrolled in 12th grade (pegrade = 12)

High school graduate, not enrolled in college = completed high school (peeduca ≥ 39) and not enrolled in school (preschool == 2)

Not high school graduate, not enrolled in school = did not complete high school (peeduca < 39) and not currently enrolled in school (peschool = 2)⁴³

Household income reported by head of household – categories range from Not Reported to \$75,000 or more from 1995-2002 as reported after our October meeting. From 2003 to 2005, the top categories were changed to \$75,000 to \$99,999, \$100,000 to \$149,999, and \$150,000 or more.⁴⁴

Mean education of head of household – (peeduca_ref) A summary variable of the highest grade completed for the household head was created -- collapsing into five categories (1=less than high school; 2=high school; 3=some college to associates degree; 4=bachelor’s degree; 5=graduate/professional degree.)

Mean family size (dependent family members) – (totdepfam) number of persons where prfamnum = 1, 2, 3, or 4.

⁴³ In a handful of cases, high school graduation status and enrollment appeared to conflict. In these cases, the highest degree of education variable “trumped” the enrollment variable. For non high school graduates who reported enrollment in 1st year of college, we coded these cases as not graduated, enrolled in high school. For high school graduates coded as still enrolled in 12th grade. These cases were coded as high school graduates, not enrolled in college.

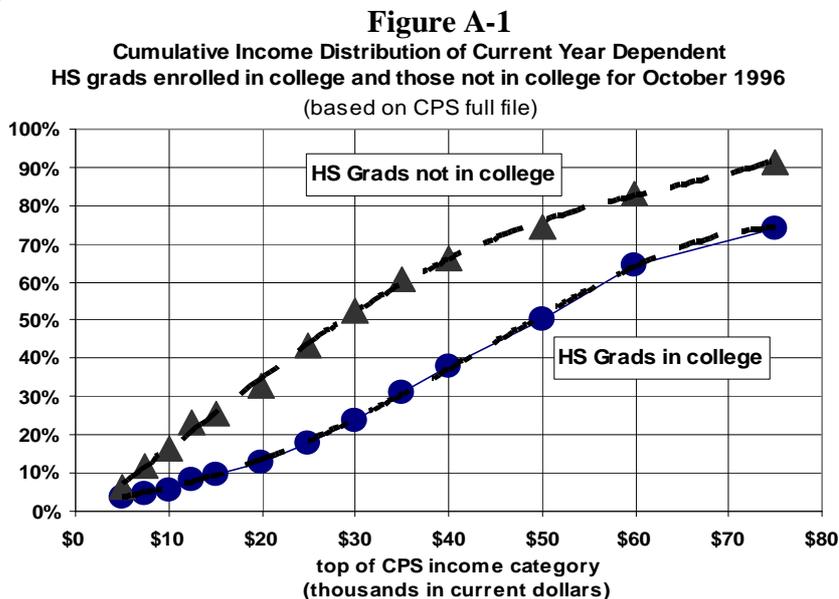
⁴⁴ The October CPS asks only one income question rather than a series of detailed income questions such as those found in the annual March survey.

Weights – (pwfmwgt_ref) Based on an analysis of the data and suggestions from other researchers, the family weight from the household head record was.

Adjusting the CPS data (in which households are assigned to current dollar income categories) to create counts of high school graduates and immediate college-goers in constant (inflation-adjusted) dollar income categories -- The following approach was used to develop the count of CPS-defined, dependent family members in each of the four, constant dollar or inflation-adjusted income categories who completed high school and were enrolled in college during each year.

First, dependent family members from families for which income was not reported (i.e., this data field was blank) were assigned to the CPS current year income categories according to the distributions of current year high school graduates; college enrollees in the immediate post high school completion year; and not enrolled, recent high school completers for whom family incomes were reported.⁴⁵

Second, for each group of individuals (current year high school graduates, immediate college goers, and current year high school graduates who were not enrolled in college) a cumulative income distribution was developed for each of the 1996-2005 years (using the current year dollar income categories) and an equation for the continuous or smoothed cumulative distribution was estimated for each group of individuals for each year (for an example, see Figure A-1, below)



⁴⁵ Because, substantially different shares of female and male high school graduates and college goers were in families for whom incomes were not available in many years and the family income distributions were different for females and males for whom family income reports were available, the assignment of individuals without income reports was done separately for females and males and then, these separate estimates were added together to create of the overall distribution individuals among the various income categories.

Third, based on a series of breakpoints that divide families into relatively broad, constant (2005\$) income categories (i.e., LOW < \$30,000, MODERATE \$30-50,000, MIDDLE \$50,000-70,000, and > UPPER \$70,000 as shown in Table A-2, below) -- the estimated cumulative income distributions and the total counts of the relevant populations for each year were used to calculate number of dependent family members who were current year high school graduates, immediate college enrollees, and immediate non-enrollees in each of the years.

Based on these numbers, the immediate post-high school college-going rates for these groups of dependent family members were calculated.

Table A-2

Breakpoints to Establish Constant 2005\$ Income Categories
(current year dollar breakpoints that represent constant 2005 \$)

	top of LOW	top of MOD	top of MID
2005	\$30,000	\$50,000	\$70,000
2004	29,008	48,347	67,685
2003	28,095	46,825	65,555
2002	27,576	45,960	64,344
2001	26,935	44,891	62,848
2000	26,525	44,209	61,892
1999	25,656	42,761	59,865
1998	24,985	41,642	58,299
1997	24,588	40,980	57,372
1996	24,176	40,293	56,411
1995	23,399	38,999	54,598
1994	22,760	37,933	53,107

Adjusting the CPS-derived counts of dependents in the various income groups to account for the missing high school graduates and immediate college enrollees (i.e., formerly dependent family members who have become ‘family leavers’) – This adjustment is an important step in arriving at accurate estimates for the baseline, college-going rates. As noted above, the CPS does not include important data about a recent high school completers are no longer in their parental households – so called, ‘family leavers’. These ‘family leavers’ may have left their parental families by establishing independent families or households or they may be living ‘independently’ while enrolled in college rather than living in on-campus, college-provided housing. Many of these ‘leavers’ may be ‘dependent’ on their parental families (using the definition of ‘dependency’ traditionally used in analyzing college-going and establishing financial aid awards) but they are not ‘dependent family household members’ as defined by the Census.

If the share of high school graduates who become ‘family leavers’ differs among income categories and/or varies over time, omitting these students may create significant errors in

the baseline college-going rates and trends needed to assess the results of the ‘natural experiment’.

The year-to-year consistency of the October CPS data formats and the CPS sampling design provide an opportunity for identifying family members who have become ‘family leavers’. In the CPS data files, these ‘family leavers’ are represented by empty person-level fields in the current October survey records for families that were also surveyed in both the current year and the preceding year October CPS.

But, ‘family leavers’ educational attainment (i.e., whether they completed or graduated from high school during the current year) and their current educational status (i.e., whether they are currently enrolled in college) are not reported because these questions are not asked for individuals who are no longer in the surveyed family households.

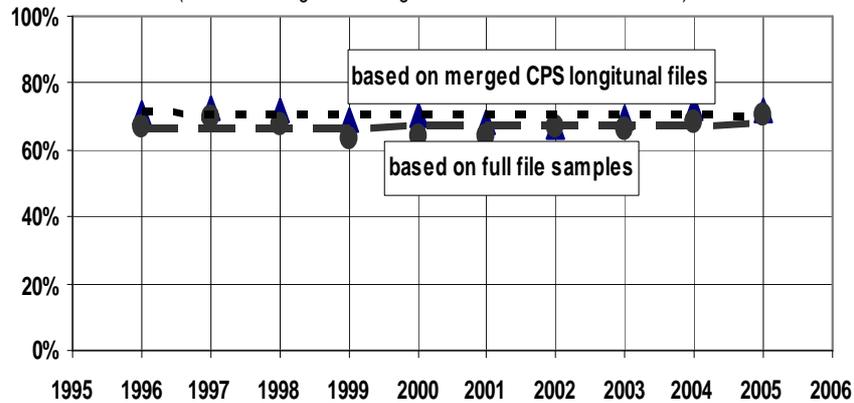
The following approach was used to develop the estimates for the number of ‘family leavers’ in each income category.

First, a series of one-year, longitudinal data files was created using the overlapping October CPS samples for the 1995/1996 through 2004/2005 two year time periods. It was not possible to develop a 1994/1995 merged file because an identifier change between those two years that made merging impossible.⁴⁶ In addition, merging 2003 and 2004 files required the use of a modified set of identifiers.

In order to test the representative quality of the one year longitudinal survey samples, the overall immediate enrollment rate estimates for dependent family members derived from the series of merged two-year, ‘longitudinal’ October CPS files were compared with the estimates derived from the full sample for each of the years (again, limited to dependents family members). This comparison confirmed that the merged file samples are generally representative of the full file samples (see Figure A-3, below).

⁴⁶ See Madrian and Lefgren, “A Note on Longitudinally Matching Current Population Survey Respondents”. Footnote 2, Page 4 of this paper states “Note that neither March 1984 and March 1985, nor March 1994 and March 1995, can be merged. This inability to create a merged file results from revisions in the household identifiers implemented to protect the confidentiality of survey respondents following revisions in the CPS geographic identifiers. These revisions also affect the ability to match consecutive months during the 1984-85 and 1994-95 time periods.” The authors note that attempts, by others, to create a merged file based on revised characteristics were not successful.

Figure A-3
Estimated Immediate Post HS Completion College Going Rates
for CPS Dependent Members
 (based on merged CPS longitudinal files and CPS full file data)



For each of the following categories of ‘dependents’ and ‘family leavers’ parental family background data and counts were developed: 1) dependent high school graduates who were enrolled in college; 2) dependents who had not graduated from high school and were still enrolled in high school; 3) dependent high school graduates who were not enrolled in college; 4) dependents who had not graduated from high school and were no longer attending school; and 5) ‘family leavers’ (for whom educational attainment and enrollment were not coded).

Next, it was necessary to identify the high school seniors in year (N) who became ‘family leavers’ in the subsequent year (N+1) within each family income category. But, the merged two-year, longitudinal sample files and the full one-year October file do not contain data indicating whether these missing ‘family leavers’ (who were high school seniors in the first year – N) had completed high school by the following October – year N+1 -- and whether, if they were high school completers, they became ‘immediate college enrollees’ in the following October.

The lack of high school completion information for high school seniors who became ‘family leavers’ creates the need for one of the two major assumptions used in developing the baseline immediate college-going rate estimates – the assumption used was that for each income category, the high school completion rate of seniors who subsequently (i.e., in the subsequent year’s, October survey) became family leavers is equal to the completion rate of seniors who continued to be dependent family members in the subsequent year’s survey.⁴⁷

⁴⁷ Although this assumption appears reasonable, no studies that addressed this assumption were found in the literature.

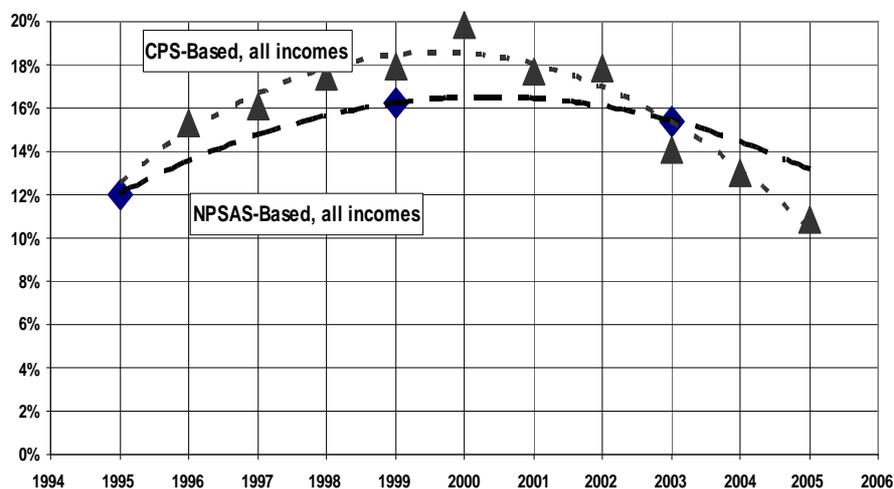
The next step in the analysis involves using the NPSAS and CPS data sets to estimate the share of high school completing, CPS-defined ‘family-leavers’ in each income category who became college enrollees in the fall following their high school completion.

The NPSAS data sets for the 1995/96, 1999/00, and 2003/04 academic years contain data indicating the residence status of immediate, post high school graduation, college students. These data identify which students lived at home, off campus but not at home, and on campus. Thus, the NPSAS data can be used to ‘identify’ immediate post high school, college students who are probably CPS-defined ‘family leavers’.

In addition, the CPS October data sets for 1995 through 2005 can be used to calculate the total number (not the number in each income category) of college students who are ‘family leavers’ by comparing the total counts of immediate, post high school college goers who are dependent family members with the total number individuals who are attending college immediately following high school.

Comparing the NPSAS-derived and CPS-derived estimates of the share of all immediate post high school completion college-goers who are CPS-defined ‘family leavers’ suggests that the NPSAS and CPS ‘family leaver’ estimates are relatively comparable (see Figure A-4, below).

Figure A-4
 CPS-Based and NPSAS-Based Estimates of Shares
 of Immediate Post HS Completion College Enrollees
 who are "CPS-defined family leavers"
 (all income groups combined)



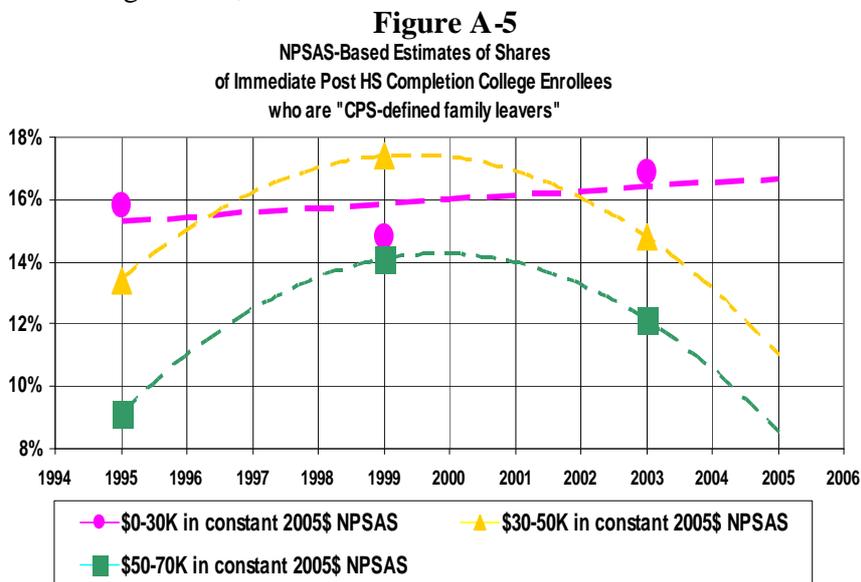
Using the NPSAS data set, it is possible to identify the proportion of immediate post HS college going CPS-defined ‘family leavers’ in each of the four constant dollar income categories. This identification is complicated by the different income definitions and sources used in the NPSAS and October CPS surveys. In the NPSAS, family incomes for lower income students are generally based on the Free Application for Federal Student

Assistance (FAFSA) -- ‘administrative’ data provided by parents and students when they apply for federal assistance. In the NPSAS, family income for families that did not apply for federal student aid is either imputed or derived from surveys. In the CPS, the family income data are based on respondents’ answers to one income question for which the responses are categorical, rather than continuous.

Several research studies have reviewed the differences between survey-reported and administratively-recorded income data.⁴⁸ In general, these studies report that the incomes included in survey and administrative data sets which include the same persons or families are different. Given this problem and the lack of any studies addressing the accuracy of parent and student administratively-recorded and survey-reported family incomes for families with college students, a ‘rank-order’ method was chosen to make the needed NPSAS-CPS comparability adjustments (as opposed to a more direct income conversion method).⁴⁹

To develop similar rank-order income groupings, the NPSAS data for each of the three NPSAS years was used to identify the income breakpoints that divided the NPSAS sample of CPS-defined dependent family members who were attending college immediately after high school into the same size groups (in percentage terms) as resulted from the use of the constant dollar income categories used for analyzing the CPS data for each of the three NPSAS years.

The resulting estimates of the share of immediate college goers from each income category who are CPS-defined, ‘family leavers’ in each of the NPSAS years are shown in Figure A-5, below

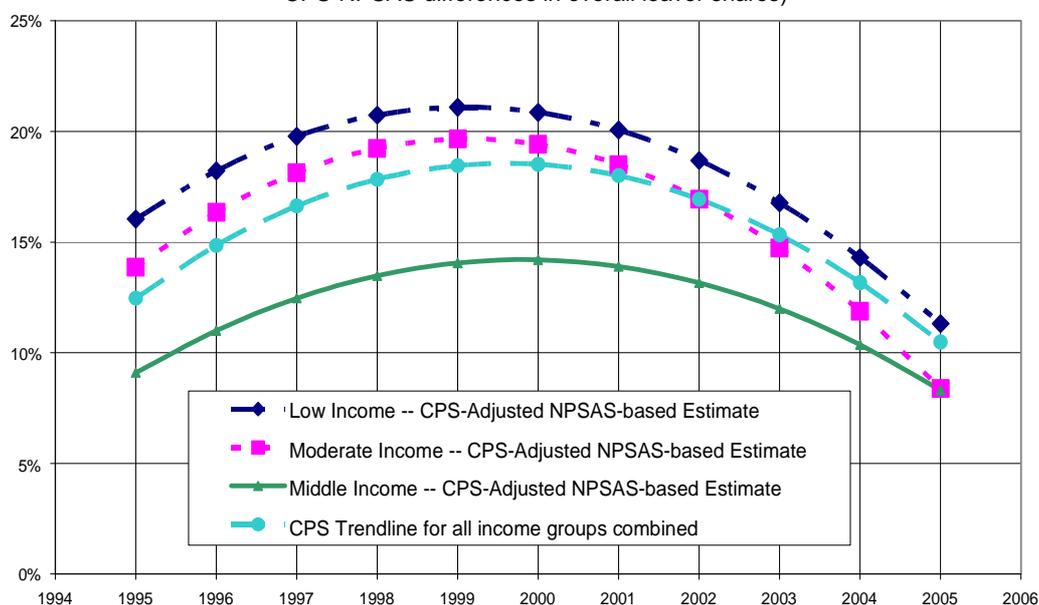


⁴⁸ See for example, Haveman, Robert and Geoffrey L. Wallace, “Work and Earnings of Low-Skill Women: A Sobering Comparison of Survey Responses and Administrative Records”, December 2003.

⁴⁹ Although Haveman and Wallace reported significant differences between survey-reported and administratively-recorded data in their study of unemployment insurance earnings, a reanalysis of their data indicated that the rank order positions of the survey and administrative data were relatively highly correlated (Spearman Rho coefficient 0.6494 with 1819 observations).

Prior to using these NPSAS-based estimates for the shares of immediate enrollees in each income category who are ‘family leavers’, it is necessary to adjust the estimated shares for each income category for the differences observed in the overall (i.e., all income categories combined) NPSAS and CPS ‘leaver share’ estimates (see Figure A-4, above). This adjustment yields the following NPSAS-based, CPS-adjusted estimates of the share of immediate enrollees in various income groups who are CPS-defined, ‘family leavers’ (see Figure A-6, below)

Figure A-6
NPSAS-based, CPS-adjusted estimated Share of Immediate Enrollees from Various Income Categories who are ‘CPS-defined’ Family Leavers
 (NPSAS-based estimates adjusted for CPS-NPSAS differences in overall leaver shares)



Using the ‘leaver’ shares shown in Figure A-6 and the CPS-derived estimates for the number of immediate post high school, dependent college goers, it is possible to derive an estimated number of immediate post high school ‘leavers’ who are enrolled in college in each of the CPS years.

$$\# \text{ Leavers}_{iN} = \# \text{ Dependents}_{iN} \times (\text{LS}_{iN} / (1 - \text{LS}_{iN}))$$

where LS_{iN} = leaver share of all enrollees in category i in year N

Combining the results of the CPS full file, CPS one-year longitudinal file, and NPSAS analyses, yields estimates for the number of high school completers and immediate college goers (for the combination of dependent family members and ‘family leavers’) during the 1996-2005 years (see Tables A-7 and A-8, below).

Table A-7

**Estimated Number of High School Completers
in Various Constant 2005\$ Income Categories**
(dependents and 'leavers' combined, in thousands)

	low <\$30K	mod \$30- 50K	mid \$50- 70K	upper >\$70K	TOTAL
1996	663	553	477	861	2554
1997	643	549	514	952	2658
1998	648	507	465	1031	2651
1999	578	542	529	1061	2710
2000	525	525	429	1066	2544
2001	464	405	375	1163	2406
2002	518	516	454	1166	2654
2003	513	448	356	1237	2554
2004	515	492	478	1158	2644
2005	502	464	442	1103	2511

Table A-8

**Estimated Number of Immediate Post High School Completion
College Enrollees in Various Constant 2005\$ Income Categories**
(dependents and 'leavers' combined, in thousands)

	Low <\$30K	mod \$30- 50K	mid \$50- 70K	upper >\$70K	total
1996	297	339	354	654	1644
1997	322	317	347	804	1791
1998	340	307	295	791	1733
1999	245	324	332	782	1683
2000	223	289	240	826	1578
2001	167	205	190	899	1461
2002	246	307	286	858	1696
2003	242	228	156	997	1623
2004	247	294	312	865	1718
2005	242	293	300	847	1682

The next (and final) step in developing the baseline, immediate college going rate estimates involves adjusting the counts of high school graduates and immediate college enrollees (derived from the CPS and NPSAS data and shown in Tables A-7 and A-8, above) to the counts reported in administratively-based, national totals.

Using data from the Digest of Education Statistics 2005 (Table 181) for the total number of high school graduates and immediate post high school, college enrollees and assuming that the distribution of these totals among income categories follows the patterns shown in Tables A-7 and A-8, final baseline

estimates of the numbers of high school graduates and immediate college enrollees can be developed (see Tables A-9 and A-10, below)

Table A-9
Baseline Estimated Number of High School Completers
in Various Constant 2005\$ Income Categories
 (corrected to correspond to Digest of Education Statistics 2005 totals)
 (dependents and 'leavers' combined, in thousands)

	low <\$30K	mod \$30-50K	mid \$50-70K	upper >\$70K	total
1996	690	576	497	897	2660
1997	670	572	535	992	2769
1998	687	537	493	1092	2810
1999	618	579	565	1135	2897
2000	568	569	464	1155	2756
2001	491	429	397	1232	2549
2002	546	543	478	1228	2796
2003	537	470	373	1296	2677
2004	536	512	498	1206	2752
2005	520	481	458	1143	2602

Table A-10
Baseline Estimated Number of Immediate
Post High School Completion, College Enrollees
in Various Constant 2005\$ Income Categories
 (corrected to correspond to Digest of Education Statistics 2005 totals)
 (dependents and 'leavers' combined, in thousands)

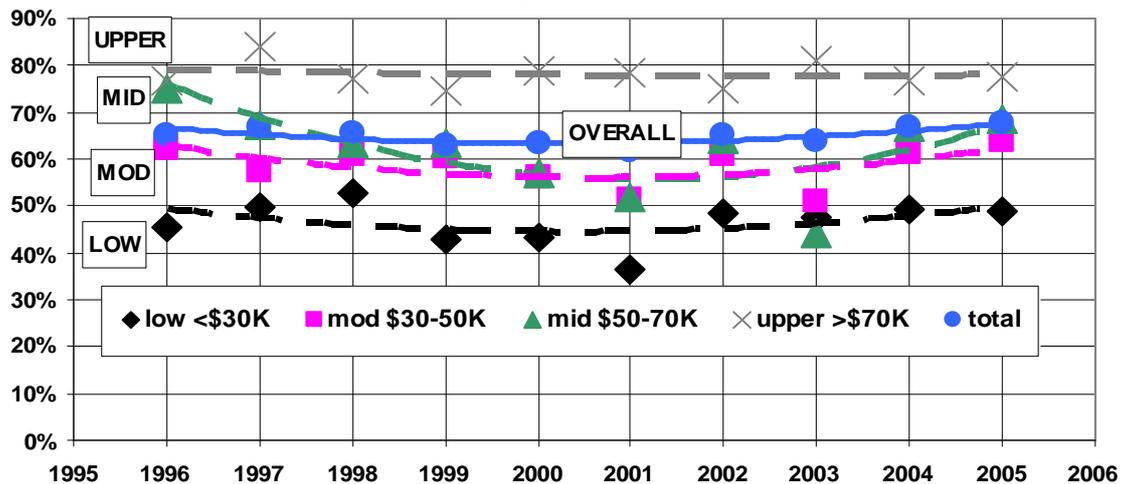
	low <\$30K	mod \$30-50K	mid \$50-70K	upper >\$70K	total
1996	312	357	372	688	1729
1997	334	329	360	834	1856
1998	362	327	313	842	1844
1999	266	351	359	847	1822
2000	247	320	265	913	1745
2001	180	221	205	968	1574
2002	264	330	308	922	1824
2003	255	241	164	1051	1711
2004	264	314	333	924	1835
2005	253	307	314	887	1761

Using these corrected baseline estimated counts, the final step in the analysis is the calculation of the baseline estimates for the annual, immediate post high school completion, college going rates (see Table A-11 and Figure A-12, below).

Table A-11
“Corrected”
Baseline Estimated Immediate Post High School College-Going Rates
For High School Completers from Various Constant 2005\$ Income Categories

	low <\$30K	mod \$30-50K	mid \$50-70K	upper >\$70K	total
1996	45.2%	62.0%	74.9%	76.6%	65.0%
1997	49.8%	57.5%	67.2%	84.0%	67.0%
1998	52.7%	60.9%	63.6%	77.0%	65.6%
1999	43.0%	60.5%	63.5%	74.6%	62.9%
2000	43.4%	56.3%	57.1%	79.1%	63.3%
2001	36.6%	51.5%	51.7%	78.6%	61.7%
2002	48.4%	60.7%	64.4%	75.1%	65.2%
2003	47.5%	51.2%	43.9%	81.1%	63.9%
2004	49.2%	61.3%	67.0%	76.6%	66.7%
2005	48.8%	63.7%	68.5%	77.6%	67.7%

Figure A-12
“Corrected”
Baseline Estimated Immediate Post HS Completion College Going Rates
(Dependent and Leavers Combined)
 (totals adjusted to represent Digest of Education Statistics 2005 totals)



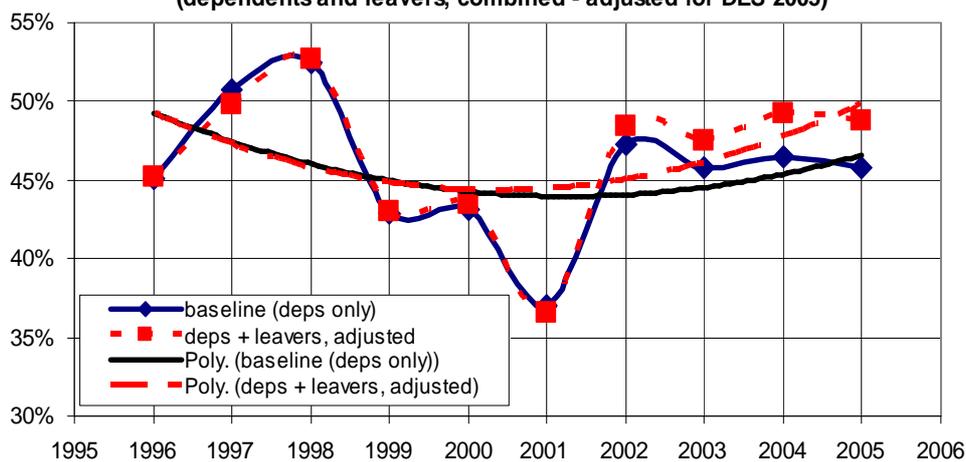
What are the effects of these various corrections in the baseline estimated, college-going rates for various income groups of high school completers?

The differences between the ‘directly calculated’ (i.e., based solely on the annual CPS data for dependent family members) and ‘corrected and adjusted’ estimated baseline, immediate college going rates (i.e., based on the inclusion of ‘family leavers’ and adjustments for the differences between the CPS derived counts and those reported in administrative data series) are, in general, relatively modest (see Figures A-13a thru A-13c, below).

However, examining the ‘directly calculated’ and the ‘corrected and adjusted’ estimated baseline rates for the 1999-2004 years (when the impacts, if any, of the price declines are more likely to be occurred) suggests some potentially important differences in the baseline estimates. During these years, the trend line for the baseline immediate enrollment rate among low income youth appears to have been shifted upward by an increasingly significant amount (in terms of percentage points) in later years as a result of the adjustments and corrections. During the same years, the trend line for the immediate enrollment rate for moderate income youth appears to have shifted downward (by a small amount) during the earlier years of the period of potential experimental impact. For middle income youth, the trend line appears to have been shifted downward by a relatively constant amount.

Figure A-13a

Comparing Unadjusted Baseline Immediate College-going Rate for Low Income Youth (dependents only) with estimated 'Corrected Baseline Rate' (dependents and leavers, combined - adjusted for DES 2005)



-- Figures A-13b and A-13c appear on the next page --

Figure A-13b

Comparing Unadjusted Baseline Immediate College-going Rate for Moderate Income Youth (dependents only) with estimated 'Corrected Baseline Rate'

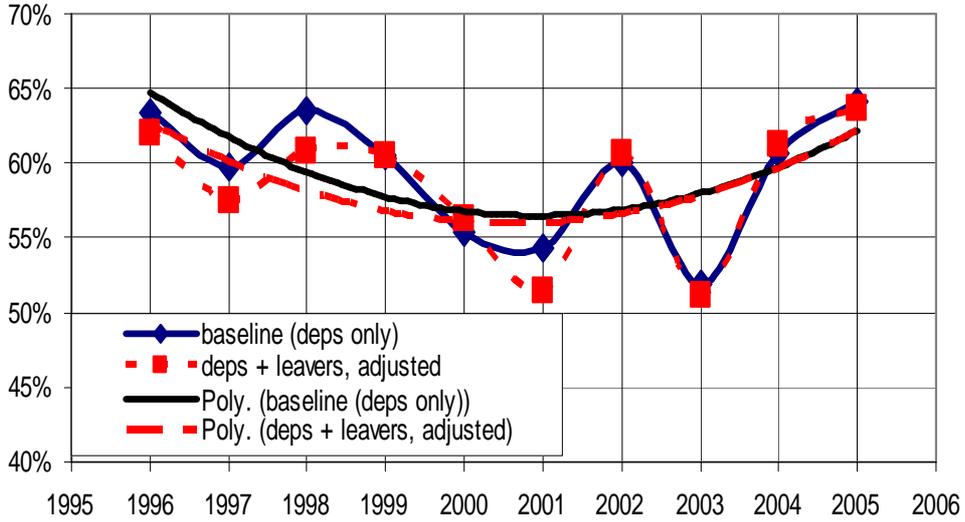
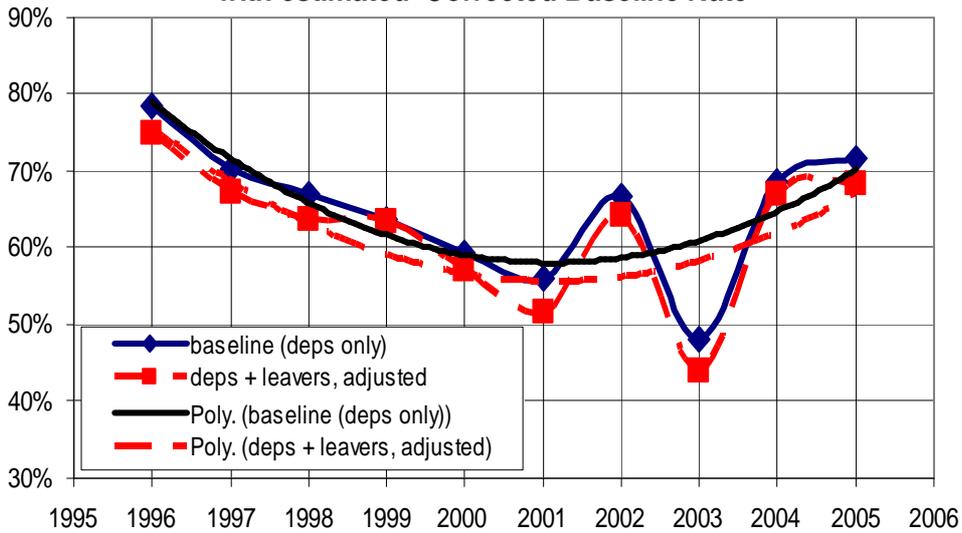


Figure A-13c

Comparing Unadjusted Baseline Immediate College-going Rate for Middle Income Youth (dependents only) with estimated 'Corrected Baseline Rate'

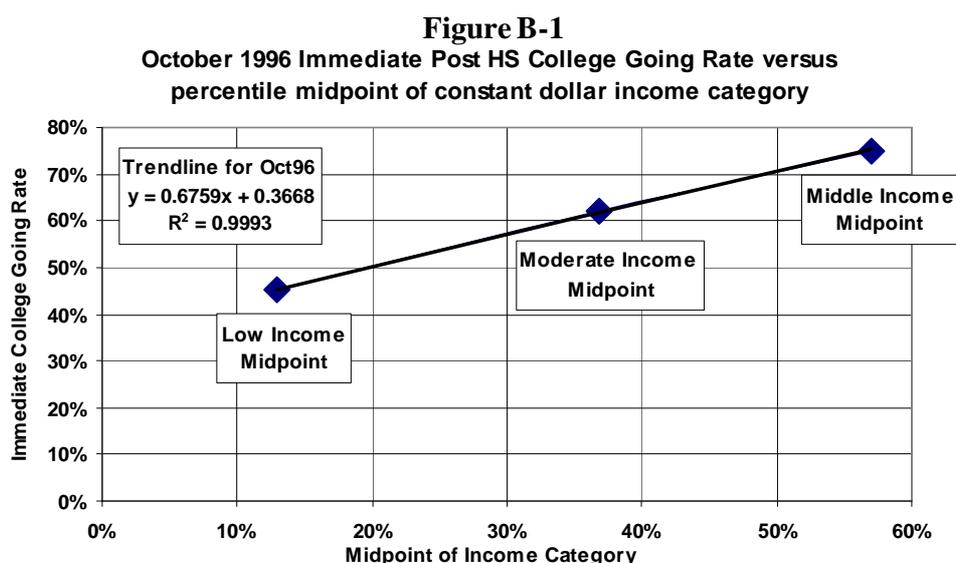


Appendix B

Estimating the effect of changes in the family characteristics of high school graduates in constant dollar income categories on estimated baseline immediate college going rates

This appendix reviews the method used to adjust the baseline immediate college-going rate estimates for changing family characteristics as represented by the changing position of the constant dollar income categories within the overall income distribution.⁵⁰ This limited approach was chosen in part because it appears likely that the impacts of the changing income distribution positions may also represent, in part, the impacts of changes in other family or parent characteristics.⁵¹

The first step in this adjustment methodology was to estimate how the immediate enrollment rates of low, moderate, and middle income potential college-goers were related to the income distribution positions of these groups of high school graduates during the early years of the studied period. Figure B-1 (below) shows this relationship for individuals completing high school in 1996, who could potentially be first time college enrollees in October 1996.

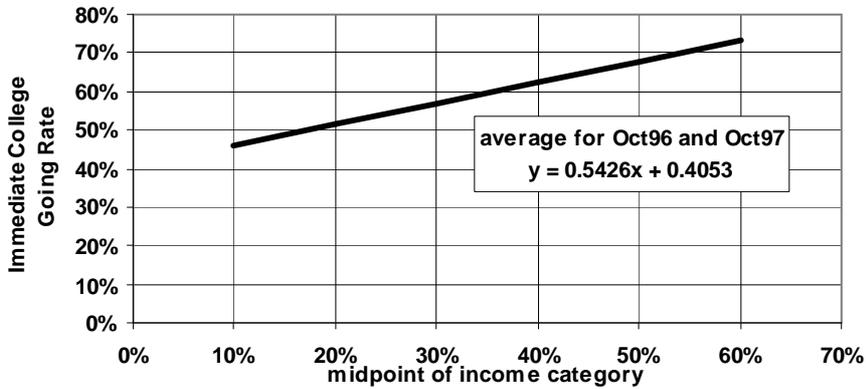


The second step in the estimation strategy involved estimating this same relationship based on the October 1997 CPS data and then developing an estimated relationship for the average of the two initial years of the period under review (1997-1998). The average relationship between the midpoints of the income group positions in the income distribution and the immediate college going rates for the 1996-1997 years is shown in Figure B-2 below.

⁵⁰ No attempt was made to estimate the impact of other changes in family or parent characteristics on these students college going rates.

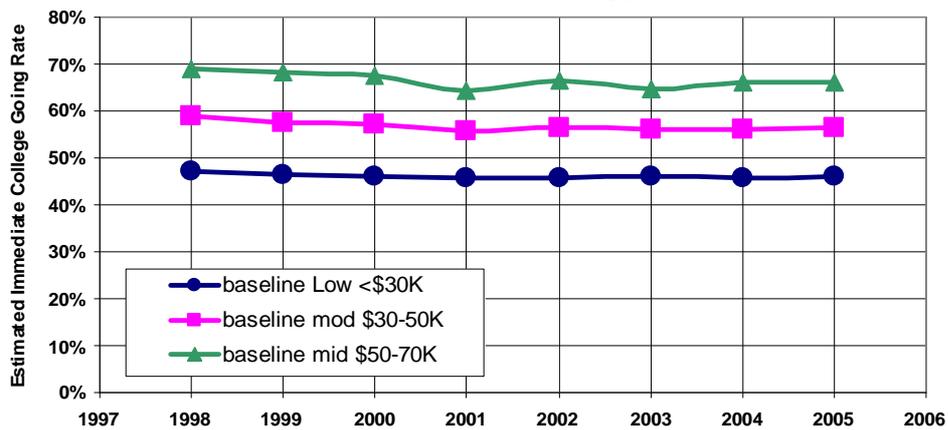
⁵¹ The validity of this assumption was not tested.

Figure B-2
Average Relationship between
Immediate Post HS College Going Rate and
Percentile Midpoints of Constant Dollar Income Categories
 (for low, moderate, and middle income groups in Oct96 and Oct97)



Next, using this average 1996-1997 relationship and the midpoint positions in the income distribution for the three constant dollar income categories (see Figure IV-B, above), it is possible to estimate what the college-going rates for the various groups would have been during the 1998-2005 years if the only changes occurring during these years were the changes in family characteristics -- as represented by positions in the income distributions (see Figure B-3, below).

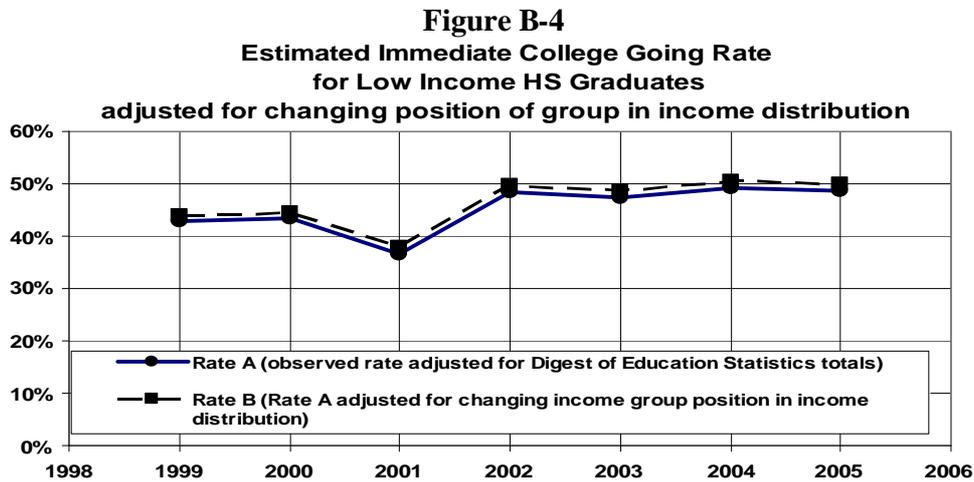
Figure B-3
Estimated Immediate College Going Rates assuming that
changes in the post 1998 rates solely depend on changing positions
of low, moderate and middle income groups in the income distribution
 [based on 1996/97-1997/98 average]



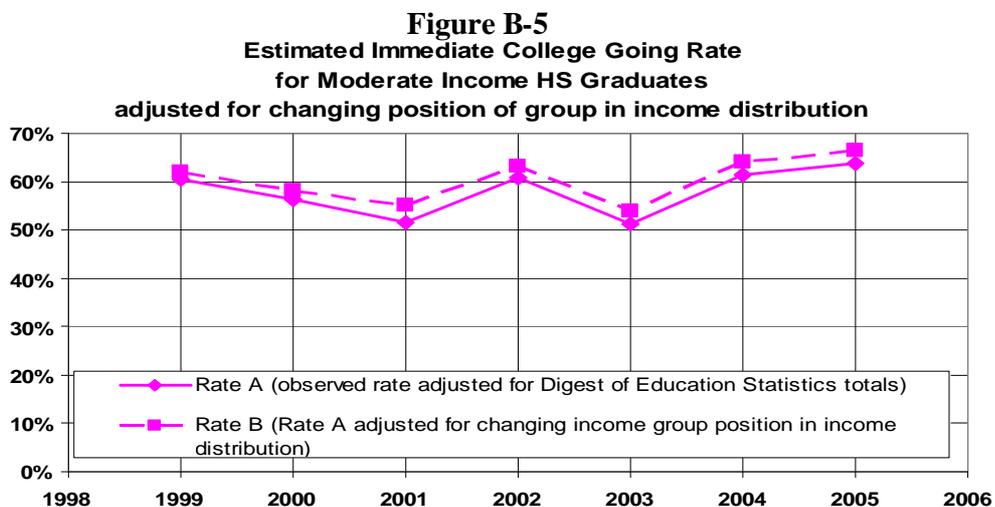
These estimates suggest that the immediate college going-rates for middle- and moderate-income youth would have declined during the 1998-2005 years (particularly during the 1998-2001 years) solely because of the effect of changes in the family characteristics of these high school completers. For low-income youth, the effect of these changes appears to have been much smaller.

As a next step, these estimated changes in college-going rates (solely impacted by changing family income category positions in the overall income distribution) were used to develop a series of annual ‘correction factors’ for each of the three income categories - the difference between the estimated rate in 1998 and the estimated rate in each of the subsequent years (1999-2005). Adding these ‘correction factors’ to the estimated baseline college-going rates for each income category for each year provides an estimate of what the college going rate would have been had the income group’s positions in the income distribution remained essentially constant during the 1999-2005 years.

These adjusted immediate college-going rates (adjusted for changing income category positions in the income distribution) indicate that during the period when the impact of the price declines, if any, would have been more observable, the pattern of increasing immediate college-going among high school graduates from low-income families did not change significantly as a result of the changing family characteristics of these high school graduates (see Figure B-4, below)

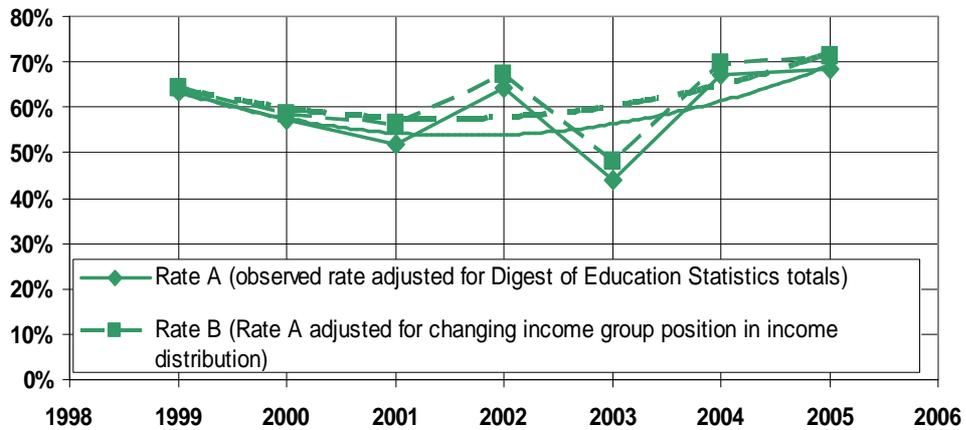


For moderate-income high school graduates, the impact of changing family characteristics was larger but the overall trend in immediate college-going rates was only modestly affected (see Figure B-5, below).



For middle-income high school graduates, the impact of changing family characteristics on immediate college-going rate appears to have been even greater (see Figure B-6, below) and a comparison of the ‘adjusted’ and ‘unadjusted’ trend lines suggests that changing family characteristics of these middle-income youth may have exaggerated the ‘U’ shaped pattern observed in the analysis of the trends in these youth’s baseline college-going rates (see, for example Figure III-A, above).

Figure B-6
Estimated Immediate College Going Rate
for Middle Income HS Graduates
adjusted for changing position of group in income distribution



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