

ENHANCED EARNINGS AND TAX REVENUES FROM A UNIVERSITY OF WISCONSIN-WHITewater DEGREE: A SYNTHETIC ANALYSIS

by

Russ Kashian

Fiscal and Economic Research Center
University of Wisconsin – Whitewater
Hyland Hall

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FISCAL AND ECONOMIC RESEARCH CENTER

Economics Department, 800 W. Main Street, Whitewater, WI 53190

Contributors

Principal Researcher

Russ Kashian

Data Administration and Auditing

Christie Kornhoff, Academic Department Associate

Report Preparation and Editing

Joshua M. Bechard

Survey Design and Editing

Joseph D. Carroll Jr.

INTRODUCTION

This report addresses a critical issue in public finance: the economic value of an education. The value of this education takes several forms. The most apparent is the enhanced earnings the student ultimately receives in the workplace for his or her valuable knowledge and talent. The second value is the benefit enjoyed by the community when this graduate adds to the overall income base of the state. The third value is the psychological and intellectual benefit the graduate gains from the knowledge and enjoyment a university education offers them. This report focuses on the first two values. However, it is essential to recognize the third positive component of a college education. Omission of this fact underestimates the overall value of the process, the institution, and the outcome.

It is often argued that investments by the government, in a fashion similar to the private sector, should have some basis in cost/benefit analysis. This report develops a model to quantify the economic value of an undergraduate degree earned at UW-Whitewater from 1980 to 2008. This economic value is determined to be the incremental income tax revenue generated from students who graduated from UW-Whitewater, remained in the state and in the labor force. The state assists this educational process by investing in UW-Whitewater by funding a portion of its operations. In return for this investment, the state has a more educated workforce that receives higher wages. These workers then pay higher taxes, thus returning this initial investment. In addition to calculating the return on investment to the university, this study also calculates the return on investment to the individual who received the degree.

Both streams of educational investment (from tax revenues and the student's tuition) require a return on investment. This financial return is one method through which society can justify the investment. Education beyond high school is becoming increasingly vital to today's workers who wish to perform complex tasks required in the workplace. It is also necessary to attract firms who desire high levels of human capital and training. The acquisition of a high quality university education is expensive to

both the state and the individual. Wisconsin provided more than \$35 million to UW-Whitewater in the 2007-2008 school year alone. While this contribution is substantial, the majority of the cost of the education is assumed by the student. The cost of tuition, living expenses, school supplies and forgone income over the course of an undergraduate education adds up quickly. As a result, a college education poses an immense financial burden for government, students and their families. A simple question undoubtedly enters the minds of many participants: "Are the benefits of a college education worth the costs?"

Data for this study were obtained from a number of sources. To determine the income of UW-Whitewater graduates, the Fiscal and Economic Research Center at the university conducted an e-mail survey of 18,571 alumni (from a list provided by the UW-Whitewater Alumni Association) and received 2,201 responses. Initial earnings and 2008 earnings were calculated using this survey. In the case of the 2008 earnings, three sources were available: a Payscale.com survey of 1.2 million college graduates, a UW-Whitewater survey of graduates at mid-career and a regression model. This report selected the lowest value of the three sources, which was the regression model. High school earnings were obtained from the U.S. Census Bureau's "Current Population Survey."

RETURN ON INVESTMENT TO THE STUDENT: THE OPPORTUNITY COST OF ATTENDING COLLEGE

This section addresses the return on investment to the student. The first issue to be addressed is the cost of attending college. The second issue is the financial return on this investment. The third area is a calculation of the payback period necessary to recoup the opportunity cost of the education. The fourth

¹ This issue is not calculated in this report. However, it is anticipated that without a highly educated labor pool, Wisconsin would be a less attractive site for firm development.

area is the estimated internal rate of return generated by this investment. In all four areas, the opportunity cost of the education is calculated as the tuition paid to UW-Whitewater plus the lost wages a high school graduate would have made during the years he or she attended college. However, a number of assumptions are included in this model. The first assumption is the expectation that the student would have worked during summer vacation. As a result, the opportunity cost was only 75 percent of the forgone wages. The second assumption was that since the student would have required food and housing, his or her residence cost (whether residence halls or apartments) is not included in this calculation. These assumptions hold down the opportunity cost. However, due to a lack of consistent longitudinal data on young high school graduate earnings, the earnings estimates are based on seasoned high school graduates (age 25 years and older) over time. Due to their acquisition of skills through the workplace, these workers receive compensation reflecting higher levels of human capital than 18-year-old workers.

Tuition

Throughout the study period (1976-2008), both nominal income and tuition have risen steadily. There is a strong positive correlation (0.93) between the

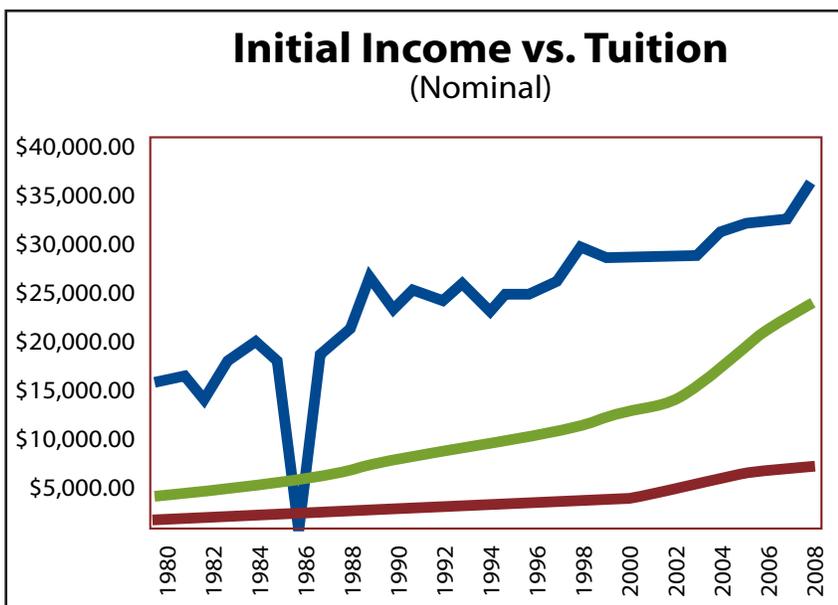
total amount spent on tuition by a graduate and the initial nominal income earned by a UW-Whitewater graduate. However, while real income for college graduates has risen over the last 28 years, tuition has risen faster than initial income (see Figure A and Table 1).

Table #1

GRADUATION YEAR	TOTAL TUITION PAID	INITIAL INCOME	MULTIPLIER
1980	\$3,292	\$15,533	4.72
1990	\$6,829	\$23,237	3.40
2000	\$11,941	\$29,878	2.50
2008	\$22,842	\$37,737	1.68

Controlling for inflation, the four-year tuition paid by freshmen enrolling in 1976 (the beginning of the study period) was \$3,292, while their initial income upon graduation in 1980 was \$15,553. For graduates in the class of 2000, the four-year tuition was \$11,941 while the initial income was \$29,878. For graduates in the class of 2008, the four-year tuition was \$22,842 while initial income was \$37,737.

Figure A



Income forgone by attending college

The largest factor in determining the opportunity cost of attending college is the income a student is not earning while in school. In the case of UW-Whitewater, the amount of income forgone far exceeds the cost of tuition. To determine how much income a student forgoes while attending college, U.S. Census data regarding the incomes of workers who have only a high school education² is used. Once controlled for inflation, it is clear that the real income of a high school graduate has experienced real wage decay since 1976. In 1976, high school graduate real median annual earnings were roughly \$36,000. By 2008, this had decayed to an average of \$31,000.

This model anticipates that college students will work during the summer, or three months out of the year. With this expectation, we project that a college student isn't forgoing 100 percent of his or her potential income—only 75 percent. For instance, a year 2000 graduate could miss out on as much as \$121,000 nominally over the course of a four-year

education. However, when summer employment is factored in, we find that this graduate has forgone just under \$91,000 in income.

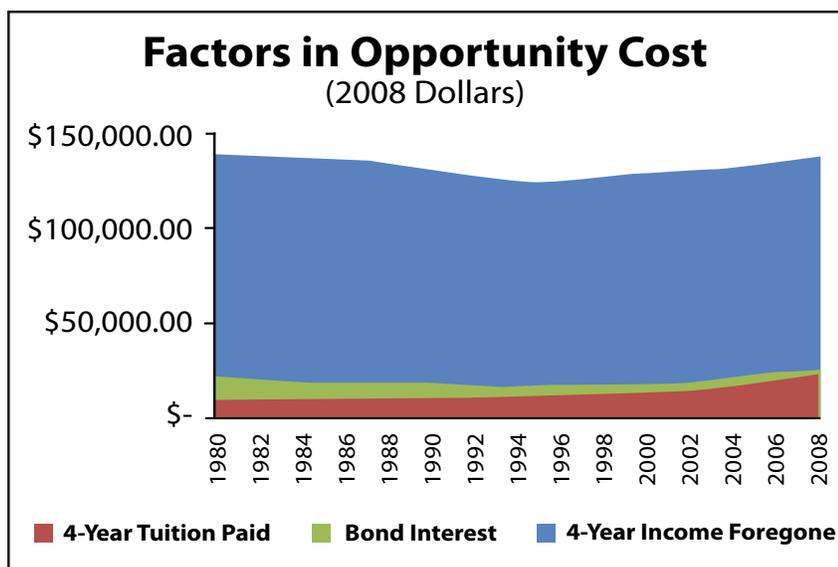
The opportunity cost of attending UW-Whitewater

The opportunity cost of attending college is the sum of nine months of lost earnings and the tuition paid. However, to be fair, we must consider that these individuals had the opportunity to invest the tuition dollars they could have spent on college. As a result, this study quantifies the value of this forgone investment based on the one-year Treasury bill. This investment is used due to its consideration as a risk-free investment (free of both default risk and inflation risk). Figure B displays all three factors in the calculation of opportunity cost.

EARNING BACK THE COST OF AN EDUCATION

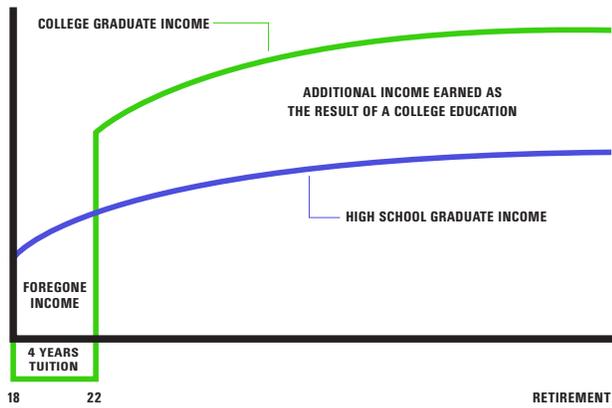
Figure C depicts (in a theoretical framework) the lifetime earnings of both university and high school graduates. The blue line represents high-school-graduate earnings from the point of graduation to retirement. The green line represents this same information for university graduates, but is noticeably different. Rather than producing a smooth curve, the first four years of income appear to cross over into the negatives. This represents the fact that income is forgone and tuition is being paid. This is the opportunity cost described in the previous section. After four years of education, this line quickly rises above the high school earnings curve, and the student begins to experience the financial benefits of a college education.

Figure B



² This study uses high-school-graduate income data for "seasoned" graduates (those age 25 years and older). This overestimates their income since we consider the opportunity cost of the 18-to-21-year-old graduate who make less than these seasoned high school graduates.

Figure C



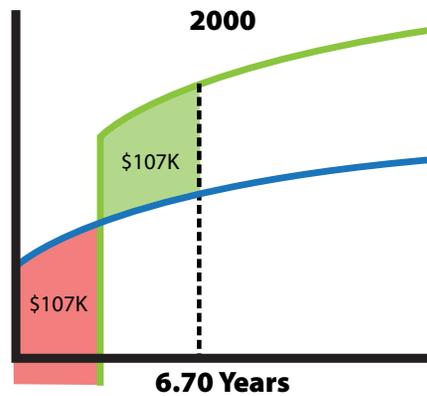
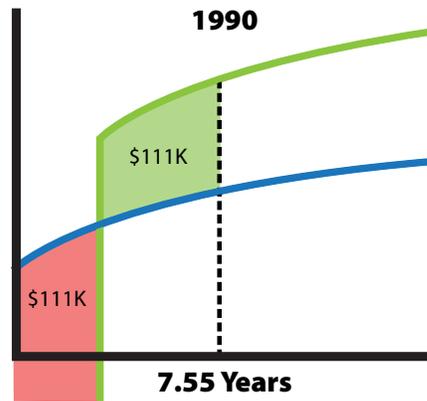
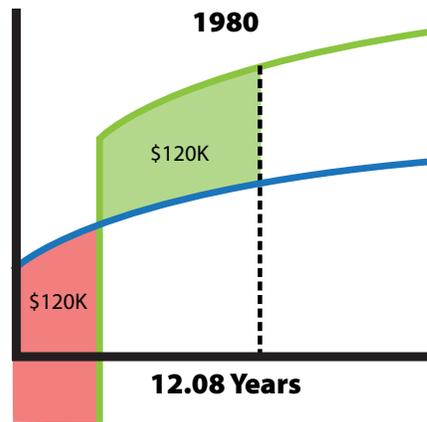
As stated earlier, higher education is an income-earning asset and a social asset. This study focuses on the income-earning asset. Once purchased, an education produces a series of payouts. In terms of education, the additional income earned (versus high school) each year is a series of payouts directly resulting from the initial educational investment. The internal rate of return on a college education compares the initial costs of attending school with the ultimate income benefits that come with graduation.

One issue addressed in this study is the amount of time (the time horizon) it takes to see the benefits of a higher education exceed the costs. As displayed earlier in Table A, the ratio of initial UW-Whitewater undergraduate degree income to tuition paid has fallen over time. As a result, the initial payback to the UW-Whitewater degree appears to have diminished. However, this result does not hold up over time.

Figure D depicts the income stream curve, with the blue line representing high school graduate income and the green line representing college graduate income. The pink-shaded area in the first four years shown in the graph represents the initial opportunity cost of attending college. This curve has a particular area – a set dollar amount. This is the sum of the four years that the student spent outside the job market (controlled for summer employment), plus the tuition (and the forgone interest) paid.

Figure D illustrates enhanced earning curves for 1980, 1990 and 2000 UW-Whitewater graduates. The

Figure D



dashed line in the middle of the graph represents a given point in the career of a college graduate. The green-shaded area to the left of this line is the educational financial benefit that has been realized up to that particular point in time. As time passes by, the green area becomes larger. When it surpasses the size

of the red area, we have found a break-even point: when all the initial costs of attending college have been matched by its financial benefits. This break-even point, considered in this study as an average, can take any number of years after college graduation to achieve, depending on income and costs associated with a higher education. The amount of time after graduation to reach this point varies between graduation years, and is dependent on factors such as initial income, tuition costs, and bond rates.

It is clear in Figure D that the 1980 graduate recovered the opportunity cost of attending college after 12.08 years of employment post-graduation, while 1990 graduates recovered the cost in 7.55 years and 2000 graduates in 6.70. This reduction in payback time is a reflection of the decay in wages to high school graduates and a rising return on investment in human capital. In effect, the gap between the college graduate and the high school graduate is widening to the benefit of the UW-Whitewater graduate. In terms of this mathematical representation, the area colored pink then equals the area colored green. The area beyond this represents the return on an investment in a university education.

Internal rate of return on a UW-Whitewater degree

The internal rate of return calculates the enhanced earnings of a UW-Whitewater degree as a return on the opportunity cost of attending college. In a traditional calculation, the internal rate of return would look at the enhanced earnings over a lifetime in relation to the investment (the opportunity cost). Since this study is using censored data (it truncates at 2008), the full work life of the participant is not available. Basing the internal rate of return on this limited data would seriously underestimate the return on investment. As a result, this study looks at the return necessary to pay off the opportunity cost in the time frame presented in Figure D.

A 1980 graduate's opportunity cost is \$119,877. Enhanced earnings (his or her earnings as a college graduate minus expected earnings as a high school

graduate plus the cost of tuition) is equal to this opportunity cost after 12.08 years. The interest rate required to receive \$119,877 on an \$119,877 investment over 12.08 years is 8.3 percent. A similar story is told when examining the graduating classes of 1990 and 2000 in addition to 1980:

Table 2

YEAR	OPPORTUNITY COST	YEARS TO BREAK EVEN	RATE OF RETURN TO BREAK-EVEN POINT
1980	\$119,877.37	12.08	8.3%
1990	\$110,574.98	7.55	13.3%
2000	\$107,162.15	6.70	14.9%

When compared to other investments between 1976 and 2008, we can see how an investment in a UW-Whitewater degree offers a competitive rate of return (controlled for inflation) when compared with investments in bonds or in the stock market (see Table 3):

Table 3

Average 1 – Year Bond Rate (1976-2008)	6.41%
Average Stock Market Return (1976-2008)	4.31%

However, in examining stock and bond rates up to 2006 rather than 2008, we see that they have experienced a higher rate of return prior to the financial crisis of 2008 (see Table 4):

Table 4

Average 1 – Year Bond Rate (1976-2006)	6.62%
Average Stock Market Return (1976-2006)	8.69%

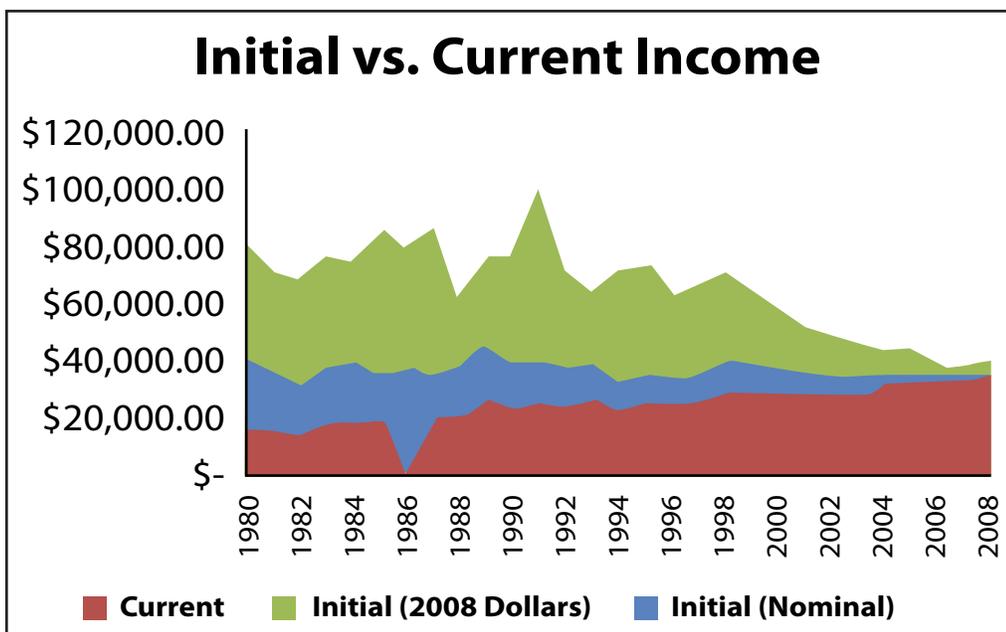
The relationship between Table 3 and Table 4 is also a testament to the volatility of the investment. While it is possible that alternative investments (gold, real estate, equities, etc.) may offer higher rates of return in specific times, the recent financial crisis displays that a college education is a much more sound and risk-averse (or risk-neutral) investment.

WHERE GRADUATES ARE TODAY

Between 1980 and 2008, 54,911 students graduated from UW – Whitewater. A survey of this group was conducted to allow for the creation of income curves based on a particular graduate’s current and initial income. A curve was constructed for each graduating class, and enhanced earnings for each class were calculated. According to our survey results, approximately 66.2 percent (36,351) of 1980-2008 UW-Whitewater alumni currently live in Wisconsin³, while 68.2 (37,449) participate in the labor force (24,791 within Wisconsin).

There are three sources of predicted income for these graduates. The first source, PayScale.com, estimates that a college degree from UW-Whitewater will result in an individual earning \$77,000 per year mid-career. The second source, from our alumni survey, finds that the average earnings of UW-Whitewater graduates without a post-graduate degree are \$80,000 per year. By using a regression, the data obtained in the alumni survey find that a UW-Whitewater graduate with only a bachelor’s degree earns roughly \$73,000 per year. This result controls for those graduates who subsequently obtained a post-graduate degree. This report uses the lesser of these earnings estimates to build a conservative model.

Figure E



Income: Then and now

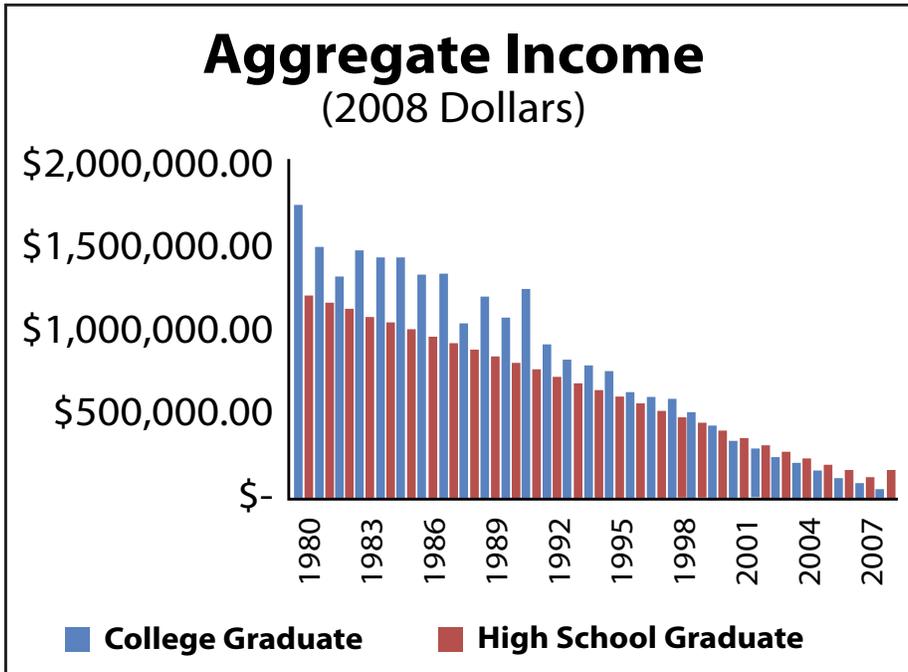
Upon graduation, UW-Whitewater graduates average roughly \$35,000 2008 dollars in initial income. Real initial income (the blue area of the chart) has been at a relatively stable level since 1980. The green area represents the current earnings of UW-Whitewater graduates. Graduates who have been working for a longer period of time have a noticeably higher salary than their fresh, unseasoned counterparts. A 1980 graduate for instance averages \$80,000, while a 2008 graduate averages only \$39,500 (see Figure E).

Aggregate Income

Graduates from 1980 have earned just under \$1.8 million per person since graduation. Alternatively, a high school graduate of the same age has earned only \$1.2 million. Compare this to 2008 graduates who have earned only \$35,000 in contrast to their high school graduate counterparts who have earned \$168,000. This difference represents the effect that four years of forgone income has on one’s aggregate earnings immediately following high school. Upon examination of the chart below, it is apparent that while recent graduates begin their career with aggregate earnings lagging behind high school graduates, they quickly catch up due to their increased capacity to earn (see Table 5).

³ This number is consistent with an independent study done by UW-Whitewater Alumni Association.

Table 5



State taxes generated

Wisconsin ultimately experiences benefits from the increased income levels gained through a college education. Besides the intangible quality of life benefits afforded to the state, college graduates pay higher state taxes due to their higher incomes.

This analysis is limited due to the financial crisis in 2008. A longitudinal examination would require depreciating that state aid used for capital purchases. In this fashion, it would be possible to assess current income against current expenses. This analysis is beyond this study’s limited goal. As an alternative, this study looks at the impact enhanced earnings had on income tax revenues in 2008.

In 2008 alone, this study determined that UW-Whitewater graduates have earned more than \$3.5 billion. While much of this study uses estimates (thus the title of a synthetic model), the projections contained within are reasonable and conservative.

Compare this figure with what this same number of people would have earned with only a high school education: \$1.3 billion. Overall, the enhanced earnings (the difference between college and

high school graduate incomes) of UW-Whitewater graduates for 2008 equal roughly \$2.2 billion. In 2008, the state invested \$35 million in the university. As a result, enhanced tax revenues from UW-Whitewater graduates for the year totals \$65.3 million, and is given by this equation:

$$\text{2008 UW-Whitewater enhanced tax revenues} = \text{enhanced earnings of UW-Whitewater graduates (\$2.2 billion)} \times \text{labor force participation rate (68.2 percent)} \times \text{percent living in Wisconsin (66.2 percent)} \times \text{state income tax rate (6.5 percent)}^4$$

As a result, the state’s investment over time in the university produced a positive return in income tax revenue. The estimated return for 2008 exceeds \$30 million. Once again, while it would be attractive to look at overall return on investment over time, this would require detailed data regarding capital investment versus operational spending.

⁴ Note that this does not consider two-earner couples whose income tax rate at the typical UW-Whitewater graduate bracket is 6.75 percent. As a result, the enhanced tax revenues figure of \$65.3 million may be somewhat understated.

SUMMARY

The financial benefits that a UW-Whitewater education brings to graduates and to the state are significant. While students typically begin to receive enhanced earnings benefits within 10 years of graduation, Wisconsin is constantly experiencing the enhanced tax revenues being paid by graduates—more than \$30 million in 2008 alone. Education is a very important factor in the Wisconsin economy. A well-educated workforce means higher productivity and a higher standard of living. This study examines higher education as an investment, comparing its initial costs with the ultimate benefits that it brings. For students, the trade-off of forgone income and tuition expenses brings significantly higher lifetime earnings. For the state, investment in higher education not only brings a more productive workforce, but measurable long-term returns through state taxes—each dollar contributed is ultimately returned to the state with interest. A college education is most certainly worth the time, money and effort that it demands for all parties involved.