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**Ph.Dollars: Does Grad School Make Financial Sense?**

Sarah Webb  
United States  
11 April 2008

When Laurie Earls started graduate school at Vanderbilt University in Nashville, Tennessee, in 2001, a Ph.D. looked like a pretty good deal from a financial point of view: no tuition and she'd even receive a stipend. But when her car died during her first year, she had to replace it. Then she married another graduate student, J. J. Westmoreland; they took out a student loan to help pay for the wedding. By the time she turned 30, her minimal student health insurance policy, which didn't include dental, no longer met her needs.

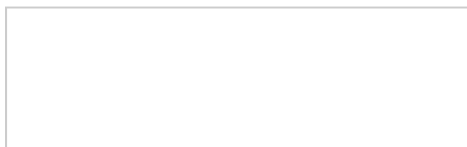
It's hardly news that paying the bills while in graduate school is hard, but it's generally assumed that in the long run advanced training pays off financially. A gloomy 2005 [CNN/Money article](#), however, said "no," listing "academic researcher" as one of three jobs offering the worst pay for the training investment. The reality is, or seems to be, that although a Ph.D. is unlikely to pay off big over the course of

a career, it's not likely to be a big financial loser, either.

Throw in the intangible benefits of a career in science, and the degree may well be worth it for some. "You do [a Ph.D.] because you love it, not because it's going to be the big payoff," says Douglas Comer, vice president for research at Cisco Systems in San Jose, California, expressing the conventional wisdom. But in purely financial terms, the case for graduate training is not compelling, and the short- to medium-term sacrifices a career in science can demand cause even some passionate scientists and trainees to reconsider their plans before they reach the financial break-even point.

**OPPORTUNITIES AND OPPORTUNITY COSTS**

When Mark Regets, a statistician with the U.S. National Science Foundation (NSF), compared the lifetime earnings of a bachelor's-level biologist with those of a Ph.D. recipient, he found that the estimated lifetime earnings of



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the average Ph.D. biologist modestly outpaced those of the bachelor's-degree recipient. The analysis assumed that the B.S.-level scientist started earning at 22, that the Ph.D. recipient started earning at 30, and that both worked until they retired at 65. Regets's Ph.D. scientist earned \$1.4 million over the course of a 35-year career, whereas the biologist with a bachelor's degree earned \$1.3 million. His model is based on 2006 survey data in NSF's [Scientists and Engineers Statistical Data System \(SESTAT\)](#). He used mean salary values as a function of the number of years since completing a degree, and his analysis encompassed all employment sectors and included a 3% discount rate for future earnings. With those assumptions, a Ph.D.'s earnings didn't overtake those of the bachelor's-degree recipient until age 60.



Laurie Earls

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Although a biology Ph.D. may pay off modestly, eventually, a Ph.D. in computer science is probably a financial loser in both the short and long terms, says Comer, who is currently on extended leave from a faculty position at Purdue University in West Lafayette, Indiana. A student might finish a master's degree in as little as a year--2 years is more likely--whereas a computer-science Ph.D. averages 6.5 years. So a master's-level computer scientist should have an extra 5 years of earnings, raises, and promotions before the Ph.D. enters the workforce.

To make things even worse for the better educated, the closing of industrial research laboratories since the late 1990s has forced computer science Ph.D.s into academic jobs, where salaries may not match those of their master's-level private-sector colleagues, Comer adds. The situation is likely to be similar for other scientific specialties, such as engineering, that offer good starting salaries and strong employment prospects to those with a bachelor's or a master's degree.



Alyson Reed

More broadly, the 2008 edition of NSF's [Science and Engineering Indicators](#) suggests some room for financial optimism for Ph.D. scientists. Median salaries for new Ph.D.s hover a few thousand dollars above those for new master's recipients. And although a Ph.D. may not bring a huge short-term payoff, it does bring a lower risk of unemployment. Unemployment rates for recent Ph.D. recipients stood at 1.3% in 2006. The rate for those with master's degrees was 4.4% and 4.7% for those with bachelor's degrees.

**THE POSTDOC PREDICAMENT**

That low unemployment rate--and even some of the recent salary gains--may be connected to the institution of the postdoc, which now employs at least 60,000 researchers. Although a postdoc offers training opportunities and protected time for research (while keeping scientists out of unemployment lines), it may discourage scientists from seeking higher paying (and potentially more rewarding) employment. Postdoctoral salaries have improved since the mid-1990s as NIH increased its minimum fellowship stipend levels--often used as benchmarks for setting stipends from other sources--to nearly \$37,000 for new Ph.D.s compared with just \$20,000 in 1997.

Postdocs insist that salary isn't a top concern, says Alyson Reed, executive director of the National Postdoctoral Association (NPA) in Washington, D.C., citing Sigma Xi's [2005 postdoc survey](#). Duration of training is a troubling issue, she adds. "You've spent [up to] 20 years of prime earnings capacity as a student or trainee," she says. For many of those years, a scientist might not be eligible for retirement benefits and is making minimal Social Security contributions. "Before you know it, you're 42, and you have very little in the kitty."

## PROFESSIONAL GAIN VERSUS FINANCIAL WEARINESS

As training periods get longer, financial costs become a real challenge to starting families. When Keith Micoli--a former chair of the NPA executive board--started his graduate work at the University of Alabama, Birmingham (UAB), in 1994, he assumed that a Ph.D. in cell and developmental biology would be faster and cheaper than medical school and a residency but similar in its benefits. His first child was born the day before he started graduate classes. Because of child-care costs, his wife chose to stay home.



Keith Micoli

Housing was cheap in Alabama, but basic expenses such as family health insurance left them a few hundred dollars in debt each month. Over 7 years of graduate school, Micoli estimates, the family accumulated about \$20,000 in credit card debt. While seeking a tenure-track teaching job at a 4-year college, Micoli treads water as an instructor at UAB. He's the primary breadwinner in a household that now includes three children.

## SHIFTING PRIORITIES

When Earls started graduate school, her eye was fixed on a professorship prize. "I was optimistically willing to sacrifice any number of years of my life and money for that career path," she says.

Recently, after 7 years of grad school at Vanderbilt, Earls and Westmoreland, her husband, both took postdoc positions at St. Jude Children's Research Hospital in Memphis, Tennessee. Their salaries exceed the NIH minimum stipend of about \$37,000 per year, and like most professionals they now have subsidized health and dental insurance. With Memphis's modest housing costs, they expect to buy a house, Earls says. Yet between a mortgage and the student loans that will soon come due, Earls expects to barely break even; saving toward retirement isn't likely to commence anytime soon.

"I ... think that my family expects that now we're making tons and tons of money because we have Ph.D.s. We don't know how to tell them that, no, we're [each] making less than a schoolteacher," Earls says. "I think if I had it to do over again, I would still do [my Ph.D.] because I really love science." But at 32, she's traded idealism for financial realism. "We've gone from being completely decided about our career path at the beginning of grad school to being completely open." Although she still hopes for an academic job, she has started to browse the job listings "in case some job pays well enough to lure me away."

<p>Sarah Webb has a Ph.D. in bioorganic chemistry. She writes from Brooklyn, New York.</p>	<p>Comments, suggestions? Please send your feedback <a href="#">to our editor</a>.</p>
<p>Photos. Top: Atlanta Center for Behavioral Neuroscience. Courtesy, National Science Foundation. Middle, bottom: courtesy of the subjects.</p>	<p>DOI: 10.1126/science.caredit.a0800055</p>

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