
CHAPTER 4: RETURNS ON HUMAN CAPITAL: It's All About YOU!



What You Will Learn



What is Human Capital?

What is a Human Capital Investment?

What is Opportunity Cost?

What is the Time Value of Money?

How to Measure Returns on Human Capital Investments Employing Time
Value of Money Calculations

Introduction

Most of us have heard the expression “pay yourself first,” but do we give much thought to *investing* in ourselves first? After all, your greatest asset is You! Your own human capital is as critical a component of your total portfolio as your financial investments. In fact, for most young people, their human capital is a large, if not largest, portion of their net worth. What is **Human Capital**? Simply stated, a human capital investment is anything that increases an individual’s long-run productivity. You invest in human capital when, for example, you go to school, go to the gym, take a summer internship, or maintain a healthy diet. Investments in human capital can improve your earning prospects, as well as make your life more enjoyable in the future. Indeed, anything that improves your productivity at work or other aspects of your future well-being is a human capital investment.

Human Capital consists of the innate abilities, health, & physical attributes embedded in you. A **Human Capital Investment** is anything that increases the usefulness of your human capital in the long-term

Your human capital is an innate part of you – you can not wake up one day and decide to sell it. Nor can you transfer your human capital to another person. You can, however, decide how to use your human capital and hopefully maximize the benefits you receive from this very important asset. Most of us, by example, use our human capital by “selling” our services to an employer in exchange for a salary and/or benefits.

You should expect a return on your investments in human capital just as you expect returns when you invest in financial assets such as stocks and bonds. However, returns on human capital are not always in the form of tangible money returns (e.g., higher earnings). Some human capital human investments can make you a better citizen, allow you to more effectively preserve your health, or make you a better parent. Such non-

monetary or intangible returns to human capital can be quite high. When there are intangible returns to human capital, the actual money return on human capital may be below returns on financial investments, but may still be very worthwhile.

Throughout your life, you should consider whether investing your time and money in human capital is worthwhile. This assessment should include estimating both the money and intangible returns to potential human capital investments. In this Chapter, you will learn how to estimate the money returns to human capital investments. The tradeoff of risks and returns to human capital investment will be addressed in Chapter 2. Because this is a finance book, we will concentrate on human capital investments that can improve your work skills, and thus yield higher earnings. Our focus will be on the returns to education that you undertake as an adult. The reason is that these investments generally are the most costly in terms of both time and money -- they constitute a major component of your assets! They are part of your **portfolio** just like stocks and bonds are. The money returns to your human capital investments and financial investments can, and should, be compared.

Your **Portfolio** consists of all your assets that produce monetary returns, which may be in the form of income or increases in the value of assets (capital gains)

Human Capital Investments: How to Make Good Financial Decisions

To make good financial decisions about human capital investments, you need to consider both the costs and benefits involved, and understand that the costs and benefits of investments usually are realized at different times. The ability to compare dollar amounts received in different time periods requires the use of what is perhaps the most important concept in finance: **money has a time value**. Simply stated, money you earn today is worth more than the same amount of money received in the future because you can earn interest on money you receive today. There are several methods used to calculate the time value of money, the principle ones of which will be used in this Section. You should become very familiar with the concept of the time value of money and related calculation methods which are all reviewed in detail in Appendix [1] and should be studied before completing this chapter.

Time Value of Money is the principal that a dollar received today is worth more than a dollar received in the future because of interest earned. See **Part I, Chapter [2]** for the detailed explanation and examples of this key principal.

We will begin by examining the costs of human capital investment as it relates to higher education or training. There are two types of such costs: (1) out-of-pocket costs and (2) **opportunity costs**. We then will evaluate the benefits, and finally put it all together to examine the rate of return on a college education.

Opportunity Cost is the value of the next best use of your time.

Estimating Out-Of-Pocket Costs of Education and Training

Estimating out-of-pocket costs is pretty easy. You just list all of the extra costs you have because you are in school or in training. At a minimum these costs would include the following:

- (1) Tuition, fees and other direct payments for education or training
- (2) Books, tools and other things you need to buy for the course(s) you are taking
- (3) Extra personal expenses because of the education (e.g., eating out more often, buying new clothes)
- (4) Extra housing and transportation costs because of the education

You can obtain information on tuition and fees directly from the school or training program in which you are interested. The College Board compiles the tuition and fee information for over 3000 colleges and universities each year and these data are published by the Chronicle of Higher Education. Their web site, <http://chronicle.com/stats/tuition/>, is easy to use.

Our **RITE** evaluation for <http://chronicle.com/stats/tuition/> is presented at Chapter End [1].

For college students, book costs have risen very rapidly. Book costs per semester of \$800 or \$900 are not uncommon. Students have understandably become concerned about these costs. In many states students have formed Public Interest Research Groups (PIRGs) to try to lower the costs of books.

Interested in lowering the cost of Your Text Books? Go to: <http://www.maketextbooksaffordable.com/textbooks.asp?id2=14226>
RITE evaluation is presented at Chapter End [2]

Estimating the extra personal costs, transportation costs and housing costs incurred as a direct result of your course or training program is more difficult. Extra personal costs could include: buying a computer, paying for access to the internet, eating out more often, buying more or different clothes. You might have extra transportation costs because you need to commute to classes or because you need to fly back and forth from your home to your college.

The cost of living varies quite dramatically across US cities and some of the extra costs of a college education are caused by these variations. For example, Boston, a city with more than 600,000 college students, has a cost of living that is higher than the majority of US cities (e.g., the cost of living in Boston is almost 15% higher than the cost of living in Cincinnati). ACCRA, a non-profit community development group, provides information on how living costs vary across US cities. Their web site is at <http://www.coli.org/>. They charge for their cost of living information, but you can obtain the information for free from the US Statistical Abstract. Go to <http://www.census.gov/compendia/statab/prices/>.

RITE evaluation for <http://www.coli.org> is at Chapter End [3]

Real-Life Examples: The Prototypes

Sebastian's Out-of-Pocket Costs for a State University: Alex's son, Sebastian will be enrolling at the University of Illinois at Chicago Circle ("UIC") as a full-time student (12 hours of classes each semester). Since Sebastian is a resident of Illinois, his annual tuition and fees are just under \$3,800, guaranteed by the State of Illinois for a 4-year program. From his brother (currently a junior at UIC), he knows books and supplies will be about \$800 per year and personal expenses (things like movies, internet access, cell phone/IM and clothing) will cost between \$2,000 and \$2,500 per school year). Sebastian applied early for on-campus housing, and expects to

live with his friend. Housing and the University's minimum meal plan will cost him around \$7,000 for the nine month school year. As an on-campus resident, Sebastian's transportation expenses will be negligible; however he anticipates he'll spend around \$1,500 for gas and parking when he borrows one of his parent's cars for personal use. Sebastian's total costs for one year of university education is around \$15,500, or approximately \$62,000 for the 4-year program.

Sources: <http://www.uic.edu/ucatalog/SC.shtml#b>, <http://www.housing.uic.edu/rates.html>

Bridget's Out-of-Pocket Costs for a Graduate Degree: Still working as an entry-level AutoCAD drafter for a small architecture firm three years out of college, Bridget is seriously considering going back to graduate school to get her Masters in Architectural Design. She estimates her total annual out-of-pocket costs for a graduate degree from MIT (her school of choice) to be about \$45,050, which includes \$32,300 of tuition, \$2,800 of extra personal expenses and \$9,950 of extra housing costs. For the 3-1/2 year program, this totals around \$157,675.

Source: Architecture Department. MIT. Oct. 2006 <<http://mit.edu>>

Estimating the Opportunity Cost of Education

Estimating the opportunity cost of education or training is more difficult than estimating the out-of-pocket costs. The opportunity cost is the value of the time you spend going to school or in training. Recall that this is the value of the time in its *next best use*. For most of us, the next best use of our time would be working. The salary or earnings we would have made are a good estimate of the opportunity cost of school or training. This opportunity cost is often as high or higher than the out-of-pocket costs.

Estimating what you would have earned if you hadn't gone to college requires some imagination and effective use of internet resources. To illustrate exactly how you would proceed, we will estimate our two Prototypes' opportunity costs of going to school rather than taking a job. The opportunity cost of school is the earnings from the job you would have if you were not going on to college, or pursuing graduate school (or other training) as in Bridget's case. To estimate these earnings, first use your imagination to answer the following two questions.

- (1) Where would you have lived if you had not gone to college?
- (2) What kind of job would you have had if you had not gone to college?

For Bridget, we assume she would remain an AutoCAD drafter if she did not pursue a graduate degree in architectural design, so her opportunity cost of going to graduate school is the salary she would have earned in her current position. For Sebastian we will use the U.S. Bureau of Labor Statistics Metropolitan Area Occupational Employment and Wage Estimates at <http://stats.bls.gov/oes/current/oesrcma.htm>, to get an estimate of what he would have earned. To use this site, begin by clicking on the first letter of the state you would have been living in. For our Prototype Sebastian, this would

Check out **What People Earn Across the Country**. Go to: <http://stats.bls.gov/oes/current/oesrcma.htm>
The RITE Evaluation for this BLS site is at Chapter End [4]

be Illinois, so we'd click "I". On the page next appearing, click on the city that would be closest to you, which is "Chicago" for Sebastian.

A new page appears with a list of broad occupational categories. Click on the category that you think describes best the job you would have had. In Sebastian's case, if he didn't go to UIC right after high school, he would have been working as a salesperson at Home Depot near his mother's house in the suburbs of Chicago, so we click on "Sales and Related Occupations." On the next page, we click on the job that best describes what Sebastian would be doing, or "Retail Salesperson." Looking at the row of data across from this job title, the first number in the column entitled "Employment" is the number of people doing this job in the area selected (Chicago in this example). The next three numbers tell you what people earn doing that job. The column entitled "Mean Annual" gives the average annual earnings of people in that job -- \$24,280, which is a good estimate of what Sebastian would earn if he didn't go to college.

Real-Life Examples: The Prototypes

Sebastian's Opportunity Cost of a Year at UIC

If Sebastian hadn't decided to go to UIC, he would have taken a job with Home Depot near his mother's house in the suburbs of Chicago. From our research above, he would have earned around \$24,000 per year, or \$96,000 over a 4-year college program. As you can see, the annual opportunity cost of Sebastian's education is higher than his out-of-pocket costs.

Source: http://stats.bls.gov/oes/current/oes_16974.htm#b41-0000

Bridget's Opportunity Cost of a Year at MIT

Bridget would earn around \$27,000 as an architect drafter (assuming she is in the low 10% percentile of the occupation due to her lack of a professional Architecture Degree). Her opportunity cost over the 3.5-year Architectural program would be about \$94,500. In Bridget's case, the annual out-of-pocket expenses for a graduate degree are higher than her opportunity costs.

Source: http://stats.bls.gov/oes/current/naics4_541300.htm#b17-0000

Benefits of Education – How to Measure the Return of Your Investment

The economic benefit of education or training is the increased earnings capacity you have because you received such degree or training. For example, the value of your undergraduate education is the increase in lifetime earnings that hopefully occurs because you have a college degree rather than just a high school diploma.

Given that you only receive the benefits of education in the future, how do you measure what these future returns are worth to you today? You employ the principle of the **time value of money** and use the same techniques that investors and businesses use to evaluate potential investments and projects. The two primary approaches and calculation methods are:

Remember to review **Time Value of Money** concepts and calculation methods in **Part I, Chapter [2]**.

What is this investment worth to me today? To answer this question, you will calculate the **Present Value** of the future returns by **discounting** the increase in future earnings you will receive as a result of your education or training program. This will give you today's value of your investment so you can make a solid financial decision about your potential human capital investment.

Present Value, also known as **Discounting**, is the current value of a future amount or amounts based on an assumed interest rate ("**discount rate**") and a certain period of time. See **Part I, Chapter [2]**

What is the rate of return on this investment? To answer this question, you will calculate the **Internal Rate of Return** on the future incremental earnings you will receive as a result of your education or training program. This will allow you to compare the potential return on your human capital investment to returns on other financial investments.

Internal Rate of Return, or IRR, is the annualized effective compounded return or yield that can be earned on an investment. Mathematically, it's the discount rate that results in a net Present Value = 0 for a series of cash flows. See **Part I, Chapter [2]**

This chapter will focus on Present Value, while the next chapter will study further Internal Rate of Return and its uses in comparing returns and risks.

Measuring the Return of Your Investment – Net Present Value

We will focus first on what the human capital investment is worth today by using discounting to calculate the present value of the extra earnings that you could receive as a result of your college education or training. To do this, you will need to (1) assume an appropriate discount rate, (2) estimate the extra earnings generated by your education or training, (3) estimate the opportunity cost of your education or training (as explained previously), and (4) use a spreadsheet. These calculations can be done by hand, but are much easier to do in a spreadsheet as demonstrated in Part I: Building Your Financial Tool Box - Chapter [2].

The rate by which you should discount future earnings depends on what return you assume you could have made if you had invested money today. As we will learn later, rates of returns to investments have varied wildly over time. A survey of historical returns in the U.S. over the past several decades indicate that one would make about a 4% return investing in secure bonds and about an 8% return investing in stocks. Using these historic returns as a guideline, it is reasonable to generally assume a **discount rate** between 4% and 8%.

The **Discount Rate** is the percent return you assume you could have earned if you invested today. See **Part I, Chapter [2]**

Estimating the extra income you will earn as a result of your investment in education or a training program requires a thought experiment analogous to what we did in identifying the opportunity costs of education, including a similar use of the wage estimates at the Bureau of Labor Statistics' web site. In addition to imagining what your life would have been like if you had taken a job rather than going to college, you need to imagine what your life will be like after you graduate from college and what type of job you are likely to have as a result.

Continuing with our prototype Sebastian who will be attending UIC, we derive from the U.S. Bureau of Labor Statistics site what Sebastian's earnings between 2010 and

2015 would be, on average, if he had decided not to go to college (displayed in the third row of Table 4.1 below, “Earnings – High School Degree”). Note that Sebastian would make steady progress, but that the rate of increase in his earnings is not very high. This generally is true for jobs that people get immediately after high school. The second row of Table 4.1 illustrates earnings between 2010 and 2015 assuming a college degree is earned. Note that as a college graduate, the earnings are both higher and grow more rapidly than the earnings of a high school graduate.

Table 4.1
2010-2015 Earning with A College Degree vs.
with Only a High School Degree

Year	2010	2011	2012	2013	2014	2015
Earnings - College Degree	\$43,000	\$44,100	\$45,500	\$47,000	\$49,200	\$51,000
Earnings - High School Degree	\$25,300	\$26,100	\$27,000	\$27,800	\$28,700	29,600
Benefits of College Degree	\$17,700	\$18,000	\$18,500	\$19,200	\$19,900	\$20,400

Source: U.S. Bureau of Labor Statistics Metropolitan Area Occupational Employment and Wage Estimates at <http://stats.bls.gov/oes/current/oessrcma.htm> (RITE evaluation [4] at Chapter End).

The “extra” earnings Sebastian receives as a result of his college education are not only large, they grow over time. A typical working life is 30 to 50 years---a long time. To continue our present value exercise, we will assume that Sebastian will work for 40 years. Using a spreadsheet will require simplifying our assumptions. The present value calculation in Excel, for example, requires that we place a single value on the annual benefits of education. We will assume that Sebastian’s earnings are \$25,000 higher each year as a result of his college degree.

We are now ready to use a spreadsheet to calculate the present value of the benefits of Sebastian’s UIC degree. Building on what you learned from your Financial Tool Box in Part I, Chapter [2], open Excel, click on the function key (“fx”) and bring up the PV (Present Value) screen. Recalling the Excel present value formula from our Tool Box in Part I, Chapter [2]: PV(rate,nper,pmt,fv,type), you now have to fill in the required “function arguments” as follows:

Rate is the discount rate you want to use. We’ll use 6% as a good midrange discount rate.

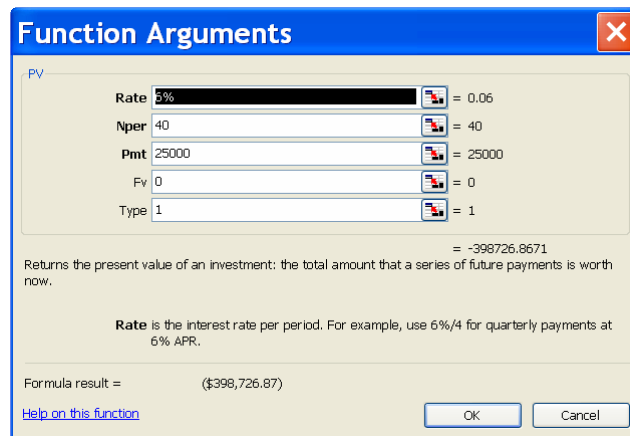
Nper is the number of periods (years in Sebastian’s case) that the payments will be made. We are assuming Sebastian will receive extra earnings for 40 years because of his college degree.

Pmt is the amount of each yearly payment. We are assuming Sebastian will receive \$25,000 in extra earnings each year because of his college degree.

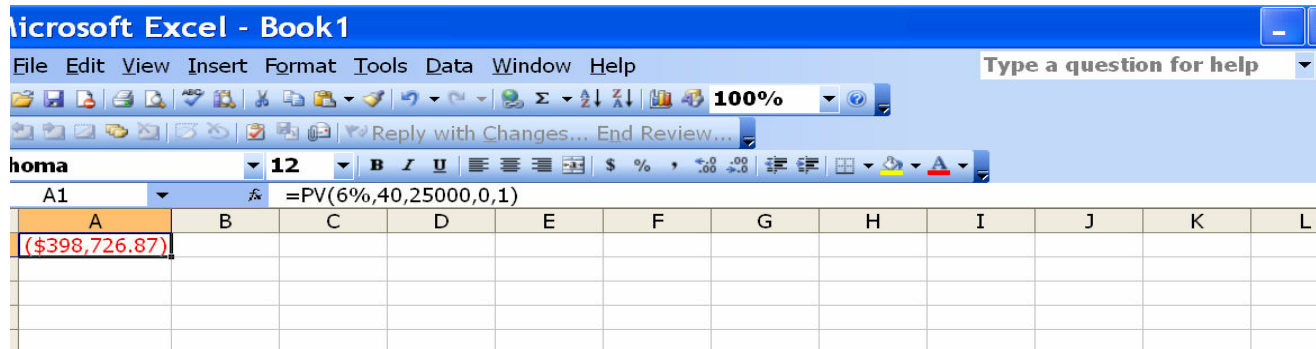
FV (for Future Value) – we are interested in present value and not future value, so we input ‘0’ here.

Type indicates when payments will be made or for our example when Sebastian will receive his paychecks. A ‘0’ indicates that payments are made at the beginning of the period, and a ‘1’ indicates that payments are made at the end of the period. This is somewhat tricky as Sebastian technically receives his salary on a bi-weekly basis over the course of the year so the correct “Type” for him is somewhere between 0 & 1. Unfortunately, Excel doesn’t offer options between 0 & 1, so to be conservative, we will assume that Sebastian receives all earnings at the end of the period.

Your screen should now look as follows.



Click *OK* at the bottom right of the box, and your spreadsheet should reappear and look as follows:



Excel indicates that the present value of Sebastian’s college degree is \$398,726.87. The appropriate way to interpret this is: “A conservative estimate of the value of Sebastian’s human capital investment in a college degree is around \$400,000.” This more general statement reflects the fact that we have made some simplifying assumptions (including not accounting for income taxes) and some conservative estimates, including

for the discount rate, how long Sebastian works and the level of benefits flowing from his degree. Stating a general round number like \$400,000 rather than a precise number like the one produced by Excel alerts you to the fact that this is just an estimate.

We now similarly can calculate the present value of the graduate degree in architectural design that our prototype Bridget is contemplating. Returning to the Present Value function in Excel, we will use all the same assumptions we did for Sebastian's calculation except for "Pmt". Recalling that "pmt" is the amount of each annual payment, or in this example, the estimated increase in annual earnings Bridget receives as a result of her graduate degree. From the U.S. Bureau of Labor Statistics site, we learn that the median for an Architect's earnings currently is \$62,850, producing an annual benefit for the architectural degree of \$35,850 (since Bridget earns around \$27,000 as a drafter). As in Sebastian's case, we would assume these earnings to grow over a lifetime of working. For our present value calculation we will assume that Bridget's earnings are \$40,000 higher each year as a result of her graduate degree. Our present value function arguments in Excel will now be: $PV(6\%, 40, 40000, 0, 1)$ which produces a present value of \$637,962.99. Thus, a conservative estimate of the present value of Bridget's human capital investment in a graduate degree in architectural design is around \$600,000.

Are Sebastian's and Bridget's human capital investments "worth it"? Even after accounting for their out-of-pocket and opportunity costs, we would say: Yes! The **Net Present Value** of the benefits of Sebastian's college education equals the Present Value of his incremental earnings less the out-of-pocket and opportunity costs of his college degree, or approximately \$242,000 ($\$400,000 - \$62,000 - \$96,000$). Similarly, the net present value of Bridget's graduate degree in Architectural Design is \$347,825 ($\$600,000 - \$157,675 - \$94,500$).

END OF CHAPTER EXERCISES – TYING IT ALL TOGETHER

- (1) Using the College Board web site, <http://chronicle.com/stats/tuition/>, what tuition and fees are listed for the school you are attending? Are you paying more or less than this amount? If so, explain why what you are paying is different than the amounts given on the College Board web site? [Hint: College tuition costs have increased by between 5% & 8% each year since 2000.]
- (2) Using the Bureau of Labor Statistics Metropolitan Area Occupational Employment and Wage Estimates at <http://stats.bls.gov/oes/current/oesrcma.htm>, calculate the annual opportunity cost of your college education. Begin by answering the following two questions: (1) Where would you have been living if you hadn't gone to college? (2) What you have been doing, and how much would you be earning?
- (3) Using the Bureau of Labor Statistics Metropolitan Area Occupational Employment and Wage Estimates at <http://stats.bls.gov/oes/current/oesrcma.htm>, estimate what you will be earning after you graduate from college and are pursuing the career for which you are training.
- (4) With the data from questions #2 and #3 above, calculate both the present value and net present value of your college education.

WEB REFERENCES WITHIN CHAPTER: RITE© EVALUATIONS

[1]

Evaluation of http://chronicle.com/stats/tuition/ Web Site (As of: 8/2/2007)			
<p>Relevance: A</p> <p>The <i>About the Chronicle</i> hyperlink indicates that the Chronicle publishes the Chronicle of Higher Education & the Chronicle of Philanthropy. It also compiles statistics on the costs of higher education & the salaries and job openings for higher education faculty and administrators; site last updated 8/1/2007</p>	<p>Identity: A</p> <p>The <i>Contact Us</i> hyperlink gives detailed information about how to contact the organization by mail, phone or email</p>	<p>Trustworthy: A</p> <p>Librarian indicates that this is a reliable source for information about higher education; mission statement indicates that the Chronicle provides the best source of job data for faculty & administrators; lii.org contain one listing for the Chronicle; wikipedia indicates that the Chronicle was founded by the former publisher of the Johns Hopkins Alumni magazine in 1966 and that the Chronicle has won numerous awards for reporting</p>	<p>External Links: B+</p> <p>Home page has many links, most to other pages at the Chronicle; over 20,000 sites linked to the Chronicle, many of the sites are .org and .edu sites</p>

[2]

Evaluation of http://www.maketextbooksaffordable.org Web Site (As of: 8/4/2007)			
<p>Relevance: A</p> <p>The <i>About Us</i> hyperlink indicates that the Affordable Textbook Campaign is a coalition of student PIRGs & Student Government Associations in 14 states; the Campaign started at UC, Irvine and is now active on 50 campuses; the site also has a link that allows students to swap textbooks; the site was last updated 8/3/2007</p>	<p>Identity: D</p> <p>There is no <i>Contact Us</i> hyperlink; the <i>Take Action</i> hyperlink allows you to sign up but you don't know who you are signing up with</p>	<p>Trustworthy: C</p> <p>Librarian indicates that this is a legitimate student initiative, but that continuity is lacking; pages where they ask for personal information are not secure</p>	<p>External Links: C</p> <p>Home page has some links, all to other pages at the site; only 93 sites linked to the site; most links are from blogs or .com sites but some are from student organizations</p>

[3]

Evaluation of http://www.coli.org/ Web Site (August 3, 2007)			
<p>Relevance: A</p> <p>The <i>About Publication</i> hyperlink indicates that the ACCRA data is collected by local Chambers of Commerce and is designed to show how costs of living vary across US urban areas; last update 8/1/2007</p>	<p>Identity: A</p> <p>The home page indicates that the data are compiled by the Council for Community & Economic Research C2ER—a new name); the address and phone number are at the bottom of the page; the Contact Us link brings up a message form that allows you to send an email; on the Home page, from “About”, we learn that C2ER is a membership organization - Board members have relevant credentials & are from across the U.S.</p>	<p>Trustworthy: B</p> <p>Librarian indicates that this is a reliable source for information and is available free in the US Statistical Abstract; mission statement indicates that C2ER seeks excellence in community and economic research; lii.org contains no listing for ACCRA or C2ER; wikipedia indicates that ACCRA is the capitol of Ghana (not very helpful). Security is missing when you are asked for information regarding payment</p>	<p>External Links: B-</p> <p>Home page has many links, all to other pages at coli or c2ER; only 27 sites linked to coli.org, many of the sites are .org and .edu sites</p>

[4]

Evaluation of bls.gov Web Site (July 31, 2007)			
<p>Relevance: A</p> <p>The Bureau of Labor Statistics is the principal fact-finding Agency for the Federal Government in the broad field of labor economics and statistics; last updated 7/30/2007</p>	<p>Identity: A</p> <p>The About BLS tab gives detailed information about the Agency; the .gov domain name indicates that the BLS is a government agency (part of the US Department of Labor). Full contact information is given at bottom of the home page</p>	<p>Trustworthy: A</p> <p>Librarian indicates that this is the most authoritative site for labor market information. Mission statement indicates that integrity and accuracy of data are paramount goal; academics use BLS data for research (see NBER.org); wikipedia indicates that BLS is an independent statistical agency</p>	<p>External Links: B+</p> <p>Home page has many links, all to other pages at BLS; over 7,000 sites linked to BLS, many of the sites are .org and .edu sites</p>

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