Student Report - Example

BBUS 502B

Team X

The topic our team has chosen to research is the payoff of education. The average median salary for an individual in the United States in the year 2000 was $32,717. Using this number as a baseline, we are interested in examining the relationship between the education level attained by an individual and his/her average median salary. We feel this is of high interest to an audience such as our LMBA cohort as we all have been pondering our decisions and the investment we have recently made to pursue this degree. Our goal is to determine what key factors have the most influence on salary.

Hypothesis Testing

We are trying to prove that individuals who have a bachelor's college degree or higher will have a salary equaling 1.5 times the US average median income ($49,076) or more. H_o : the average ratio < 1.5 and H_1 : the average ratio ≥ 1.5. Ratio refers to the average median salaries for the groups of interests to the average median salaries of the overall population.

H_o : $\mu < 1.5$

H_1 : $\mu \geq 1.5$

We will not reject H_o if there is insufficient evidence to conclude that college graduate salaries are greater than 1.5 times the US average median income. We will reject H_o if there is sufficient evidence to conclude that college graduate salaries are greater than or equal to 1.5 times the US average median income. The results from our single-upper tailed t-Test shows that college graduate salary levels are greater than or equal to 1.5 times US average median income for males. We reject H_o; there is sufficient evidence to conclude that college graduate salaries are greater than 1.5 times the US average median income. The p-value of .0171 < α = .05. For females the results show that college graduate salary levels are not greater than or equal to 1.5 times the US average median income. We do not reject H_o; there is insufficient evidence to conclude that college graduate salaries are greater than 1.5 times the US average median income. The p-value of 1.00 > α = 0.05. We can conclude that females seem to be under paid compared to males with the same education.

t Test for Hypothesis of the Mean (Males)

Data	
Null Hypothesis	**1.5**
Level of Significance	**0.05**
Sample Size	**612**
Sample Mean	**1.54**
Sample Standard Deviation	**0.46638**
Standard Error of the Mean	0.0189
Degrees of Freedom	611
***t* Test Statistic**	**2.1218**
Upper-Tail Test	
Upper Critical Value	**1.6474**
***p*-Value**	**0.0171**
Reject the null hypothesis	

t Test for Hypothesis of the Mean (Females)

Data	
Null Hypothesis	**1.5**
Level of Significance	**0.05**
Sample Size	**612**
Sample Mean	**1.1**
Sample Standard Deviation	**0.3078**
Standard Error of the Mean	0.0124
Degrees of Freedom	611
***t* Test Statistic**	**32.1490**
Upper-Tail Test	
Upper Critical Value	**1.6474**
***p*-Value**	**1.0000**
Do not reject the null hypothesis	

Below is a histogram showing the relative frequency of the average median salaries for both males and females (See Charts Below). The data shows a positive or right-skewed distribution for both male and female average median salaries. A right-skewed distribution demonstrates a relationship where the mean > median. The graphs further illustrate that males are paid more having a salary of 1.54 times the US average median salary compared to the 1.10 times the US average median salary for females.

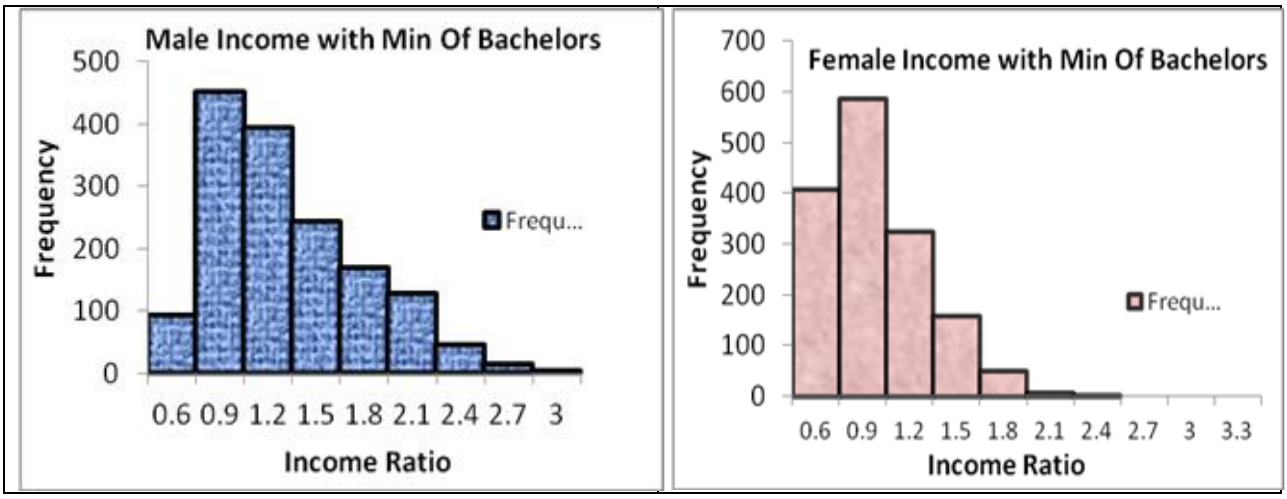
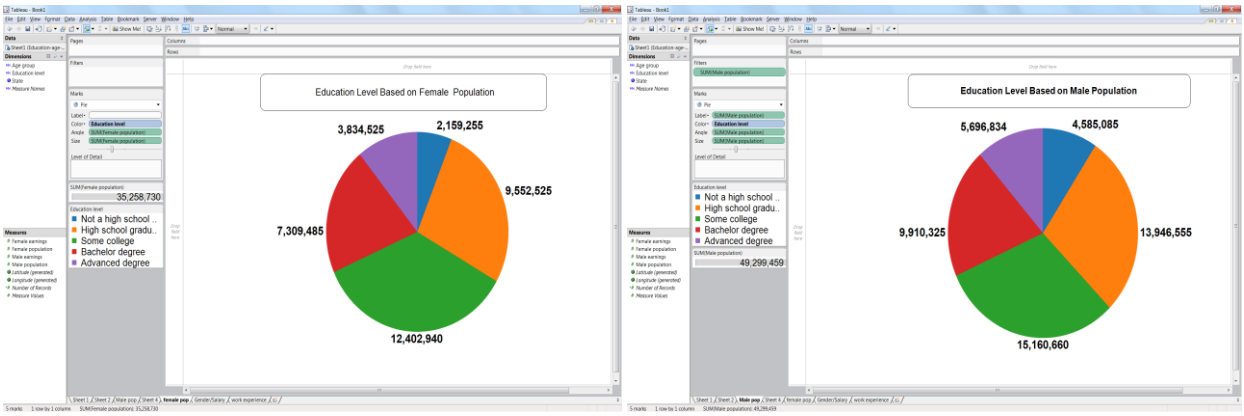


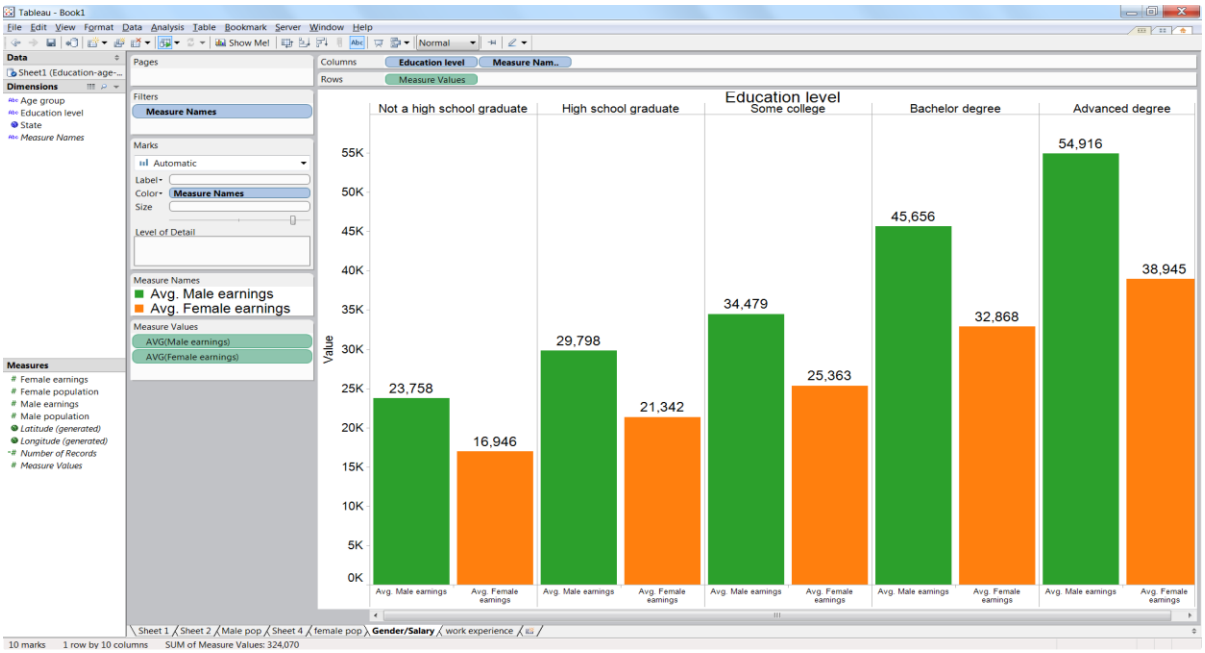
Tableau Analysis

The purpose of our Tableau analysis is to show the relationships between gender and education levels and how they affect an individual's salary. Also in our analysis, we will show how geographic location and level of experience influence one's salary. In our analysis we will assume that years of work experience are relative to his/her age. All data in our Tableau analysis will be extracted from the 2000 US Census. The survey was conducted with a male population sample of 49,299,459 and a female population sample of 35,258,730. Our Tableau data can be viewed online at:
http://public.tableausoftware.com/views/StatPaperTableau_GenderSalaries/Dashboard1?:embed=yes&:toolbar=yes&:tabs=no

Based on this the male population sample, 31.66% have a bachelor's degree or above. For the female sample population the same, 31.61% have bachelor degrees or higher (See chart below).

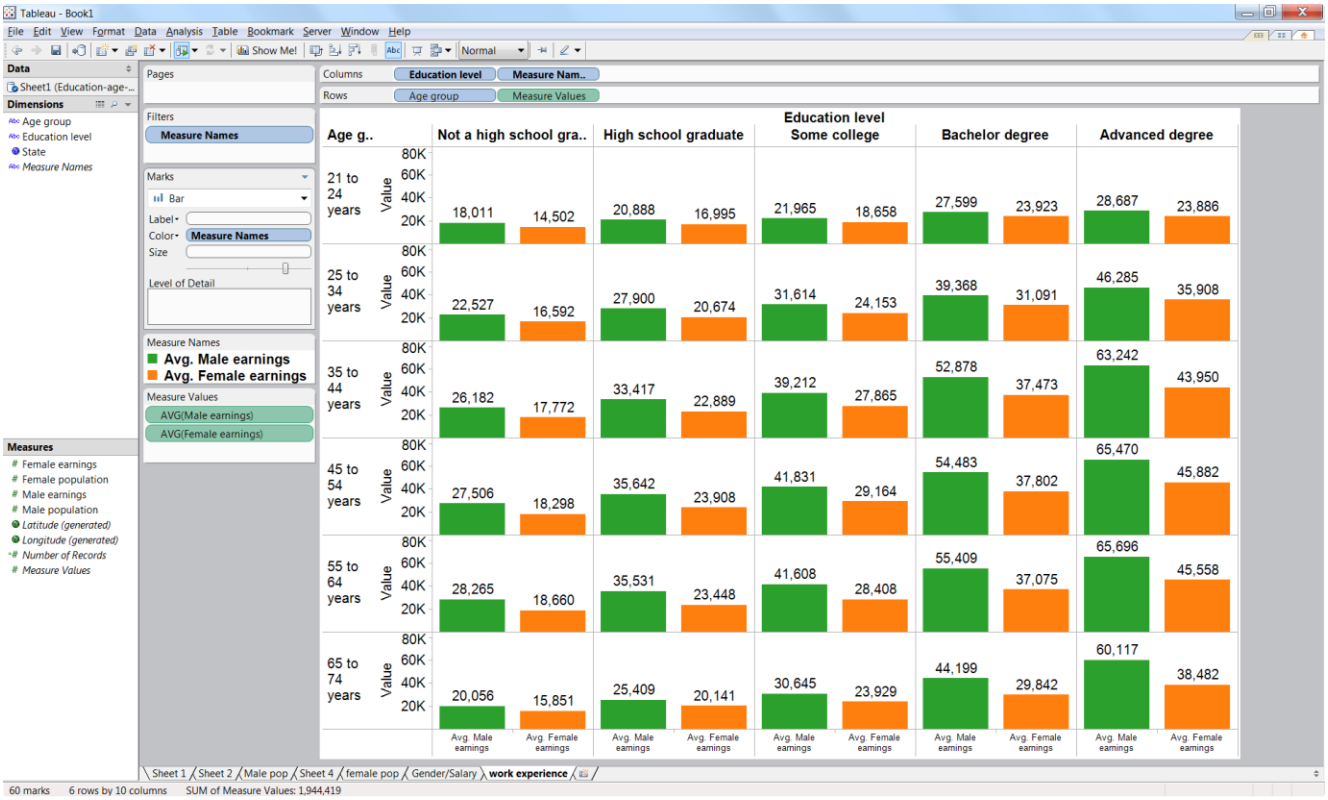


Our first graph in Tableau shows the relationship between the expected average median salary based on gender and level of education (See Chart Below). Notice that in every level of education that the average median salary for a female is approximately 28% less than the average median male salary. There is a strong relation showing that the higher the education achieved, the higher the salary for both male and female. For instance, a high school male graduate has an average median salary of $29,798 and a male with a bachelor's degree has an average median salary of $45,656. This result is consistent with today's trends in the market; higher salaries are expected for those who complete college.



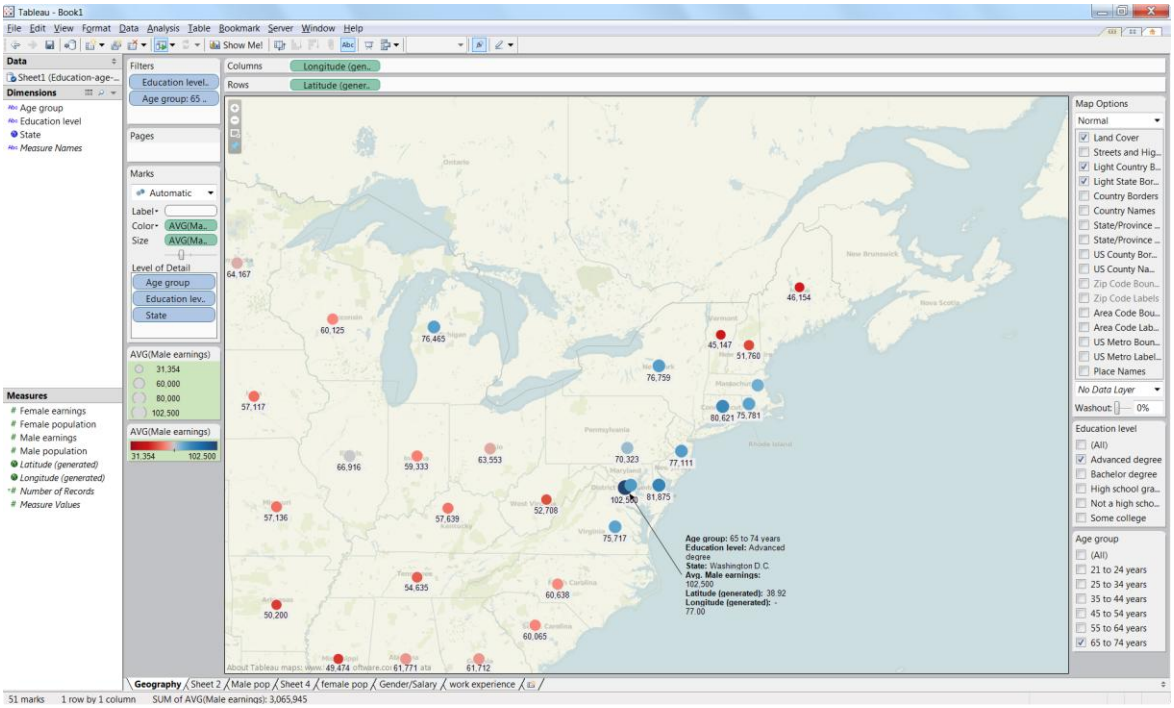
Graph showing the relationship between the expected average median salary based on gender and level of education

Our second graph in Tableau shows the relationship between the expected average median salary of an individual based on gender, level of education, and the number of years of work experience being relative to one's age (See Chart Below). Notice again the discrepancy in salary between male and female in all categories of education and work experience. Notice how the difference in salary between the two genders increases as the number of years of work experience and the level of completed education increases. For example, a male and female high school degree between ages 25-34 earned an average median salary of $27,900 and $20,674 respectively, while a male and female with an advance college degree between ages 55-64 earn an average median salary of $65,696 and $45,558 respectively. Our analysis also shows that both male and female individuals who are in the 55-64 age bracket (generally 33+ years work experience) don't earn a significant higher average median salary than male or females in the 45-54 age bracket with generally 23+ years of work experience. The data shows that the average median salary almost plateaus after the age of 54. Do employers not value individuals with over 23+ years of work experience, or are they just not willingly to pay for it? A further look at the analysis shows that the average median salary actually starts decreasing substantially for individuals who are in the 65-74 age bracket at all levels of education. This may be a result of older individuals, male or female looking for work after retirement and not being able to find work that compensates them for their education and experience. Employers might be discriminating against their age.



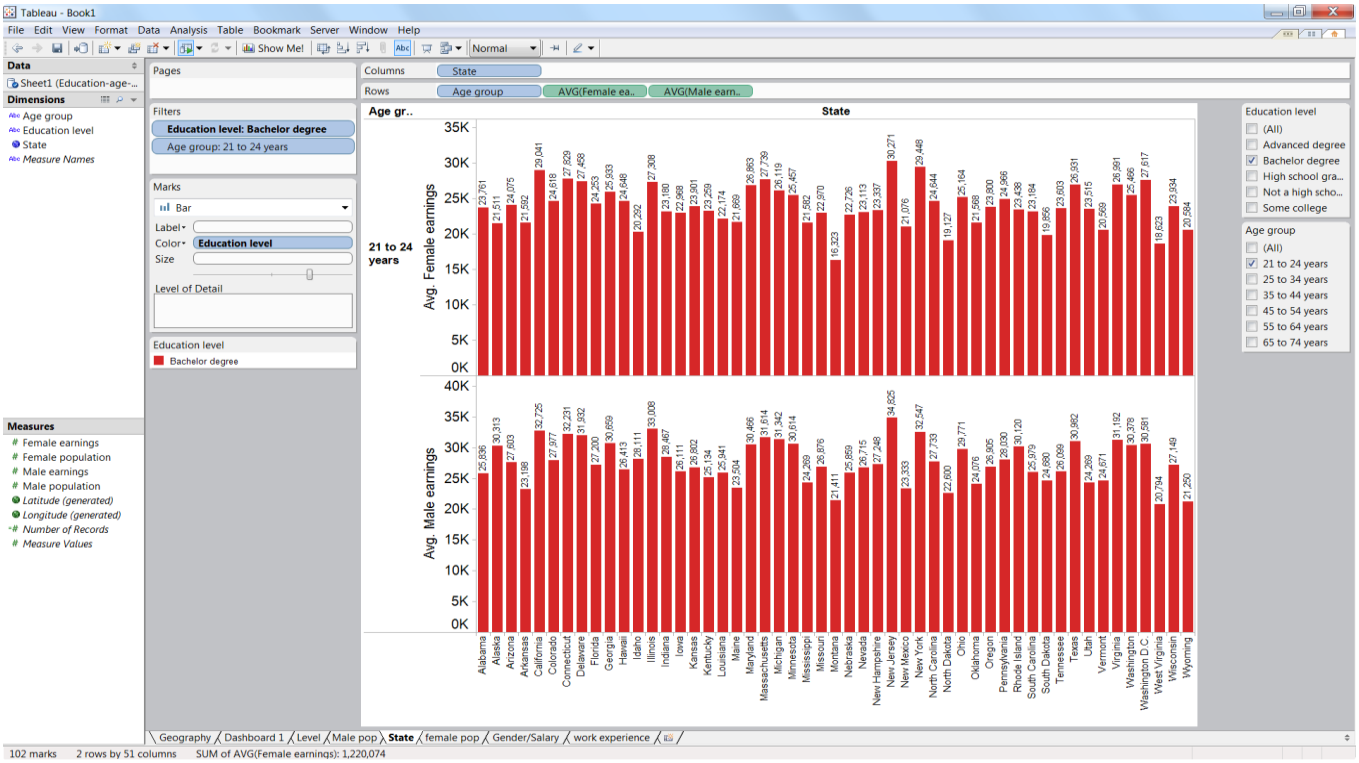
Graph showing salary based on work experience, age, and gender.

To determine the relationship between gender, work experience and educational level geographically we will need to setup a longitude and latitude generated map with some filters in Tableau. If you wanted to know which states paid the highest salary based on level of education attained and experience for both males and females, you would need to put level of education, age group and state in the level of detail field (See Chart Below). In the filter field, you would pull over the education level and age group so you can select the experience and education level of interest. Finally drag the male or female earnings over to the size field. By running different combinations using level of education and age group in the filter we can see that the District of Columbia has the highest salaries for both males and females. You will have to zoom in on the states that don't show values to determine the ranges. The highest salary for males was $102,500 for ages 65-74 with an advanced degree. These higher salaries can be contributed to the older politicians and lobbyist in the area. The highest salary for females was $68,892 for the age group of 45-54 with an advanced degree.



Example showing highest male average salary by state

Let's look at another example, suppose you want to find out in which state one can make the most money with just a high school degree. We can determine this by creating a bar graph in Tableau. To create this chart, you will need to place state attribute in the column field. The age, male earning and female earnings attributes will be placed in the row field. Finally, drag the education attribute to the color field. In the filter field, you would pull over the education level and age group so you select the experience and education level of interest. In the filter, you will check high school education and then go to the age group filter and select age group of interest corresponding to work experience. Our analysis shows that Alaska is the best state for males and females with only a high school degree having an average median salary of $22,662-$46,073 for males depending on the years of work experience. The average median salary was $19,957-$30,381 for females depending on the years of work experience (See Chart Below). These high salaries can be justified by the demand for manual labor on the fishing boats and packing plants in which higher education is not necessarily needed. On the contrary, you would probably want to avoid living in Montana having an average median salary of $16,829-$30,685 for males with high school degrees with varying years of work experience and females with an average median salary of $13,755-$19,576 depending on work experience.



Example showing highest male and female average salary by state with high school education

Our data shows that for males with advance degrees will eventually have a salary of 1.5 times the US median or greater in all the fifty states expect Montana which has salary of 1.48 times the US average median at $48,432 for the maximum years of work experience. For females our data showed that females with advance degrees will eventually have a salary of 1.5 times the US average median or greater in only seventeen of the fifty states. Most of the seventeen states where located on the east coast with the District of Columbia being the highest at 2.11 times the US average median at $68,892.

From our Tableau data and looking at the dashboard it would be interesting to analyze what the sweat spot for maximizing your salary based on the level of education attained and work experience depending on which state you live in the US. Our data has shown that geography is a major factor when looking at average salaries across the board and some states seem to put more value on work experience than others. Also more research needs to be done on why gender seems to be the most dominate factor in the difference in salaries between males and females with the same education level with similar work experience. Also some of the data used in our analysis maybe skewed slightly because the population sample wasn't large enough to be an accurate prediction of the true population. For instance, in the state of North Dakota the population sample for the female age group 65-74 years with an advanced degree was 30. The average median salary for a female in this category was $8,850. This doesn't make sense, because non-high school graduates in the same age group are making an average of $14,693 based on a sample population size of 815.

Another example of data that may need to be analyzed further for accuracy is in the state of Alaska where the population sample sizes for males and females ages 21-24 with

advanced degrees were 4 and 10 respectively. The average salaries for this group were $51,250 for males and $30,417 for females. These sample sizes may be not sufficient to be a true representation of the population of Alaska. How many individuals can truly complete an advanced degree and find work by the age of 24? A second example of possible skewed data would be to focus in on the New England states where the salaries seem to be the highest. One problem factor is this data doesn't take into account people who work in one state but live another. An Example, people work in New York, but live in Connecticut. This would show a lower average salary for New York, since most of the highest paid executives work there and a higher actual salary for Connecticut residents. Further research needs to be done to validate these claims.

Resources

Higher Education Can Pay Off for a Lifetime, by Romy Ribitzky, May 14, http://abcnews.go.com/Business/Careers/story?id=87157&page=1

Salary Gap Between High School and College Education Narrows, by Louis Uchitelle, October 7, 2005, http://tech.mit.edu/V125/N45/collegecosts.html

How Much Will an MBA raise My Salary?, author unnamed, date not specified, Business Schools Directory and Campus and Online MBA Degrees, http://www.bschool.com/library/how-much-will-an-mba-raise-my-salary/

The Gender Wage Gap; Debunking the Rationalizations, by Hilary M. Lips, date not listed, http://www.womensmedia.com/new/Lips-Hilary-gender-wage-gap.shtml

Inquiry On the 'Investment Payoff' from Higher Education, Will More Spending Produce Better Results?, by George C. Leef, March 8, 2005, http://www.johnlocke.org/acrobat/pope_articles/inquiry20.pdf

Where to Find the Fattest Paychecks, by Les Christie, September 22, 2009, http://money.cnn.com/2009/09/21/news/economy/highest_income_census/

2000 US Census

http://www.census.gov/hhes/www/income/data/earnings/index.html