Visual Basic with C/C++ Programmer Competitive Position™ Market Report

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Whole Root™ Economic Research, Inc. has carried out the Competitive Position™ Market Analysis and prepared the Competitive Position™ Market Report according to accepted statistical standards. The statistics present information about the data source. Possible biases and other errors may exist within the data source that Whole Root™ Economic Research, Inc. is not responsible for. Individual job placements can not be identified. Job placement and/or salary improvement is not guaranteed or offered.

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Welcome

The goal of Whole Root™ Economic Research is to bring detailed and extensive market analysis to individuals and improve their decision making. Competitive Position™ market analysis is a fulfillment of this mission. Its purpose is to improve the ability of individuals to correctly assess their salary opportunities and companies to meet their employment goals. Whole Root™ Economic Research is the first to provide affordable market analysis designed specifically for the computer professional and the small business employer.

Competitive Position™ market analysis takes advantage of a previously unused but widely and publicly available source of information: classified want ads. Individuals and employers receive detailed and extensive information about the classified ads they use to assess and realize job opportunities. The statistical analysis takes data dissipated across many pages of want ads and number crunches them into a specific relationship between salary offers and experience requirements. A confusing set of raw data is converted into clear and applicable information. Competitive Position™ market analysis is a valuable career and employment decision making tool.

Robert Gerald Vivona

Whole Root™ Economic Research, Inc.

Competitive Position Market Reports
Directions for Use

1. In the “Characteristics of Sample Data” page check out the Keywords that are required in each want ad for inclusion in the salary analysis and read a typical job description.

2. Find the expected salary offer for your years of experience in the “Expected Salary Offer” graph page. If you have a fraction of a year experience you can use the equations in “The Equation of the Expected Salary Offer” page to calculate your salary offer.

3. Check out the “Salary Offer Distribution” pages to find the extreme salary offers. The numbers tell you how far the salary offers can go above and below the expected level before hardly ever occurring.

4. The “Statistical Test Results” page has all of the hard core number crunching stuff. The “Characteristics of Sample Data” page has the data source and the number-of-observations information. This information attests to the reliability, authenticity and verifiability of the salary numbers.

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Characteristics of Sample Data

Sample Source: The **New York Times** Sunday Employment section
Dates: the 52 weeks (1 Year) from January 7 through December 29, 1996

Number of Classified Want Ads: 85

Keywords extracted from the Employment Want Ads

Keywords	Required	Salary Different With & Without	Number of Sample Want Ads with
Responsibility	Programmer, P/Aor Designer/Developer		
Hardware / OS			
Language	Visual Basic & C/C++		
Data Base			SQL = 39 Access = 10
Network			
MIS Software			
Industry			Wall Street = 30

Job Description

- Translates user requirements into design specifications for a new application, or, to reengineer & enhance existing applications
- Codes application modules based on a design document in Visual Basic and C/C++
- Integrates, Tests & Debugs application modules and documents the results

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The Equation of the Expected Salary Offer

The statistical analysis indicates that the Expected Salary Offer:

1. is low at entry level
2. increases by a fixed amount each year

The relationship between expected salary offers and experience requirements is expressed in the form of a Linear Equation (a line), written as:

$$\$ = a + b(YrsExp)$$

where:

$ = Expected Salary Offer
a = the Entry Level Salary Offer
b = the Salary Offer increase per year of required experience
YrsExp = Years of Experience in Same Job

The Equations Behind The Expected Salary Offer Graph

Expected Salary Offer = $32.0 + $10.8 (YrsExp)

Highest $ Offer to be Expected, with 95% Certainty = $40.2 + $7.6 (YrsExp)

Lowest $ Offer to be Expected, with 95% Certainty = $23.8 + $14.0 (YrsExp)

The **Highest $** and **Lowest $ Offer** curves are statistically constructed from the upper and lower 95% probability values of "the entry level salary offer" and "the salary offer increase per year of required experience". The curves cross at the overall central tendency salary offer and required experience point. Years of required experience further and further from the overall central tendency point have larger and larger 95% probability regions for the expected salary offer.

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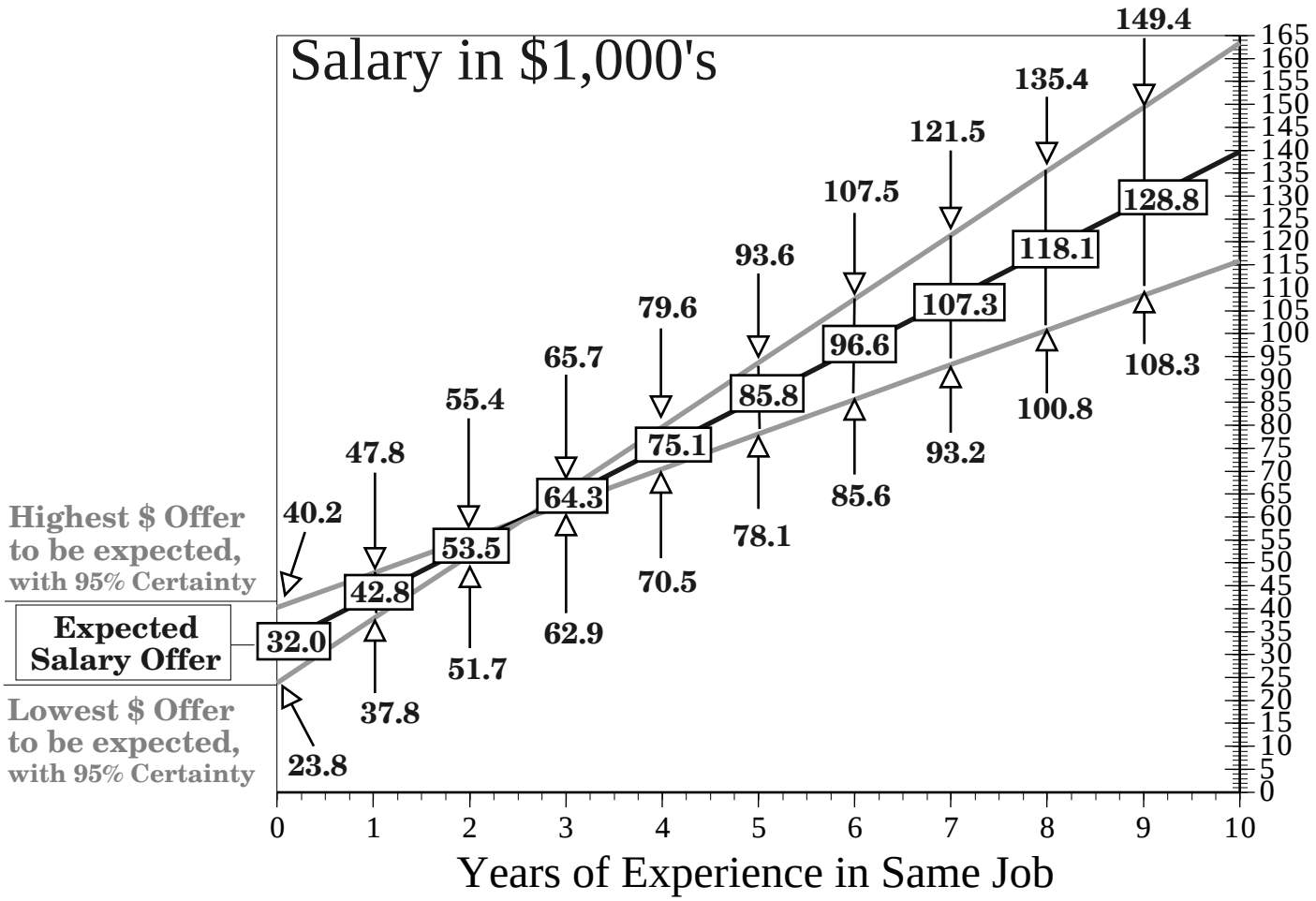
Expected Salary Offer & its 95% Probability Range
for Each Year of Required Experience



The black line depicts Expected Salary Offers across Years of Required Experience. For each year of required experience the expected salary is written in a box on the line. The expected salary is the most likely, the average and the central tendency salary offered; it is calculated from the sample of classified want ads.

The sample of classified want ads enables inferences to be made concerning the entire job market for this position. The gray lines above and below the black Expected Salary Offer line present the Highest and Lowest salary offers that can be expected. There is a 95% certainty that the average salary offer, within the entire job market for this position, lies between the High and the Low numbers that point to the gray lines at each year of required experience. For an extra degree of confidence, the 95% probability range of the mean salary should be considered at 3 years of required experience: $71.0thousand highest expected salary at 3 years experience; and, $60.4thousand lowest expected salary at 3 years experience.

The statistics are based on the classified want ads printed in the **New York Times**' Sunday Employment section for the 52 weeks from January 7 through December 29, 1996.

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Statistical Test Results

1996 NYTimes

Regression Summary
Salary (H adj) vs. 2 Independents

Count	73
Num. Missing	44
R	.968
R Squared	.938
Adjusted R Squared	.936
RMS Residual	2.450

Regression Corrected for Heteroscedasticity

The expected salary offer line was corrected for heteroscedasticity (please view the Heteroscedasticity Correction page for specifics). A consequence of correctly accounting for the relationship within the variance is that the R Squared statistic is no longer accurate. The variation around the mean salary offer has been altered to correctly calculate the expected salary offer line with all available information. Please view the Salary Distribution graphs for analysis of extreme salary offers.

The R Squared statistic calculates the percentage, of the variation in salary offers away from the mean salary offer, explained by the expected salary offer line. An R Squared statistic of 1 would indicate that the expected salary offer line would be the only salary offered in the marketplace. A reasonable degree of variability should be expected due to the many factors influencing individual want ads.

ANOVA Table
Salary (H adj) vs. 2 Independents

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Regression	2	6399.864	3199.932	533.118	<.0001
Residual	71	426.163	6.002		
Total	73	6826.027			

Regression Coefficients
Salary (H adj) vs. 2 Independents

	Coefficient	Std. Error	Std. Coeff.	t-Value	P-Value
Entry Level (H adj)	32.019	4.115	.594	7.781	<.0001
Years (H Adj)	10.758	1.601	.276	6.719	<.0001

The statistical significance tests indicate a high level of quality for the expected salary offer numbers:
1. there is less than .01% (one ten-thousandth) chance that there is no relationship between salary offers and experience requirements (P-Value in ANOVA Table)
2. there is less than a .01% (one ten-thousandth) chance that the entry level salary can not be defined (Entry Level P-Value in Regression Coefficients Table)
3. there is less than a .01% (one ten-thousandth) chance that the yearly increase in salary offer can not be defined (Years P-Value in Regression Coefficients Table)

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Heteroscedasticty Correction
1996 NYTimes

Regression Summary
ln(Resid^2) vs. Years

Count	73
Num. Missing	44
R	.267
R Squared	.072
Adjusted R Squared	.058
RMS Residual	2.722

Heteroscedasticity Test
Y = ln(Resid^2)
X = Years

The variation above and below the expected salary line increases with the years of required experience. This additional information is factored into the analysis by dividing all columns by the square root of (e ^ (2.379 + .475Years)). By giving less weight to want adds requiring greater years of experience, an unbiased expected salary offer line is derived.

ANOVA Table
ln(Resid^2) vs. Years

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Regression	1	40.527	40.527	5.470	.0222
Residual	71	526.029	7.409		
Total	72	566.556			

Regression Coefficients
ln(Resid^2) vs. Years

	Coefficient	Std. Error	Std. Coeff.	t-Value	P-Value
Intercept	2.379	.713	2.379	3.336	.0014
Years	.475	.203	.267	2.339	.0222

Original Regression with Heteroscedasticity

Regression Summary
Salary vs. Years

Count	73
Num. Missing	44
R	.679
R Squared	.461
Adjusted R Squared	.454
RMS Residual	16.661

Confidence Intervals
Salary vs. Years

	Coefficient	95% Lower	95% Upper
Intercept	35.220	26.513	43.926
Years	9.694	7.216	12.172

ANOVA Table
Salary vs. Years

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Regression	1	16890.723	16890.723	60.847	<.0001
Residual	71	19709.266	277.595		
Total	72	36599.989			

Regression Coefficients
Salary vs. Years

	Coefficient	Std. Error	Std. Coeff.	t-Value	P-Value
Intercept	35.220	4.367	35.220	8.066	<.0001
Years	9.694	1.243	.679	7.800	<.0001

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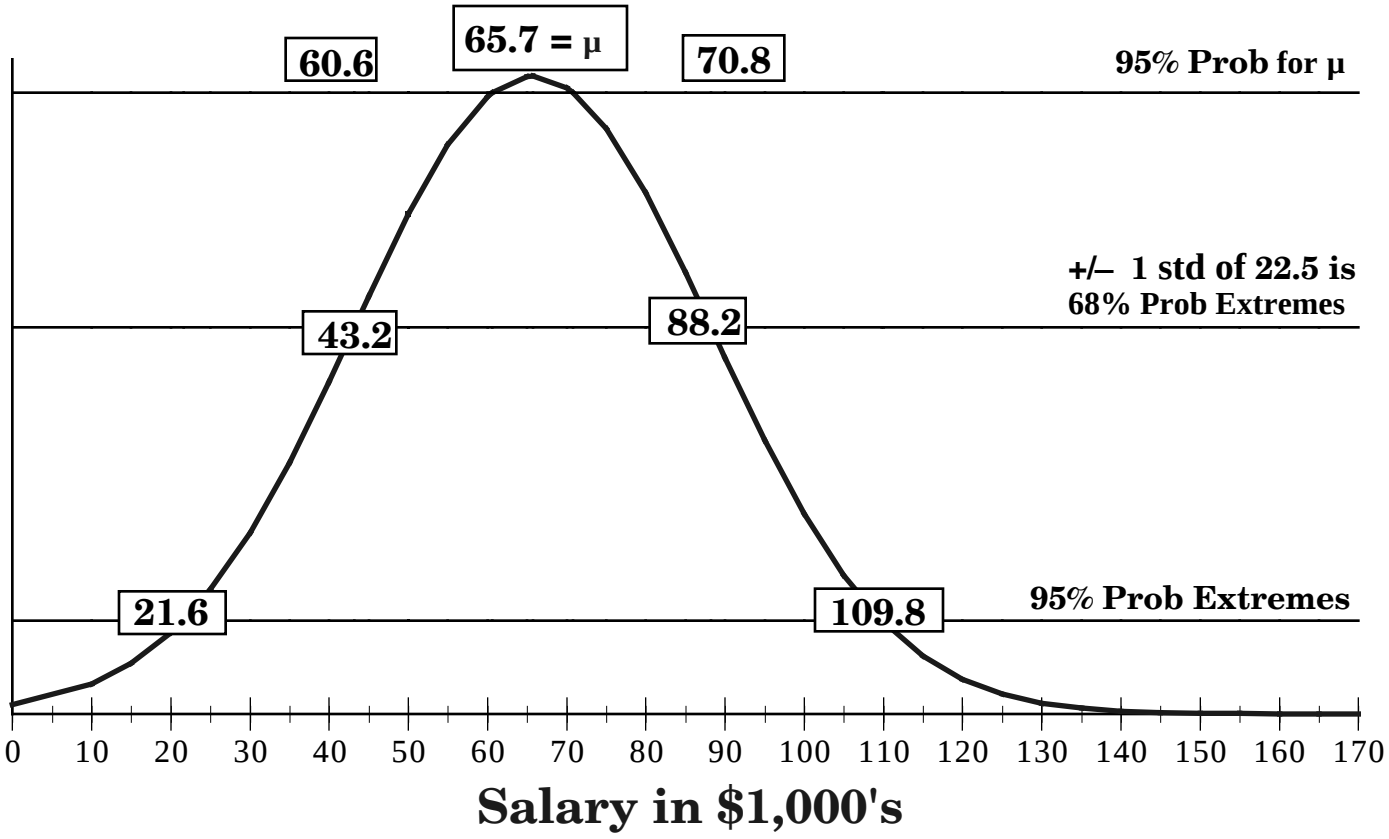
Salary Offer Distribution
Overall



Key: μ = Mean; std = Standard Deviation **73 Observations**

Extreme Salary Offers

The 68% Probability Extremes: (salary offers are not particularly likely above or below range)
- Two Thirds (68%) of salary offers are in this range
- Only 1/6th (16%) of salary offers are greater than the high number
- Only 1/6th (16%) of salary offers are less than the low number

The 95% Probability Extremes: (salary offers are highly unlikely above or below range)
- 95% of salary offers are in this range
- Only 2.5% of salary offers are greater than the high number
- Only 2.5% of salary offers are less than the low number

The 68% confidence interval is constructed by taking one standard deviation then adding it to and subtracting it from the average. The 95% confidence interval is constructed by multiplying the standard deviation by 1.96 then adding it to and subtracting it from the average.

The average salary offer and its 95% probability range is presented for completeness. For the best statistical numbers for the expected salary offer please utilize the "Expected Salary Offer" graph and "The Equation of the Expected Salary Offer" page.

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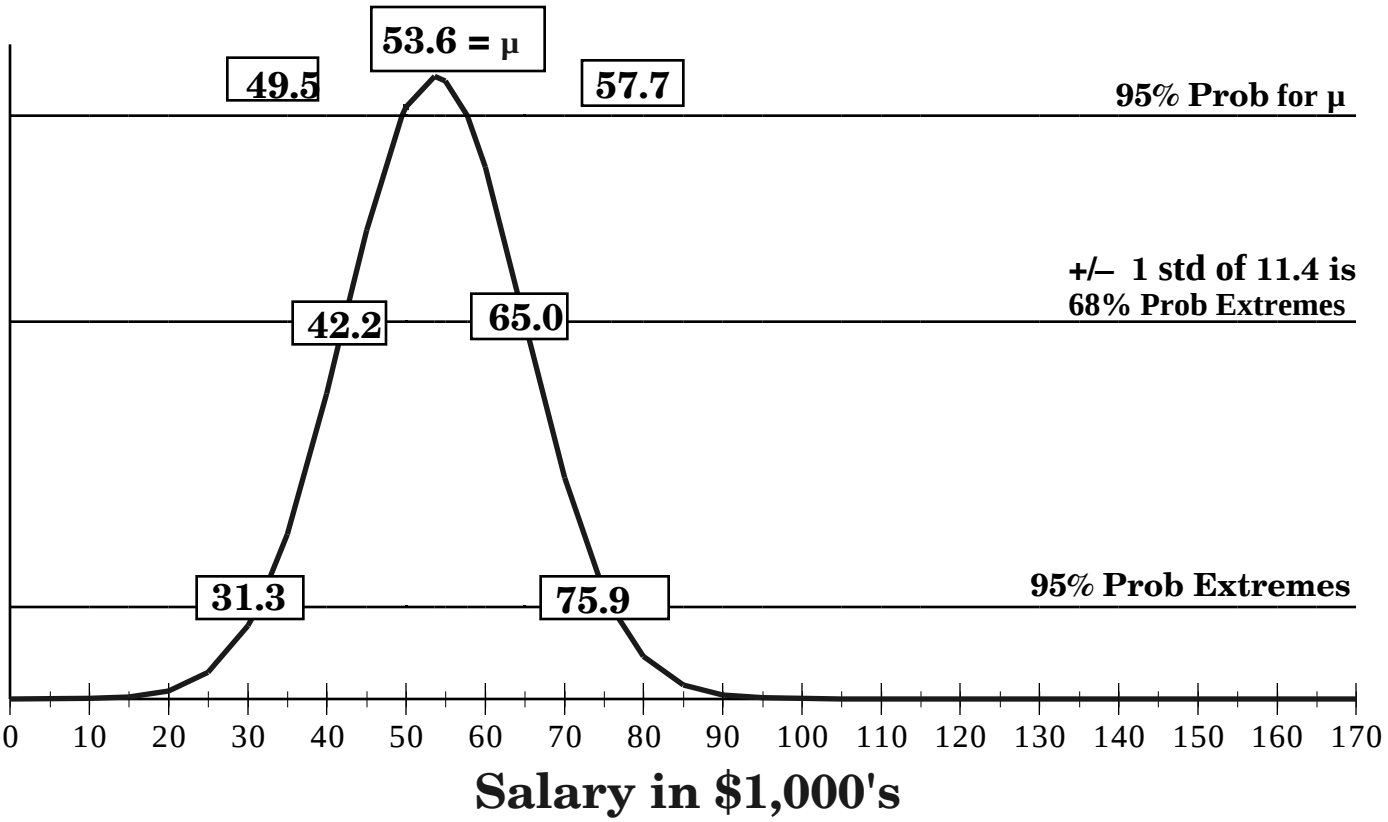
Salary Offer Distribution
2 Years Required Experience



Key: μ = Mean; std = Standard Deviation **30 Observations**

Extreme Salary Offers

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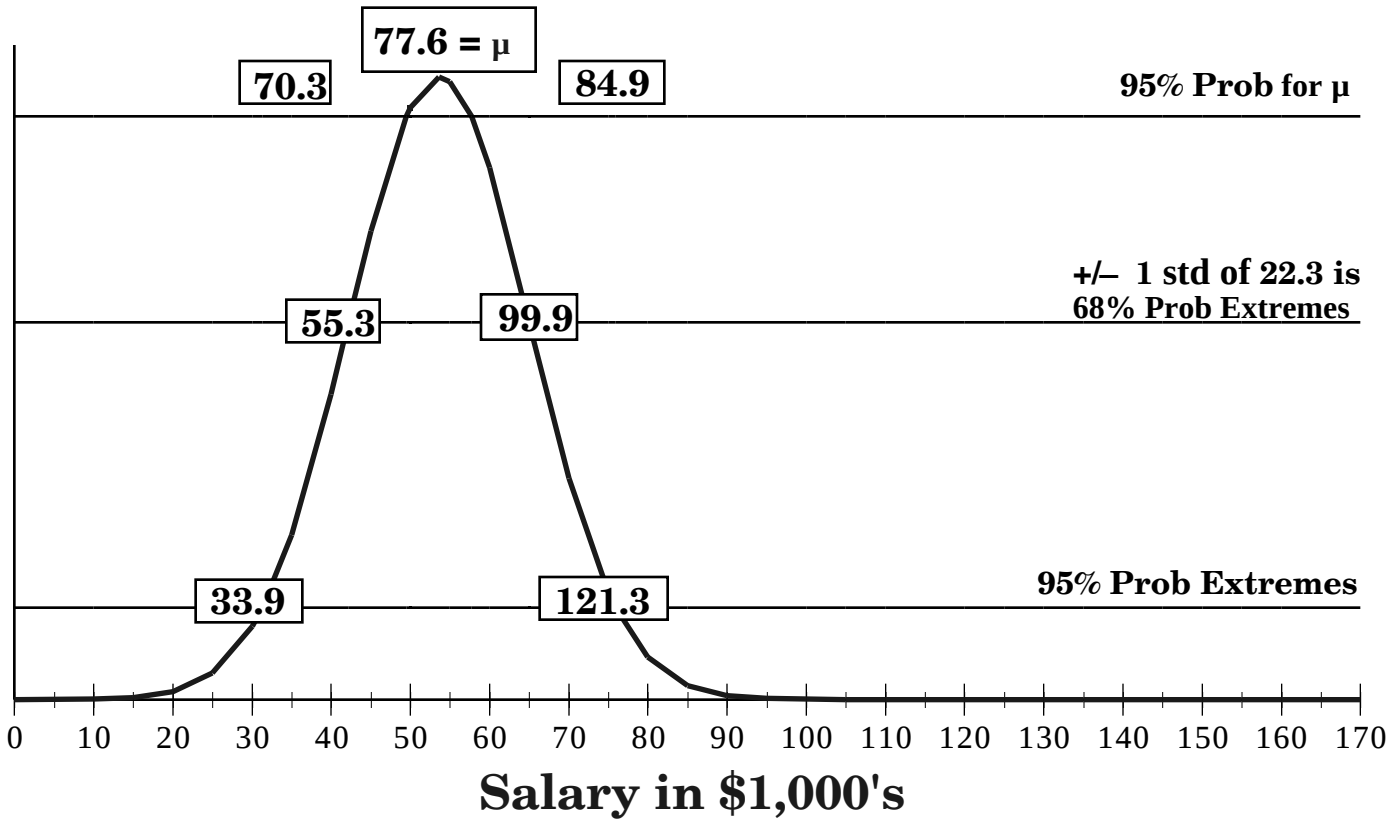
Salary Offer Distribution
3 - 5 Years Required Experience



Key: μ = Mean; std = Standard Deviation **37 Observations**

Extreme Salary Offers

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Want Ads are an Excellent Source to Measure the Characteristics of the Computer Job Market

Classified want ads collectively reflect the competitive demand and supply conditions of the computer job market. Each want ad states an employers initial bargaining position: potential salary versus desired qualifications. The goal of the listing is to elicit the best qualified candidate within the employer's cost constraints. This goal creates a competitive market for computer professionals that is displayed within the collection of classified want ads.

The success of a want ad depends on its competitive position relative to other want ads. If the salary is too low relative to the experience requirement, few suitable professionals will submit resumes. If the salary is too high relative to the experience requirement, the employer may overextend expenses for the desired job performance. The success of a want ad depends upon the cost to performance constraints of the employer relative to the salary offers and experience requirements listed in other want ads. The competition between employers for the best resumes restricts the distribution of salary offers relative to experience requirements around central tendency, or average, values.

The income level of employers determines their cost constraints and performance needs and, in turn, the demand for computer professionals. The connection between employer's income and computer job market demand is reflected in the level of salary offers relative to experience

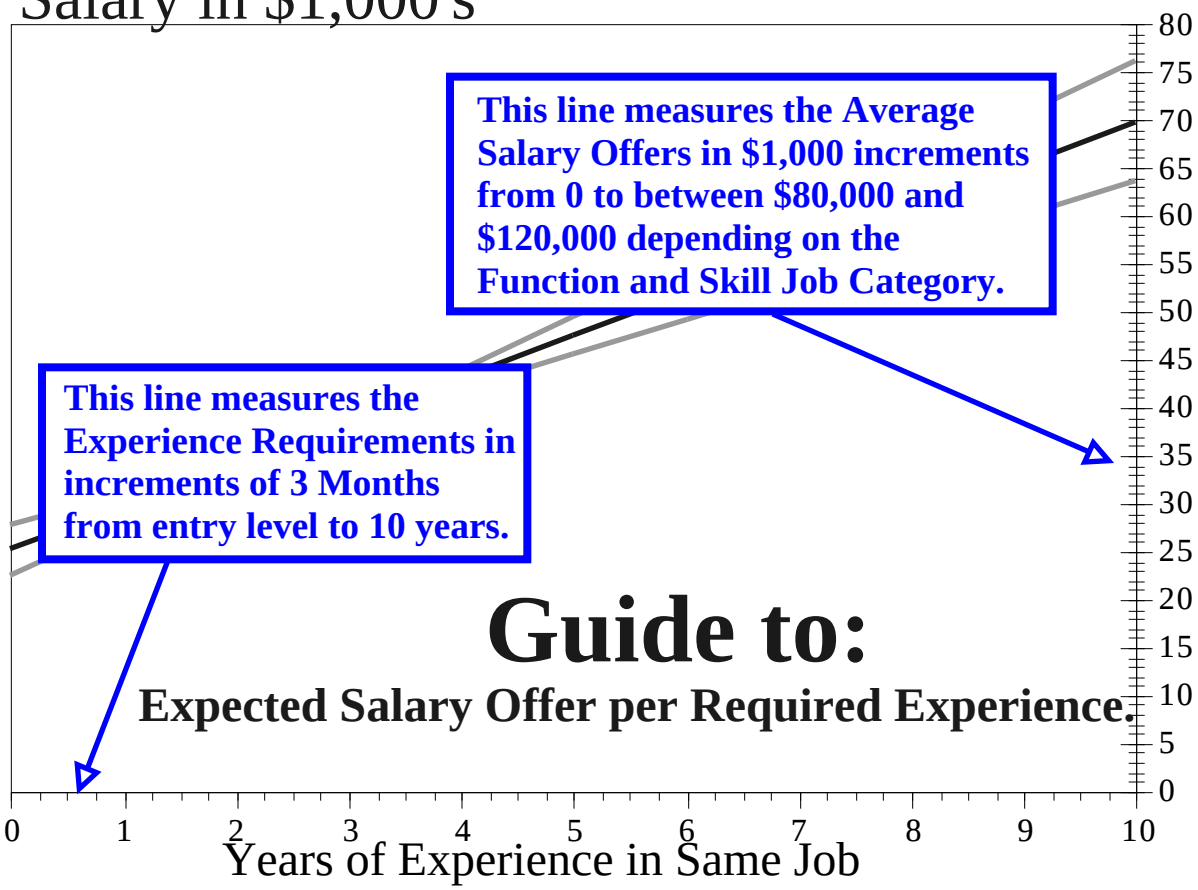
requirements. When sales are good for employers the demand for computer professionals is strong and salary offers are high. When sales are bad for employers the demand for computer professionals is weak and salary offers are low. Importantly, the differences in income levels between employers accounts for some of the variation in salary offers.

The supply of computer professionals determines the level of salary offers necessary for the employer to entice the best qualified resume applications. An excess supply of computer professionals is reflected in low salary offers. A short supply of computer professionals forces employers to make high salary offers. Employers adjust their salary offers and experience requirements to reflect the quality of resumes elicited by their want ads.

The competitive demand for and supply of computer professionals is reflected in the average, and distribution, of the salary offers and experience requirements of job listings. The average salary offer is determined by the performance needs, sales revenue and cost constraint of employers in combination with the availability and alternative opportunities of computer professionals. The distribution of salary offers is determined by: the competitive rivalry between employers; the variation in profitability of employers; the quality of the skills desired and the performance needs for a given experience requirement; and, the location of the job.

The classified employment section is today's job market news. Each want ad is written in consideration of an employer's current needs and capabilities. Collectively the classified want ads reflect up-to-date demand and supply conditions.

Other sources of salary relative to experience information are biased away from current market conditions. For instance, surveys of job holders are historical reflections of: market conditions at the time of employment; and, subsequent performance and cost of living raises. Surveys of people initially employed in a company 5 to 10 years ago may produce results that are not relevant to today's market conditions. Competitive Position Market Analysis is the first to utilize the classified want ads as a source.



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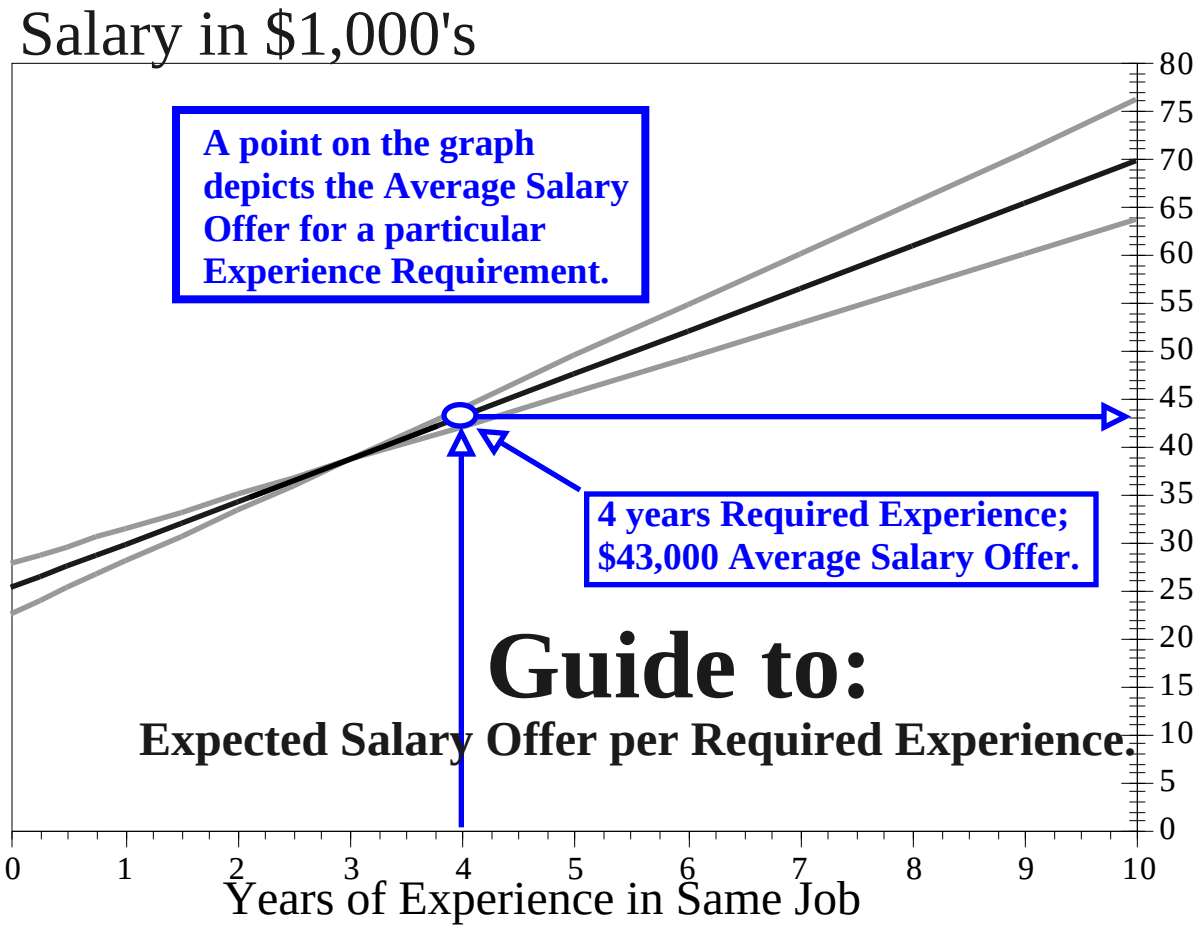

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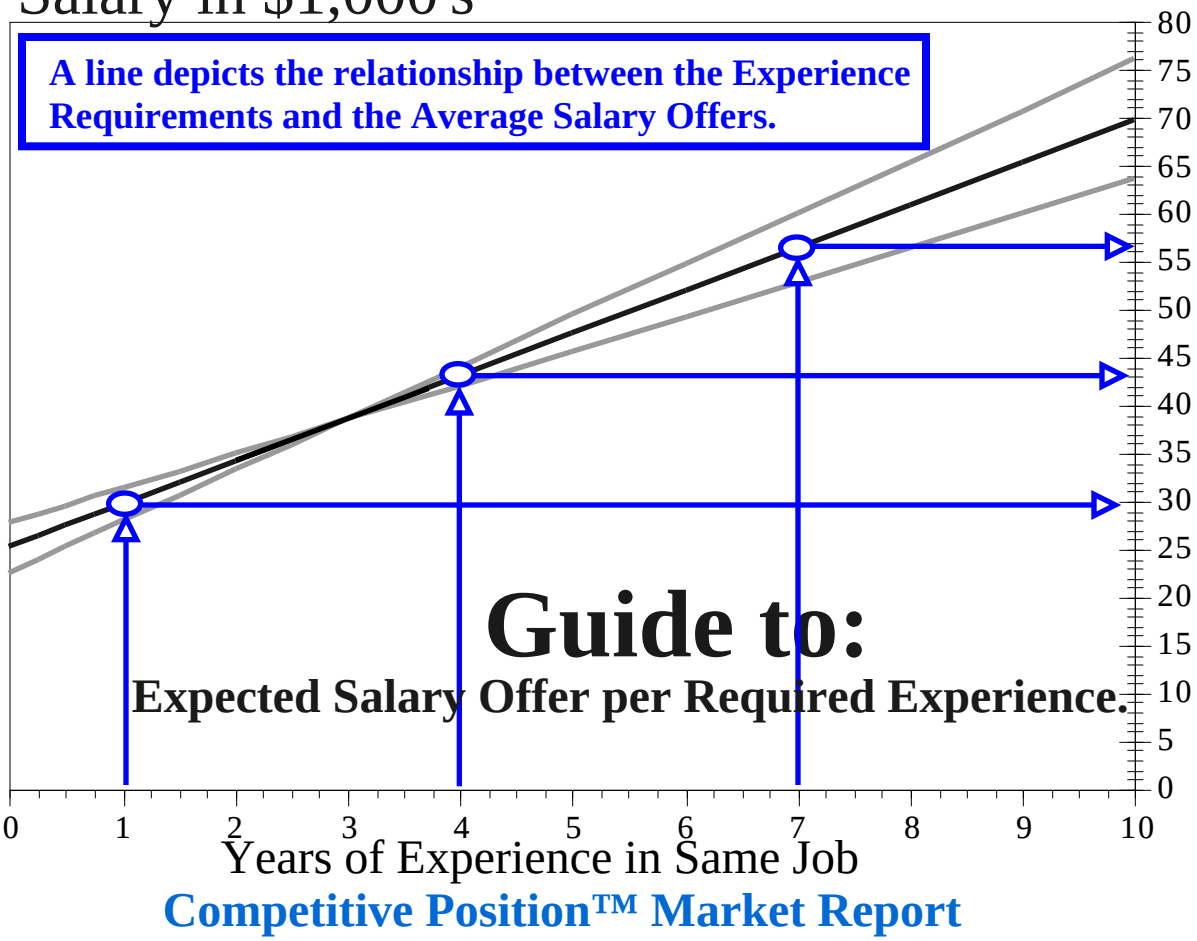

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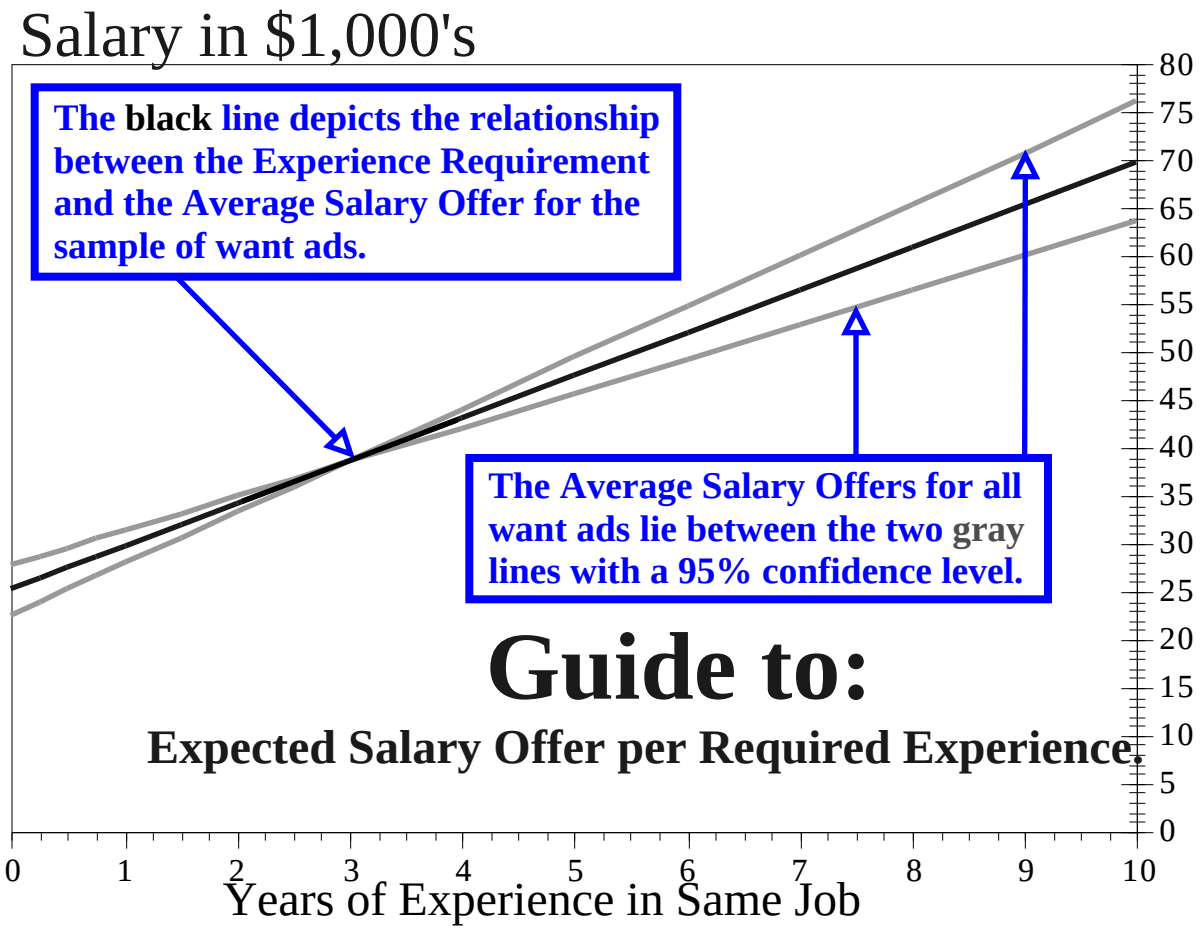

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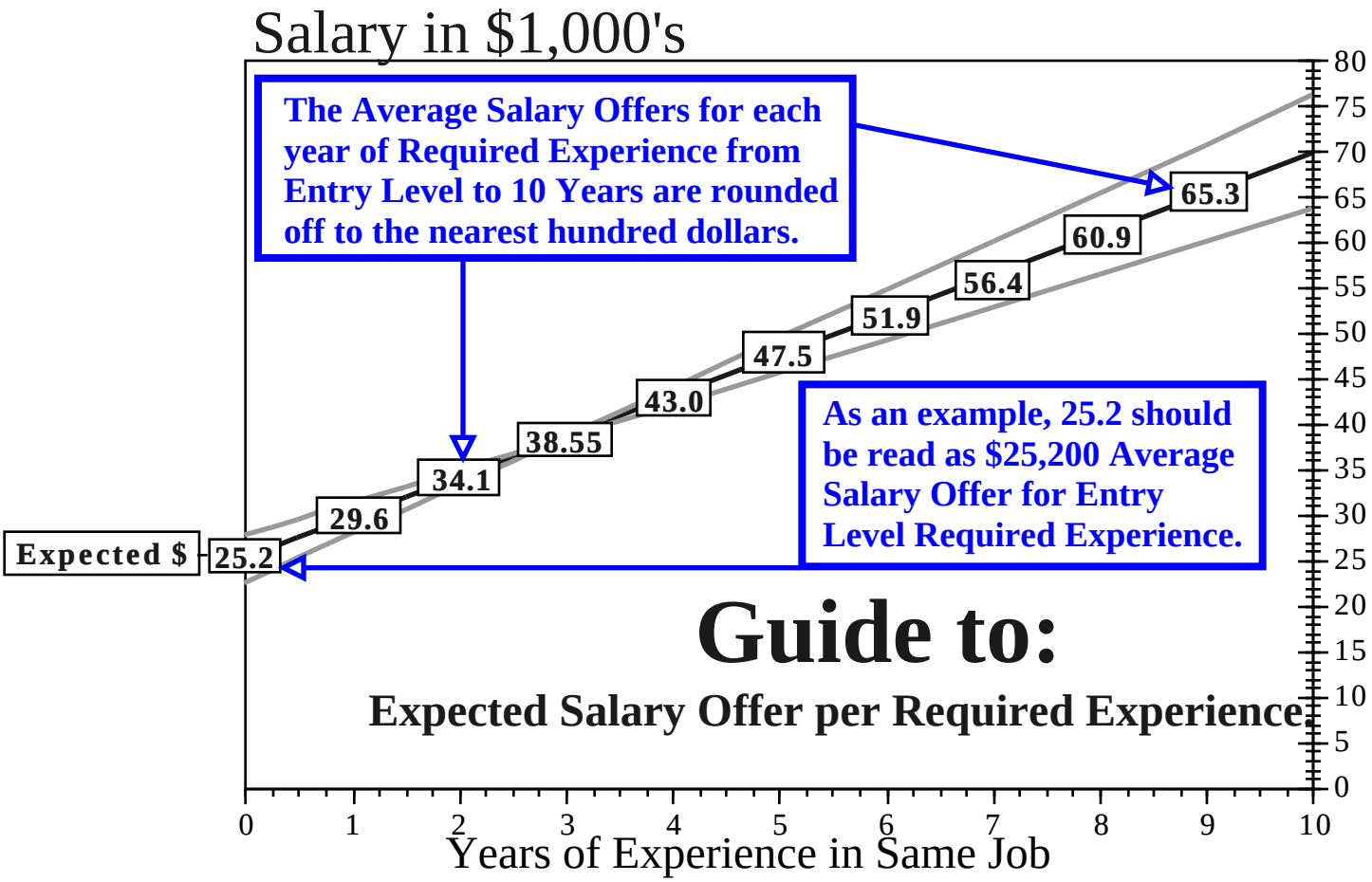

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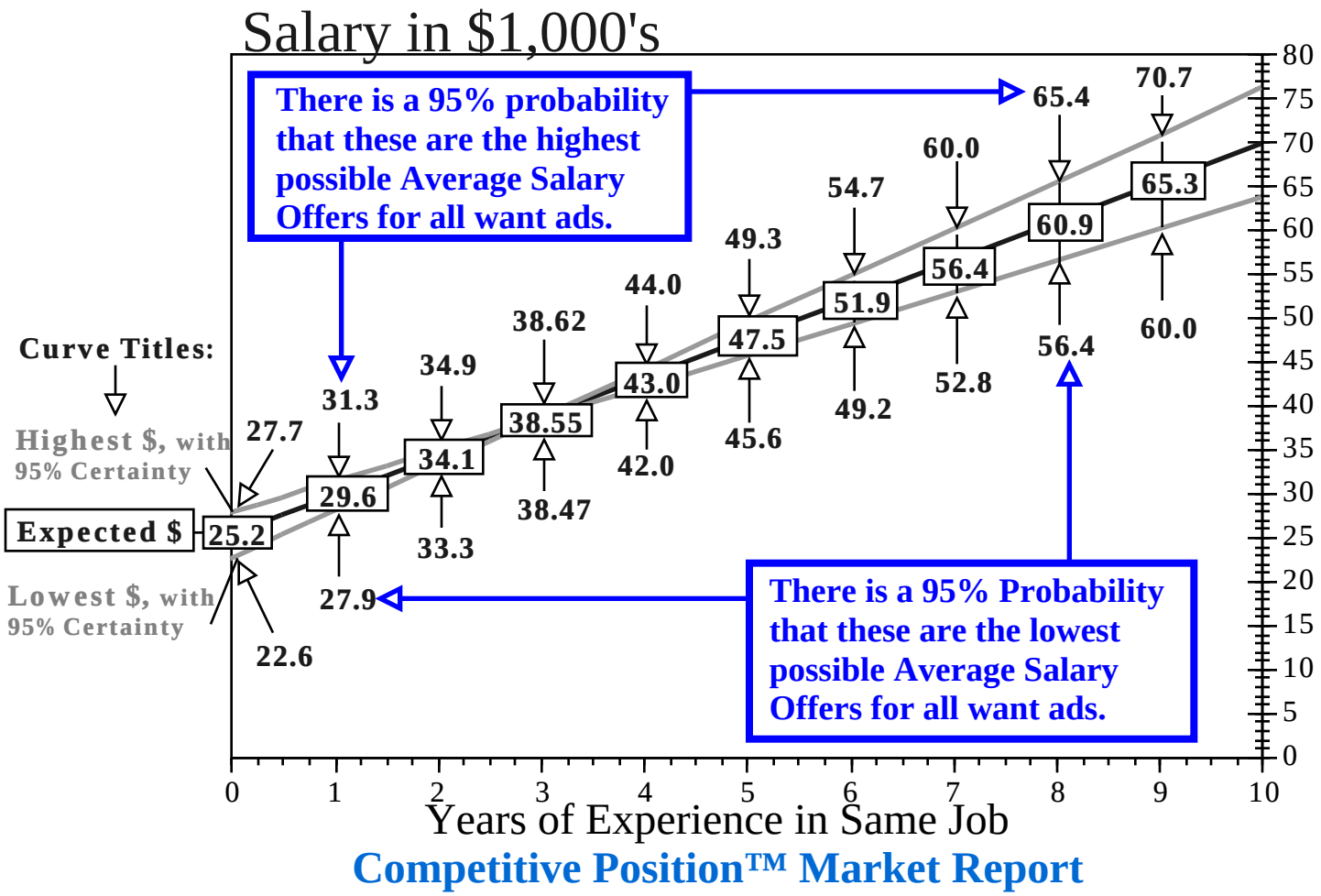

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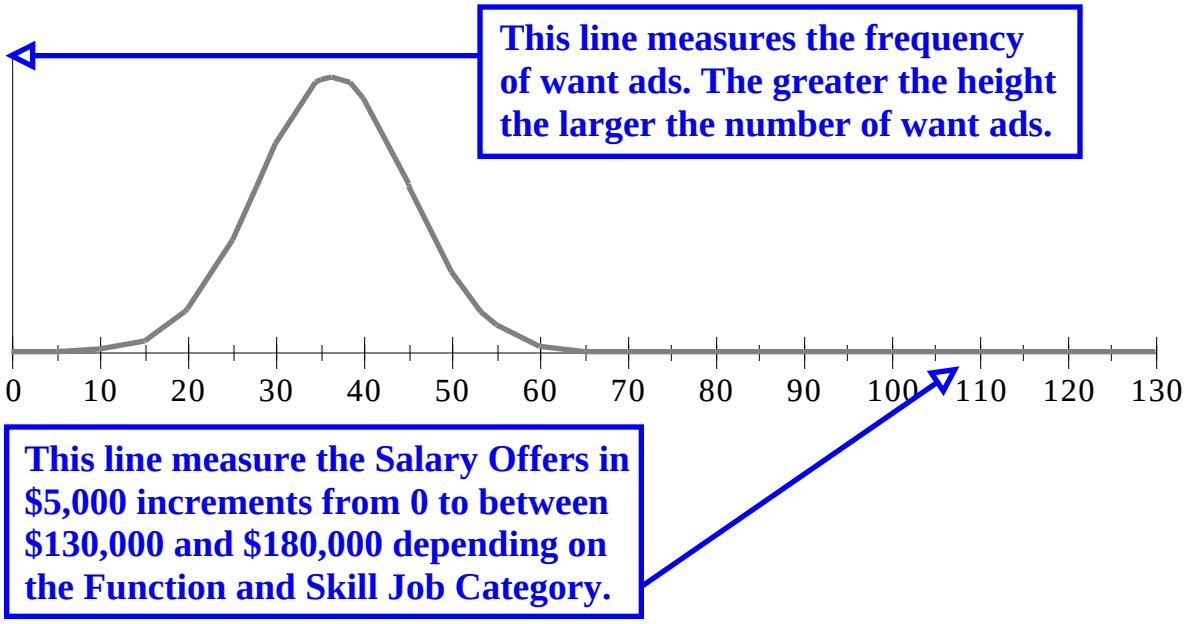
Guide to: Distribution of Salary Offers

Key: Salary in $1,000's; μ = Mean; std. = Standard Deviation.



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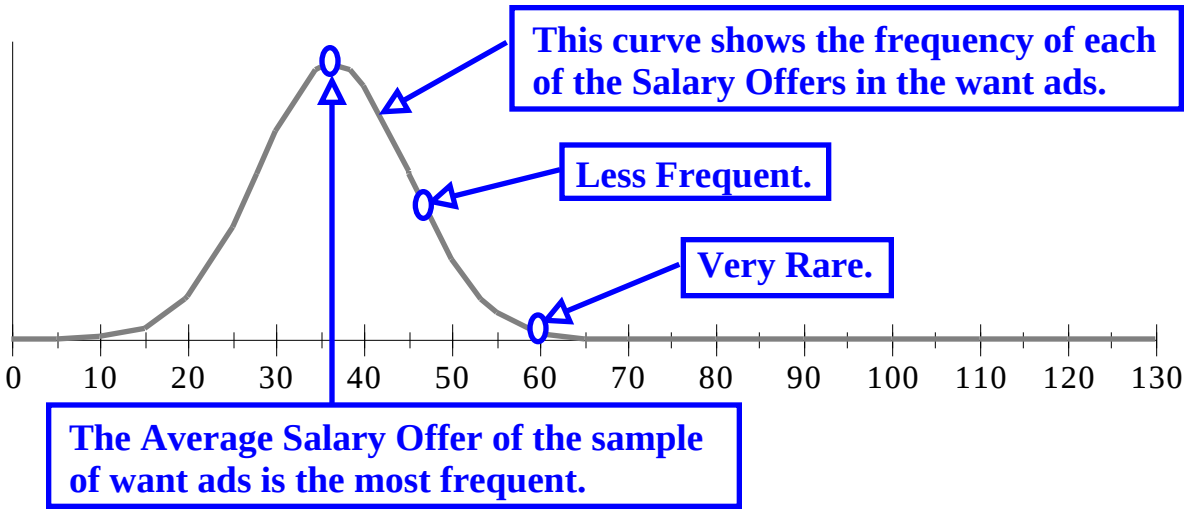

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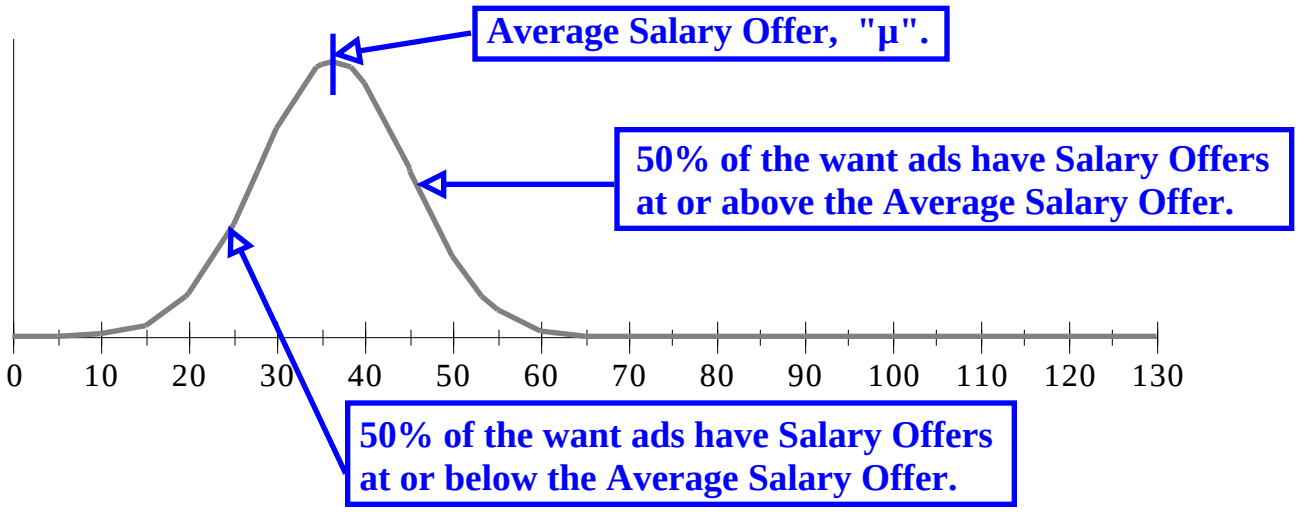

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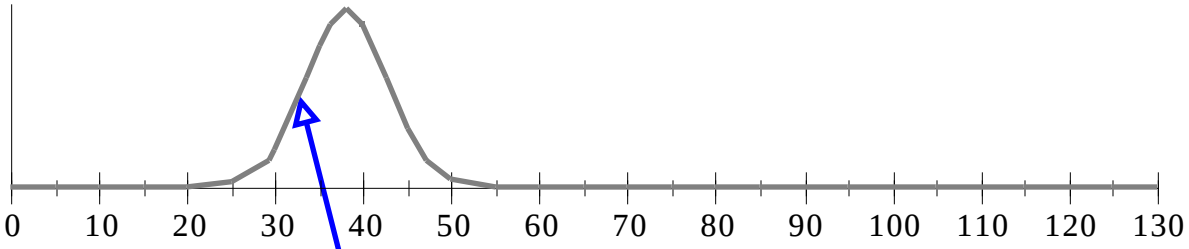
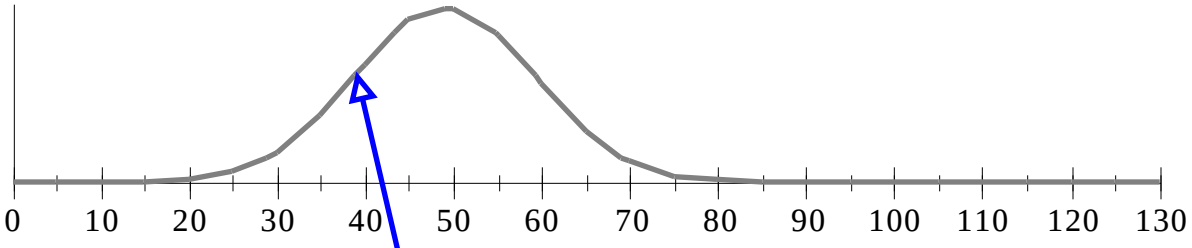
The steepness and spread of the frequency curve, or "hill", indicates the degree of variability in Salary Offers across want ads.



This steep and tight curve shows that most Salary Offers are not very different from the Average Salary Offer.



This more gradual and loose curve shows that many Salary Offers are different from the Average Salary Offer.

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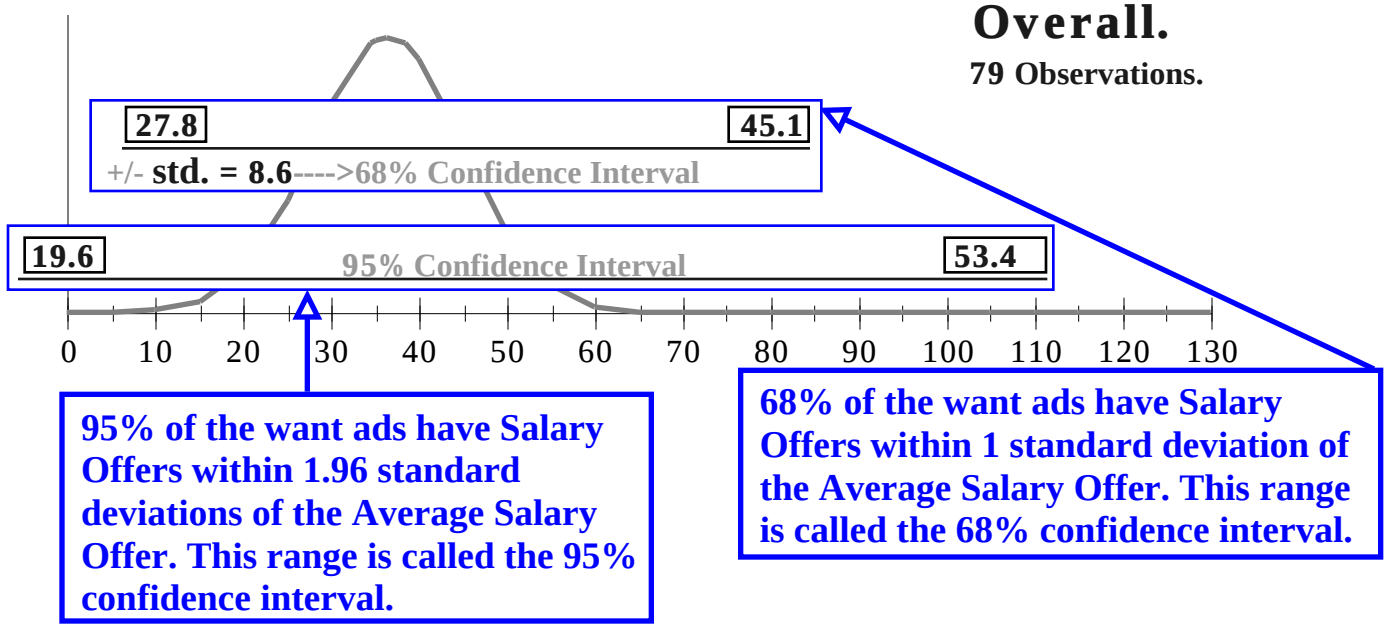

95% of the want ads have Salary Offers within 1.96 standard deviations of the Average Salary Offer. This range is called the 95% confidence interval.

68% of the want ads have Salary Offers within 1 standard deviation of the Average Salary Offer. This range is called the 68% confidence interval.

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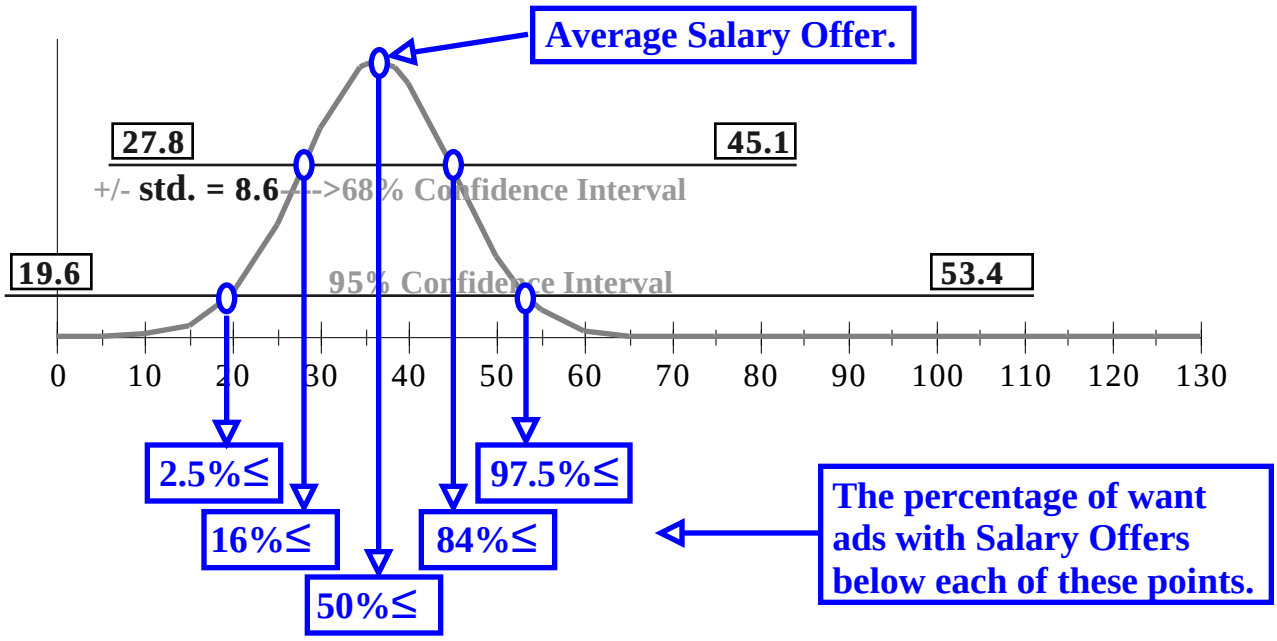

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