

# CLB 029

## ***Wrap Rate Projections***

*Lesson*



Defense Acquisition University

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# Rates

## Wrap Rate Projections

### *Introduction*

Approximate Length: 15 Minutes

Welcome to the **Wrap Rate Projections** lesson of the **Rates** module. This lesson includes the following topics:

- Intro
- Wrap Rate Calculation 1
- Wrap Rate Calculation 2
- Summary

It's common for defense systems to require operations and support (O&S) for five, ten, or more years. The Department of Defense (DoD) often operates systems for several years beyond initial design parameters.

The best example is the **B-52** airframe. First introduced as a long-range strategic bomber in the early 1950s, the B-52 still flies routine operational mission assignments.

As a cost analyst, one of the challenges you'll face is extending contractors' fully burdened labor rates (FBLRs) beyond the time period covered by the negotiated forward pricing rate agreements (FPRAs) for O&S or other services.



Wage rates and other costs vary. They typically increase over time. How can you predict what wage rates and other costs may be three or more years into the future?

## ***Learning Objectives***

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Upon completion of this lesson you will be able to:

- Identify methods for projecting future wage rates, overhead rates, and other costs rates.
- Calculate the future fully burdened labor cost and wrap rate given future wage rate projections, overhead costs rate, and other costs rate.



## ***Wrap Rate Projection Methods***

For the past five years, Contractor A has provided O&S for a war gaming interactive simulation for the U.S. Marine Corps. Contractor A's support encompasses the software and hardware (computers and simulators).

Our challenge is to predict what Contractor A's wage rates will be over the next three years.

There are statistical techniques for forecasting future wage rates, overhead rates, and other costs rates, such as:

- Regression analysis
- Moving average
  - Simple moving average
  - Weighted moving average
  - Exponential moving average

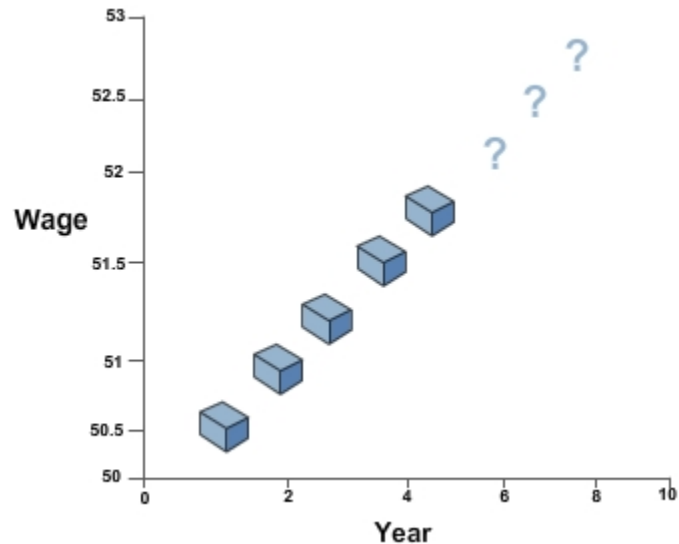
## Regression Analysis

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Regression analysis refers to techniques for modeling and analyzing several variables, when the focus is on the relationship between a **dependent** variable and one or more **independent** variables.

For example, when you use regression analysis to forecast wage rates or overhead rates, **time** is the **independent variable**, and the **wage rate** or **overhead rate** is the **dependent** variable.

More specifically, regression analysis helps you understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed.



Most commonly, regression analysis estimates the conditional expectation of the dependent variable given the independent variables—that is, the average value of the dependent variable when the independent variables are held fixed.

## Moving Average

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A moving average is a statistical method used to smooth out short-term fluctuations in time series data and highlight long-term trends or cycles. Three common types of moving averages are listed below.

**Simple moving average**—When applied to time series data, a **simple moving average** is the average of the last X number of observations. You decide how many of the most recent observations should be included to get the most realistic result.

**Weighted moving average**—A **weighted moving average** is similar to a simple moving average in that you determine how many of the most recent observations to include. The difference is—a weighting factor is assigned to each observation. Typically, the most recent observation is given the greatest weight, and each preceding observation is given a progressively smaller weight.

**Exponential smoothing**—**Exponential smoothing** is a statistical technique that can be applied to time series data, either to produce smoothed data for presentations or to make forecasts. In a simple moving average, the past observations are weighted equally. However, when exponential smoothing is applied, the most recent observation is given the greatest weight and each preceding observation is given an **exponentially** smaller weight.

## *Wrap Rate Projections Applied*

The benefit of using a statistical technique to forecast future wage rates is that the results are defensible, as long as they are derived using valid historical cost data. The shortcoming of the statistical methods is that they may ignore potentially significant cost factors.

For example, the statistical model built on historical data ignores the contractor's business base, expiration of labor union contracts, and the existence of negotiated labor rates in Forward Pricing Rate Agreements (FPRAs).

You should **not** just arbitrarily apply one of the statistical models to forecast future wage rates. Instead, you should:

- Identify those factors which may influence the contractor's future wage rates and document them in your list of assumptions.
- Use your judgment and adjust the wage rate forecasts in accordance with the factors you identified.

### **Example**

Contractor A has provided O&S for a war gaming interactive simulation for the U.S. Marine Corps for the past five years. Their direct labor wage rates are listed below.

<b>Year</b>	<b>DL Wage Rate</b>
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1	\$50.58
2	\$50.93
3	\$51.18
4	\$51.48
5	\$51.80



Our challenge is to estimate the cost of O&S for the next three years. We apply regression analysis to forecast Contractor A's labor wages in years 6-8.

## ***Results***

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Based on years 1-5, and our regression analysis, we project the wage rate in years 6-8, as shown below.

### **Year DL Wage Rate**

1	\$50.58
2	\$50.93
3	\$51.18
4	\$51.48
5	\$51.80
6	\$52.09
7	\$52.39
8	\$52.69



## ***Challenge—Projecting Future Costs***

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List at least three statistical methods for projecting future wage rates, overhead costs, and other costs.

### ***Answer***

Statistical methods for projecting future wage rates, overhead costs, and other costs include:

- Regression analysis
- Moving average
  - Simple moving average
  - Weighted moving average
  - Exponential moving average

## ***Wrap Rate Calculation***

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Now let's calculate the fully burdened labor cost and wrap rate for Contractor A in year 8.

- \$52.69 projected DL wage rate in year 8.
- 160 DL hours each month.
- 10 months of O&S provided each year.
- Overhead is allocated at the rate of 150% of direct labor costs.
- Other costs are allocated at the rate of 15% of direct labor costs and overhead costs.

### ***Answer***

160 DL hours x 10 months x \$52.69 DL rate =	\$ 84,304	DL costs
1.5 overhead rate x \$84,304 DL costs =	126,456	overhead costs
.15 x (\$84,304 DL costs + \$126,456 overhead costs) =	<u>31,614</u>	other costs
	<b>\$242,374</b>	<b>fully burdened labor cost</b>

$\$242,374 \text{ fully burdened labor cost} \div (160 \times 10 \text{ DL hours}) = \mathbf{\$151.48 \text{ FBLR or wrap rate}}$

## ***Summary***

**Congratulations!** You have completed the **Wrap Rate Projections** lesson. Please take a moment to review the key information in this lesson.

### ***Wrap Rate Projection Methods***

As a cost analyst, you will sometimes have to extend contractors' fully burdened labor rates beyond the time period covered by the negotiated forward pricing rate agreement. To do this, you may rely on statistical methods to forecast future labor rates.

**Regression analysis** is a statistical technique that illuminates how the value of a dependent variable, such as direct labor wage rates, changes in response to changes in one or more independent variables, such as time.

**Simple moving average, weighted moving average, and exponential moving average** are statistical methods used to smooth out short-term fluctuations in long-term data series.

Regardless of the statistical method you use, it is wise to consider other factors which may influence the contractor's future wage rates and adjust the statistically-generated wage rate forecasts accordingly.



### ***Wrap Rate Projections Applied***

After you rely on statistics and your judgment to forecast future wage rates, the future wage rates, coupled with forecasted overhead and other costs can be used to project the contractor's future fully burdened labor cost and wrap rate.

# Rates

## Glossary

Term	Definition
<b>Assembly</b>	Assembly involves the effort to combine parts into subassemblies and assemblies.
<b>Cost Objective</b>	Cost objective is an accounting term for a task, work order, product, program, or contract. In government acquisition the cost objective is normally the program or contract.
<b>Cost of Money</b>	Cost of money is sometimes an allowable other cost, depending on the contractual agreement the contractor has with the government. The cost of money is the cost of capital committed to facilities as an element of contract cost. Department of Defense (DoD) pays additional money for the contractor to maintain the production facilities, operating lines, etc., for the duration of the contract.
<b>Delay Allowance</b>	Delay allowance is an adjustment applied when formulating a labor standard to allow time for unavoidable predictable and unpredictable delays.
<b>Design Engineering</b>	Design engineering involves delineating the characteristics and specifications of the end product.
<b>Direct Labor Hours</b>	Direct labor hours are hours that can be explicitly attributed to a particular task, work order, program, or contract.
<b>Direct Labor Wage Rate</b>	Direct labor wage rate is the composite hourly wage rate of those employees who can be charged directly to a specific program or contract.
<b>Efficiency Rate</b>	Efficiency rate indicates a contractor's productivity and can be used to estimate direct labor hours on future projects. Efficiency rate is calculated by dividing a task's standard hours by the actual hours the contractor required to complete the task, and then multiplying the quotient by 100. Higher efficiency rates (closer to 100%) indicate greater productivity.
<b>Engineering Overhead</b>	Engineering overhead includes the cost of directing and supporting the activities of the engineering department.

Term	Definition
<b>Exponential Moving Average</b>	Exponential moving average, when applied to time series data, is the average of the last X number of observations but with varying weights assigned to each observation. The most recent observation is assigned the greatest weight and each preceding observation is given an exponentially smaller weight. It is applied to smooth out short-term fluctuations in time series data and amplify long-term trends or cycles.
<b>Fabricating</b>	Fabrication involves the fashioning of parts from raw materials or purchased materials.
<b>Fatigue Allowance</b>	Fatigue allowance is an adjustment applied when formulating a labor standard to allow time for workers to recuperate from work conditions and health concerns.
<b>Forward Pricing Rate Agreements (FPRAs)</b>	Forward pricing rate agreements (FPRAs) are negotiated by the government with contractors to set the pay standard for a variety of skill sets within a specified geographical region.
<b>Fully Burdened Labor Cost</b>	Fully burdened labor cost includes direct labor, overhead, and other costs. It is calculated by multiplying the contractor's wrap rate by the direct labor hours.
<b>Fully Burdened Labor Rate (FBLR)</b>	Fully burdened labor rate, also called "wrap rate," includes the contractor's direct labor wage rate, overhead costs rate, and other costs rate. It is used when assessing contractors' proposals and making cost estimates.
<b>General and Administrative Costs</b>	General and administrative expenses typically include the expenses of a company's general and executive offices, staff services, and other miscellaneous activities related to the overall business.
<b>Labor Standard</b>	Labor standards are used to make realistic estimations of how long it should take to complete a job. A labor standard includes leveled time—the amount of time it takes an average worker under average conditions to complete a specified task. After leveled time is established, it needs to be adjusted to allow for personal time, fatigue, and unavoidable delays. The resulting metric is the labor standard.
<b>Leveled Time</b>	Leveled time is one component of a labor standard. Leveled time is the time that a worker of average skill, making an average effort, under average conditions takes to complete a required task.
<b>Manufacturing Engineering</b>	Manufacturing engineering involves planning the manufacturing process, developing process instructions and work methods, shop loading, organizing work stations, and matching shop capabilities to contractual requirements.
<b>Manufacturing Overhead</b>	Manufacturing overhead, also known as "manufacturing expense" or "factory burden," includes all production costs except direct materials, direct labor, and other costs.

Term	Definition
<b>Material Overhead</b>	Material overhead includes costs related to the acquisition, transportation, receiving, inspection, handling, and storage of materials.
<b>Other Costs</b>	Other costs are any other costs the firm incurs but has not accounted for as either direct or overhead costs.
<b>Overhead Costs</b>	Overhead costs, also called "burden," are indirect costs that benefit multiple programs or contracts, and therefore cannot feasibly be charged directly to just one.
<b>Personal Allowance</b>	Personal allowance is an adjustment applied when formulating a labor standard to allow time for workers to take care of personal needs.
<b>Predetermined Leveled Time</b>	Predetermined leveled times are based on basic motion standard data which capture basic body motions, such as reach, move, turn, grasp, position, release, disengage, and apply pressure.
<b>Profit</b>	Profit is sometimes an allowable other cost, depending on the contractual agreement the contractor has with the government. Some acquisition contracts allow the contractor to include an agreed-upon amount of <b>profit</b> in addition to their costs. This is usually in return for taking on a difficult, high risk project that requires a long-term commitment of time and capital.
<b>Quality Assurance Engineering</b>	Quality assurance engineering involves the formulation of standards and specifications for tests and inspections.
<b>Quality Control</b>	Quality control involves the act of testing or inspecting the product during the manufacturing process and prior to final acceptance.
<b>Recovery Rates</b>	The recovery rate is used by contractors to allocate overhead and other costs to each program or contract they benefit. Recovery rates are calculated by dividing the total indirect cost pool dollars by a relevant base.
<b>Regression Analysis</b>	Regression analysis is a statistical technique that illuminates how the value of a dependent variable, such as direct labor wage rates, changes in response to changes in one or more independent variables, such as time.
<b>Reliability and Maintainability Engineering</b>	Reliability and maintainability engineering involves designing and manufacturing products to meet longevity and repair requirements.
<b>Service Centers</b>	Service centers are included in many firms to provide company-wide services such as scientific computer operation, data processing, copying, technical typing, photographing, etc.

Term	Definition
<b>Simple Moving Average</b>	Simple moving average, when applied to time series data, is the average of the last X number of observations. It is applied to smooth out short-term fluctuations in time series data and amplify long-term trends or cycles.
<b>Special Allowance</b>	Special allowance is an adjustment applied when formulating a labor standard to allow time for infrequent, unpredictable occurrences, such as power failures, machine breakdowns, and minor repairs.
<b>Standard Hour</b>	Standard hour is defined as the number of hours a skilled worker will use to complete a given job under ideal or perfect conditions.
<b>Standard Time Data</b>	Standard time data is based on groups of motions (drilling a hole or painting a square foot of surface area) that are estimated as a single element.
<b>Sustaining Engineering</b>	Sustaining engineering involves as needed support as problems arise throughout the life of the contract.
<b>Time Study</b>	During time studies, industrial engineers observe and record the time that a selected worker requires to perform each of the subtasks in the work design. Several observations are required to average out random variations and assure that all elements of the work have been considered.
<b>Weighted Moving Average</b>	Weighted moving average, when applied to time series data, is the average of the last X number of observations but with varying weights assigned to each observation. Usually the most recent is given the greatest weight, and each preceding observation is given a progressively smaller weight. It is applied to smooth out short-term fluctuations in time series data and amplify long-term trends or cycles.
<b>Work Sampling</b>	Work sampling is commonly used to develop non-engineering standards. Estimates are based on the proportion of time spent by one or more persons on a given activity.
<b>Wrap Rate</b>	Wrap rate, also called "fully burdened labor rate," includes the contractor's direct labor wage rate, overhead costs rate, and other costs rate. It is used when assessing contractors' proposals and making cost estimates.