Excel Tutorial 4:
Analyzing and Charting Financial Data

Microsoft® Office® 2013
Objectives

• Use the PMT function to calculate a loan payment
• Create an embedded pie chart
• Apply styles to a chart
• Add data labels to a pie chart
• Format a chart legend
• Create a clustered column chart
• Create a stacked column chart
Objectives

- Create a line chart
- Create a combination chart
- Format chart elements
- Modify the chart’s data source
- Add sparklines to a worksheet
- Format cells with data bars
- Insert a watermark
Visual Overview: Session 4.1

A chart, or graph, is a visual representation of a set of data values. Charts show trends or relationships that may not be readily apparent from numbers alone.

An embedded chart is an object in a worksheet.

The chart area contains the chart and all of the other chart elements.

A data label is text associated with an individual data marker, such as the percentage value next to a pie slice.

Each chart has a data source, which is the range that contains the data displayed in the chart. The data source for the pie chart is the range B2:F34.

The category values are the groups or categories that the data series values belong to. These category values show the different wines produced.

A data series contains the actual values that are plotted or displayed on the chart. This data series shows the total cases that will be produced for each wine.

The vertical axis, or value axis, displays the values from the data series.
Chart Elements

Chart elements are individual parts of the chart, such as the title or the legend.

The CHART TOOLS contextual tabs appear on the ribbon when a chart is selected.

The Format pane provides a collection of commands to format chart elements. The options change based on the selected chart element.

The chart title is a descriptive label or name for the chart.

A data marker displays an individual value from a data series. These data markers are columns.

A legend identifies which data markers are associated with each data series.

The horizontal axis, or category axis, displays the category values from each data series.
Introduction to Financial Functions

• Excel provides a wide range of financial functions related to loans and investments.

• One of these is the PMT function, which can be used to calculate the installment payment and payment schedule required to completely repay a loan.

• Other loan functions include future value, present value, calculating the interest part of a payment, calculating the principle part of a payment, and the loan interest rate.
# Financial Functions for Loans and Investments

## Figure 4-1

### Financial functions for loans and investments

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>FV(rate, nper, pmt [,pv=0] [,type=0])</code></td>
<td>Calculates the future value of an investment, where <code>rate</code> is the interest rate per period, <code>nper</code> is the total number of periods, <code>pmt</code> is the payment in each period, <code>pv</code> is the present value of the investment, and <code>type</code> indicates whether payments should be made at the end of the period (0) or the beginning of the period (1)</td>
</tr>
<tr>
<td><code>PMT(rate, nper, pv [,fv=0] [,type=0])</code></td>
<td>Calculates the payments required each period on a loan or an investment, where <code>fv</code> is the future value of the investment</td>
</tr>
<tr>
<td><code>IPMT(rate, per, nper, pv [,fv=0] [,type=0])</code></td>
<td>Calculates the amount of a loan payment devoted to paying the loan interest, where <code>per</code> is the number of the payment period</td>
</tr>
<tr>
<td><code>PPMT(rate, per, nper, pv [,fv=0] [,type=0])</code></td>
<td>Calculates the amount of a loan payment devoted to paying off the principal of a loan</td>
</tr>
<tr>
<td><code>PV(rate, nper, pmt [,fv=0] [,type=0])</code></td>
<td>Calculates the present value of a loan or an investment based on periodic, constant payments</td>
</tr>
<tr>
<td><code>NPER(rate, pmt, pv [,fv=0] [,type=0])</code></td>
<td>Calculates the number of periods required to pay off a loan or an investment</td>
</tr>
<tr>
<td><code>RATE(nper, pmt, pv [,fv=0] [,type=0])</code></td>
<td>Calculates the interest rate of a loan or an investment based on periodic, constant payments</td>
</tr>
</tbody>
</table>

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Working with Financial Functions

• Cost of a loan to the borrower is largely based on three factors:
  – **Principal**: amount of money being loaned
  – **Interest**: amount added to the principal by the lender
    • Calculated as **simple interest** or as **compound interest**
  – Time required to pay back the loan
# Explanation of Function Use

<table>
<thead>
<tr>
<th>Function</th>
<th>Use to determine...</th>
</tr>
</thead>
<tbody>
<tr>
<td>FV (future value)</td>
<td>How much an investment will be worth after a series of monthly payments at some future time</td>
</tr>
<tr>
<td>PMT (payment)</td>
<td>How much you have to spend each month to repay a loan or mortgage within a set period of time</td>
</tr>
<tr>
<td>IPMT (interest payment)</td>
<td>How much of your monthly loan payment is used to pay the interest</td>
</tr>
<tr>
<td>PPMT (principal payment)</td>
<td>How much of your monthly loan payment is used for repaying the principal</td>
</tr>
<tr>
<td>PV (present value)</td>
<td>Largest loan or mortgage you can afford given a set monthly payment</td>
</tr>
<tr>
<td>NPER (number of periods)</td>
<td>How long it will take to pay off a loan with constant monthly payments</td>
</tr>
</tbody>
</table>
PMT Function Variables

- To calculate the costs associated with a loan, you must have the following information:
  - The annual interest rate
  - The number of payment periods per year
  - The length of the loan in terms of the total number of payment periods
  - The amount being borrowed
  - When loan payments are due
Using the PMT Function

\[ \text{PMT}(\text{rate}, \text{nper}, \text{pv}, [\text{fv}=0] [\text{type}=0]) \]

**Figure 4-2** Function Arguments dialog box for the PMT function
Using the PMT Function

Figure 4-3  Monthly and annual costs of the business loan

PMT function calculates the loan payment

monthly payment is negative to indicate an expense

annual payment

New Perspectives on Microsoft Excel 2010
Excel Charts

- Charts show trends or relationships in data that are easier to see in a graphic representation rather than viewing the actual numbers or data.
- When creating a chart, remember that your goal is to convey important information that would be more difficult to interpret from columns of data in a worksheet.
Choosing the Right Chart

<table>
<thead>
<tr>
<th>Chart</th>
<th>When to Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pie charts</td>
<td>Small number of categories; easy to distinguish relative sizes of slices</td>
</tr>
<tr>
<td>Column or bar chart</td>
<td>Several categories</td>
</tr>
<tr>
<td>Line charts</td>
<td>Categories follow a sequential order</td>
</tr>
<tr>
<td>XY scatter charts</td>
<td>To plot two numeric values against one another</td>
</tr>
<tr>
<td>Custom chart</td>
<td>Available charts don’t meet your needs</td>
</tr>
</tbody>
</table>
Communicating Effectively with Charts

- Keep it simple
- Focus on the message
- Limit the number of data series
- Use gridlines in moderation
- Choose colors carefully
- Limit chart to a few text styles
4 Steps for Creating Excel Charts

• Select the range containing the data you want to chart.

• On the INSERT tab, in the Charts group, click the Recommended Chart button or a chart type button, and then click the chart you want to create (or click the Quick Analysis button, click the CHARTS category, and then click the chart you want to create).

• On the CHART TOOLS DESIGN tab, in the Location group, click the Move Chart button, select whether to embed the chart in a worksheet or place it in a chart sheet, and then click the OK button.
Creating an Excel Chart

• Select a range to use as chart’s data source

Figure 4-5: Selected chart data source
Creating an Excel Chart

- Select chart type that best represents the data
  - Use one of 53 built-in charts organized into 10 categories, or...
  - Create custom chart types based on built-ins

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### Excel chart types

<table>
<thead>
<tr>
<th>Chart Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column</td>
<td>Compares values from different categories. Values are indicated by the height of the columns.</td>
</tr>
<tr>
<td>Line</td>
<td>Compares values from different categories. Values are indicated by the height of the lines. Often used to show trends and changes over time.</td>
</tr>
<tr>
<td>Pie</td>
<td>Compares relative values of different categories to the whole. Values are indicated by the areas of the pie slices.</td>
</tr>
<tr>
<td>Bar</td>
<td>Compares values from different categories. Values are indicated by the length of the bars.</td>
</tr>
<tr>
<td>Area</td>
<td>Compares values from different categories. Similar to the line chart except that areas under the lines contain a fill color.</td>
</tr>
<tr>
<td>X Y (Scatter)</td>
<td>Shows the patterns or relationship between two or more sets of values. Often used in scientific studies and statistical analyses.</td>
</tr>
<tr>
<td>Stock</td>
<td>Displays stock market data, including the high, low, opening, and closing prices of a stock.</td>
</tr>
<tr>
<td>Surface</td>
<td>Compares three sets of values in a three-dimensional chart.</td>
</tr>
<tr>
<td>Radar</td>
<td>Compares a collection of values from several different data sets.</td>
</tr>
<tr>
<td>Combo</td>
<td>Combines two or more chart types to make the data easy to visualize, especially when the data is widely varied.</td>
</tr>
</tbody>
</table>

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Inserting a Pie Chart with the Quick Analysis Tool

• After you select an adjacent range to use as a chart’s data source, the Quick Analysis tool appears. It includes a category for creating charts. The CHART category lists recommended chart types, which are the charts that are most appropriate for the data source you selected.
To create a pie chart with the Quick Analysis tool

• Make sure the correct range is selected.

• Click the Quick Analysis button in the lower-right corner of the selected range.

• Click the CHARTS category.
  – The chart types you will most likely want to use with the selected data source are listed.

• Click Pie to select the pie chart.
CHARTS Category of the Quick Analysis Tool

Figure 4-8  CHARTS category of the Quick Analysis tool

Chart types recommended based on the selected data source

Displays other chart types that can be used with the data
Moving and Resizing Charts

- Excel charts are either placed in their own chart sheets or embedded in a worksheet.
- When you create a chart, it is embedded in the worksheet that contains the data source.
- Selecting the chart displays a selection box (used to move or resize the object)
  - To move the chart, drag selection box to new location in worksheet
  - To resize the chart, drag a sizing handle
Choosing a Chart Style

• Recall that a style is a collection of formats that are saved with a name and can then be applied at one time.

• In a chart, the format of the chart title, the location of the legend, and the colors of the pie slices are all part of the default chart style.

• You can quickly change the appearance of a chart by selecting a different style from the Chart Styles gallery.
Designing a Pie Chart

• Choose location of the legend, and format it using tools on Chart Tools Layout tab

*Figure 4-9* Pie chart in the Overview worksheet
Formatting the Pie Chart Legend

• You can fine-tune a chart style by formatting individual chart elements. From the Chart Elements button, you can open a submenu for each element that includes formatting options, such as the element’s location within the chart.

• You can also open a Format pane, which has more options for formatting the selected chart element.
Formatted Chart Legend

Figure 4-13  Formatted chart legend

- Formatting categories
- Legend on the right with a fill color and drop shadow
- Gallery of shadow styles
- Format pane
Formatting Pie Chart Data Labels

**Figure 4-14** Formatted data labels

- Data labels display the percentages associated with each slice.
- No leader lines appear because the data labels are close to their pie slices.
- Arrow to select a different chart element to format.
- Labels contain checked items.
- Labels are placed at the outside end of each slice.
- Selection box and sizing handles appear around each data label.
- Percentage format applied to the data label values.

New Perspectives on Microsoft Excel 2013
Formatting the Chart Area

• The chart’s background, which is called the chart area, can also be formatted using fill colors, border styles, and special effects such as drop shadows and blurred edges.

• The chart area fill color used in the pie chart is white, which blends in with the worksheet background.
Designing a Pie Chart

• Exploded pie charts
  – Move one slice away from the others
  – Useful for emphasizing one category above all of the others
Performing What-If Analyses and Filtering with Charts

• A chart is linked to its data source, and as changes are made to the data source the changes translate to the chart allowing a visual representation of the What-if changes.

• Filtering is another type of what-if analysis that limits the data to a subset of the original values in a process.
Creating a Column Chart

• Column chart
  – Displays values in different categories as columns
  – Height of each column is based on its value

• Bar chart
  – Column chart turned on its side
  – Length of each bar is based on its value
Filtered Pie Chart

Figure 4-16  Filtered pie chart

- Pie chart shows only the white wines
- Chart Filters button
- Only values for selected categories appear in the chart
Charts vs Pie Charts

- Column/bar charts are superior to pie charts
  - For large number of categories or categories close in value
  - Easier to compare height or length than area
  - Can be applied to wider range of data
  - Can include several data series (pie charts usually show only one data series)
Comparing Column Chart Subtypes

Figure 4-18  Column chart subtypes

Clustered Column  Stacked Column  100% Stacked Column
Inserting a Column Chart

• Select data source
• Select type of chart to create
• Move and resize the chart
• Change chart’s design, layout, and format by:
  – Selecting one of the chart styles, or
  – Formatting individual chart elements
Moving a Chart to a Different Worksheet

• Move Chart dialog box provides options for moving charts
Editing the Axis Scale and Text

• Range of values (scale) of an axis is based on values in data source
• Vertical (value) axis: range of series values
• Horizontal (category) axis: category values
• Primary and secondary axes can use different scales and labels
• Add descriptive axis titles if axis labels are not self-explanatory (default is no titles)
Changing and Formatting a Chart Title

Figure 4-20  Column chart

clustered column chart in the range F16:M29
revised chart title

revenue steadily increases over the next 10 years
Session 4.2 Visual Overview

- **XP**

A sparkline is a chart that is displayed within a cell. You can create line, column, and win/loss sparklines.

Line sparklines can contain data markers to identify the high and low points, negative points, first and last points, and all points.

These column sparklines have been ungrouped and formatted individually.

A data bar is a conditional format that adds a horizontal bar to the background of a cell proportional in length to the cell’s value.
Charts, Sparklines, and Data Bars

The plot area is the part of the chart that contains the graphical representation of the data series.

A combination chart combines two or more Excel chart types into a single graph. This chart combines a column chart and a line chart.

An axis title is descriptive text that appears next to an axis.

Data callouts are data labels that appear as callout bubbles pointing to data markers.

A line chart displays data values using a connected line rather than columns or bars.

Gridlines extend the values of the major or minor tick marks across the plot area.

Sparklines can be grouped or ungrouped. Grouped sparklines share a common format. Ungrouped sparklines can be formatted individually.
Adding Sparklines and Data Bars

- Both convey graphical information about worksheet data without occupying a lot of space
Creating Sparklines

- A mini chart displayed within a worksheet cell
- Compact in size; doesn’t include chart elements
- Goal is to convey maximum amount of graphical information in a very small space
- Can be grouped or ungrouped
  - Grouped sparklines share a common format
  - Ungrouped sparklines can be formatted individually
Types of Sparklines

- Line sparkline
  - Highlights trends
- Column sparkline
  - For column charts
- Win/Loss sparkline
  - Highlights positive and negative values
Adding and Formatting Sparkline Markers

- Can specify only line color and marker color
- Can create line markers for highest value, lowest value, all negative values, first value, and last value
- Can create markers for all data points regardless of value or position in data source
- Can add an axis to a sparkline – horizontal line that separates positive and negative values
Creating a Line Chart

• Use when data consists of values drawn from categories that follow a sequential order at evenly spaced intervals

• Displays data values using a connected line rather than columns or bars

![Figure 4-22: Line chart of the projected cash flow](image)
Editing the Scale of the Vertical Axis

Figure 4-23  Formatted value axis

- Value axis ranges from 0 to 1,750,000
- Revised scale of the value axis
- Location where the horizontal and vertical axes meet
- Major tick values spaced at 250,000 intervals
Formatting the Chart Columns

• Columns usually have a common format – distinguished by height, not color
Working with Column Widths

**Figure 4-25**  Gap width between columns

- **width of each column is decreased**
- **gap between the columns is increased**
- **new gap width value**

New Perspectives on Microsoft Excel 2013
Formatting Data Markers

**Figure 4-26** Formatted data markers and data label

- Data label displayed as a data callout
- Data markers with a white fill
Formatting the Plot Area

Figure 4-27  Final Projected Revenue and Expenses chart

- selection box for selecting chart elements
- chart area is light gold
- plot area is white
- Shape Fill button for setting the fill color of the selected shape
Creating a Combination Chart

Figure 4-29  Combo chart type

Combo chart type

Custom Combination subtype

data displayed as a line chart on the secondary axis

data displayed as a column chart on the primary axis
Combo Chart Example

Figure 4-30  Initial Sales Projections combination chart

- **Cash Flow**
  - $600,000 to $902,250
  - Year 1 to Year 10

- **Sales Projections**
  - $700,000 to 1,000
  - Year 1 to Year 10

- **Primary Axis**
- **Secondary Axis**

- Wine cases produced and sold shown as a line chart
- Yearly net income shown as a column chart
Creating Sparklines

Figure 4-36  Types of sparklines

- **Line sparklines**
  - Sales by Department
  - Data: Department, Current, 1-Year
  - Tablet sales: $29.40
  - Printers sales: $13.25
  - Monitors sales: $13.55
  - Peripherals sales: $11.75
  - All Departments sales: $67.95

- **Column sparklines**
  - Temperature Record
  - Cities: Seattle, Buenos Aires, Moscow, Melbourne
  - Temperatures: 37.7 °C, 54.0 °C, 14.3 °C, 47.4 °C

- **Win/loss sparklines**
  - Teams: Cutler Tigers, Apsburg Hawks, Central City Spartans, Liddledon Lions
  - Records: 10-2, 8-4, 6-6, 3-9
Creating Data Bars

- Conditional format that adds a horizontal bar to background of a cell containing a numeric value
  - Length based on value of each cell in selected range
- Dynamic
  - Lengths of data bars automatically update if cell’s value changes

![Figure 4-39 Data bars added to the Overview worksheet](image_url)
Modifying a Data Bar Rule

- Alter rules of the conditional format

**Figure 4-40** Edit Formatting Rule dialog box

- Value used for the shortest data bar
- Sets the fill and border colors of the data bars
- Defines how negative values will be presented
- Hides the cell value
- Value used for the longest data bar
Inserting a Watermark

Figure 4-43  Print preview of the worksheet with the watermark

Watermark courtesy of Patrick Carey