



Vish Tumu Associates

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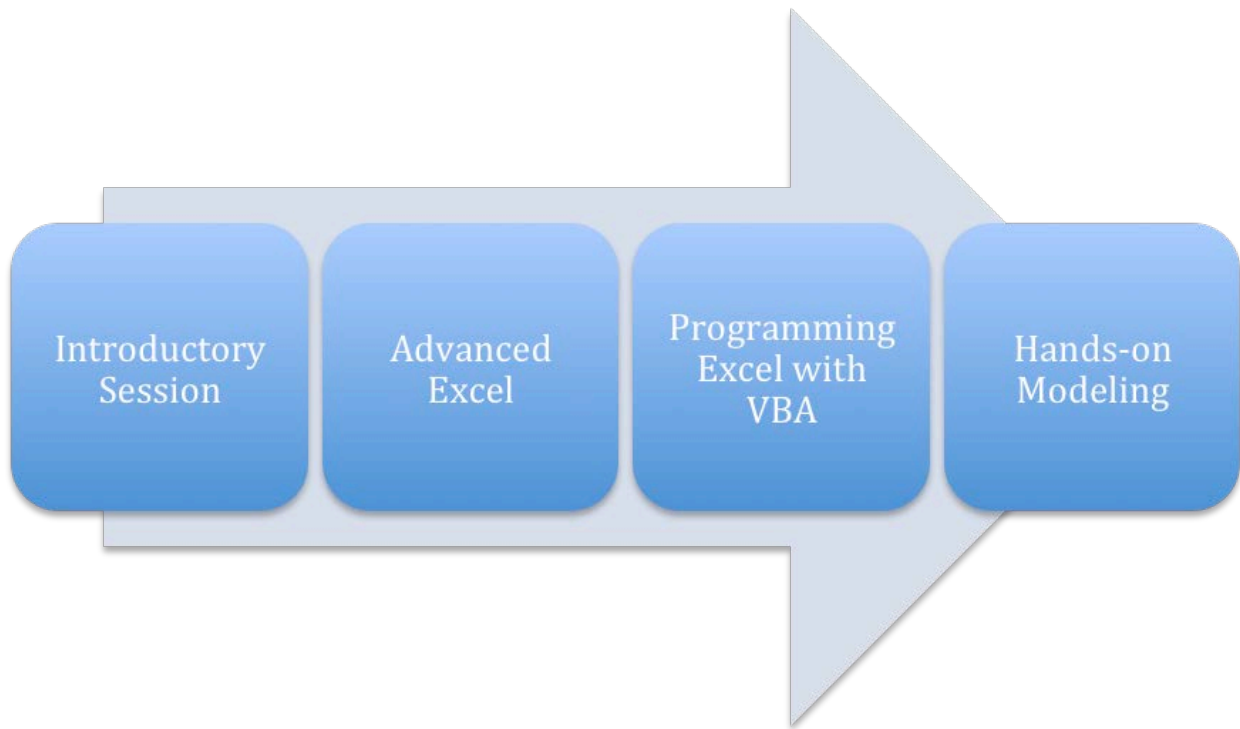


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Advanced Financial Modeling with Excel VBA

## ADVANCED FINANCIAL MODELING WITH EXCEL VBA'

### 4-day Hands-on Training Program Overview of Program



“The objective of the Financial Modeling Program is to expose participants to Modeling technology and tools using ‘advanced’ features of Excel and more importantly, Excel’s programming counterpart, ‘Visual Basic for Applications’ (VBA), for building sophisticated and useful models in all functional areas: Finance, Marketing, Accounting, Banking, Human Resources, Econometrics, Statistics, Infrastructure, Treasury, Public Policy, Engineering, and so on. The focus is on underlying technology at the heart of developing powerful and sophisticated models and thus, participants work extensively with several examples, in the process, mastering Excel’s advanced features and learning to program Excel with VBA. The concepts discussed in class neatly fall into place while examining several real-life models on the last day of the program: a dashboard, a securitization model, monte carlo simulation, importing data from the internet for analysis, simulating a HP Financial Calculator, and so on. This is a hands-on, rigorous and intellectually challenging program, imparting exceptionally valuable skills to participants that are essential for every modern-day enterprise.”

## Introduction

This 4 day Training Program exposes participants to the essential tools to build powerful and sophisticated financial models in all functional areas: marketing, human resources, treasury, accounting, finance, budgeting, stock-broking, infrastructure, power, energy, telecom, and so on. Functionality does not matter since every situation comprises of variables and the challenge in building a good model is to decompose a situation into constituent variables, establish relationships amongst variables, and transfer variables and relationships to a modeling eco-system, using Excel and its programming counterpart, Visual Basic for Applications (VBA). Participants are exposed to several real-life models built by the Program Director for International Financial Institutions. Participants receive a Program Folder and a Program CD with more than 2000 pages of reference material, case studies, exercises and slides.

In building a model, functionality does not matter since this program envisages model building as comprising of two essential tasks:

- Domain Expertise
- Modeling Framework

**Domain Expertise** refers to functionality and this aspect of model building is supplied by the participant himself; in other words, you cannot build an Accounting Model if you do not know Double-Entry Accounting, or an Option Pricing Model if you do not understand the 'Black-Sholes' Option Pricing Theory, or an Astronomy model if you do not know relevant equations for tracking planets, or an Engineering Model if you do not know the subject, or a Statistical, Risk or Econometrics Model, and so on.

**Modeling Framework** refers to the tools and techniques to build powerful and sophisticated models. This program trains participants in the modeling framework.

Note that this program is not a "how-to" on Excel; participants are expected to be familiar with Excel, should have a professional background and have been using Excel for a reasonable period of time. This program is not for fresh graduates. This program exposes participants to 'Advanced' features of Excel and to its programming counterpart, 'Visual Basic for Applications'. Participants will learn the fundamentals of writing Visual Basic code while advanced code writing is learnt by investing time in the valuable reference material provided on the Program CD.

This program is rigorous and intellectually challenging and runs from 8.30 AM to 5.00 PM for 4 consecutive days with two coffee breaks and a lunch break.

Program fee entitles you to admission to the program, program contents and to the conference facility for all 4 days.

Participants receive a program completion certificate on completion of the program.

## Advanced Financial Modeling

### Snapshot of Program

Day 1	<b>Introduction to Financial Modeling</b> (first half) <b>Advanced Excel</b> (second half)
Day 2	<b>Advanced Excel</b> (continued from day 1)
Day 3	<b>Excel Programming</b>
Day 4	<b>Modeling Case Studies</b> <ul style="list-style-type: none"> <li>➤ Share Price Forecasting Model</li> <li>➤ Monte Carlo Simulation Model</li> <li>➤ Securitization Model</li> <li>➤ Risk Return Pricing Model</li> <li>➤ Vehicle Financing Model</li> <li>➤ Project Appraisal Model</li> <li>➤ HP Financial Calculator Model</li> <li>➤ CapInvest Consumer Finance Model</li> </ul>

## Program Prerequisites

<b>Readings</b>	<p>Excel Basic / Chapter entitled 'Excel Intro Reading' provided as hard copy to participants.</p> <p>Excel Programming / Chapter Entitled 'VBA Intro Reading' provided as hard copy to participants.</p> <p>'Letter to Participants', provided as hard copy to participants.</p> <p>Case Study / Mixed Emotions for SA Olympic Team / provided as hard copy to participants.</p>
<b>(to be read the evening before)</b>	<p>Financial Modeling Case, selected by the class each day, from the inventory of newspaper articles provided to participants as course material for this program.</p>
<b>Software</b>	<p>Participants are strongly encouraged to install 'CapInvest' and to use the software prior to the program, to appreciate the features and process of building sophisticated financial models.</p>
<b>Hardware</b>	<p>Participants need to bring their own laptop to the Program with Excel 2003, Excel XP, Excel 2007 or Excel 2010. Participants interested in working with the new 'PowerPivot' tool require Excel 2010.</p>

## Introduction to Financial Modeling

Day 1  
Morning

### Introduction

- Definition of financial Modeling
- The six distinct components in financial Modeling: process, situation, variables, relationships, dimensions, decision-making
- What is not a financial model?
- Advantages of the financial Modeling framework
- The IPO (Input, Processing and Output) framework
- Examples of variables and relationships
- Layout issues in building a financial model
- Examples of types of models
- Examples of models in non-finance areas: Marketing, Human Resources

### Databases and Spreadsheets

- Difference between a database and a spreadsheet
- Role of a database in relation to a spreadsheet
- The need to intermingle in a solution
- Examples of production quality relational databases
- Other relational databases
- Programming language for manipulating databases
- The important role of excel as a flat file database
- Excel architecture overview
- Databases wrap-up

### Overview of Excel 2007

- New features
- The Ribbon
- Excel 2007 statistics

### Accessing Excel

- Two ways to access the functionality of Excel: GUI and Code
- Overview of code
- Objects
- Collections
- Platforms for building models: Worksheet and User Form

### Modeling Platforms

- Example of employing a Worksheet as a platform for a modelling situation
- Example of employing a User Form as a platform for a modelling situation

### Requirements for Developing Financial Models

- Model building concepts: variables, relationships, inputs, processing, outputs, layout issues
- Technical skills in Excel: excel object hierarchy, object properties and methods, excel events, Visual Basic for Applications

## Advanced Excel

Day 1

Afternoon

### Overview of Advanced features of Excel and its significance in Financial Modeling

- Arrays
- Functions
- Names
- Number formatting
- Data validation
- Excel Controls
- Report Manager add-in
- Data management
- What-if analysis
- Grabbing data from the Internet

#### Excel Arrays

- Examples of use of arrays to solve advanced problems
- Defining arrays
- Entering array constants
- Cells holding an array formula

#### Data Validation

- Basics
- Defaults
- Lists
- Custom
- Prompts

### Excel Functions

- Sources of Excel's functionality
- Types of Excel functions: built-in, Analysis
- ToolPak, user-defined, add-ins
- 9 categories of built-in Excel functions
- Functions: user defined
- Functions: add-ins
- Using a function and determining function parameters
- Function return value
- Creating a user defined function
- Examples of some important functions
- Using Edit / Go To / Special

#### Excel Naming Scheme

- Importance of names in Excel
- Naming cells, constants and formulas
- 3-D Names
- Naming benefits
- Names examples

#### Excel Formatting Scheme

- Formatting values
- Number formatting options
- Custom number format
- Examples of Custom Format
- Formatting codes
- Date and time formatting codes
- Formatting examples



## Advanced Excel / Day 2

### Types of Excel controls

- Placing controls on a worksheet
- Linking controls to cells
- Attaching procedures to controls

### Excel Data Management Features

- Data management features in Excel
- Five stages of data manipulation
- The "Three I's" of sources of data: Imported, Inputted, Internet
- Data filter
- Operators for filtering
- Advanced filtering procedures
- "D" functions
- Data management examples

### Excel Pivot Tables Feature

- What is a Pivot Table?
- Pivot table basics
- Pivot table examples

### What-if Analysis

- Types of "What If?" Analysis in Excel: Data Tables, Goal Seek, Scenario Manager, Solver
- Customized "What if?" analysis
- Data Tables: one-variable and two-variable
- Goal Seek
- Solver
- Solver algorithms and examples
- Scenarios

### Introduction to Business Intelligence

- Using the new PowerPivot in Excel 2010
- Manipulating 'Relational' databases with PowerPivot
- Example of manipulating a relational database with 1.2 million records.

### Grabbing Data from Internet

- Web queries
- Import commands
- Creating a new Web query

## Learning to Program Excel / Day 3

### Introduction to Programming

- MS Office programming architecture
- Entry points into Excel
- Graphical User Interface tools vs. code
- Using objects, properties and methods to manipulate Excel
- Examples of VBA Code
- Ways to execute code
- Built in modules vs. user modules
- Benefits of Code
- Executing Visual Basic code
- Manipulating Excel with objects, properties and methods

### Excel Object Hierarchy

- Scope of object properties and methods
- Object collections
- Microsoft Excel object models
- Object properties
- Object methods

### Excel Event Procedures

- Events supported by Excel
- Using Events to hook code

### Excel Macro Recorder

- Excel macro recorder
- Hands-on programming of simple tasks in Excel

### Writing Visual Basic Code

- Overview of Visual Basic code
- Parts of a Visual Basic procedure

### Visual Basic Decision Structures

- Visual Basic decision Structures
- Visual Basic control Structures

### Visual Basic Controls

- Visual Basic controls
- Visual Basic user forms
- Visual Basic toolbox
- Alternatives to forms
- Visual Basic Functions

### Useful Objects

- A Closer look at the Range Object
- The Range Object: properties and methods
- The Worksheet Object: properties, methods and events

### Other

- Variables and Constants, Arrays, Operators



## Modeling Projects / Day 4

*“Building on the exposure to Advanced Excel and VBA in prior sessions, participants proceed to examine, interactively, the architecture of several real-life models and the code behind these models.”*

### Securitization Model

This case study illustrates an example of an educational institute in an emerging market country faced with the situation of either taking a loan from a bank or securitizing its fee income to finance a school building. Participants learn the value of building a Dashboard with relevant parameters to arrive at a decision as to the amount of fee income in future years to be securitized, the rate of interest to be paid to the bank, the number of years of fee income to be securitized and so on. This case illustrates how VBA can transform an accountant from merely preparing projected financial

statements of a scenario into a decision-maker where relevant information is marshaled to arrive at an optimal decision.

### Developing a Dashboard for an investment decision

This case illustrates the important concept of a ‘Black Box’ in preparing a financial model to isolate important decision making information and variables and to assist users to perform useful tasks without attention diverted by large data; essentially, an executive is faced with a situation wherein a considerable amount of time could be spent in building a great spreadsheet that clearly isolates the IPO components of model-building: Inputs (variables), Processing (revenue forecasting engine, double-entry of items, and a trial balance) and Output (financial statements such as P&L, Balance Sheet, Sources and Application of Funds, Ratio Analysis); while the executive would have toiled endlessly to prepare this elaborate model, from a decision-making perspective, such a spreadsheet could prove to be useless: the spreadsheet needs to be visualized as an ‘engine’ that requires no human intervention where variables are manipulated by a dashboard that also incorporates interactivity. Once this is accomplished using VBA, this executive is transformed into a true decision-maker.

### Monte Carlo Simulation

An executive in the present-world lives in a World full of uncertainty; thus, to carry out a Project Appraisal using conventional tools is unrealistic since the assumptions in the Project Appraisal will remain a mute spectator. In other words, the IRR and NPV are unrealistic – to be meaningful, these parameters need to be the outcome of variables subject to probabilities. Enter Monte Carlo Simulation: this case uses a simple project to subject one of the assumption in the Project Appraisal (the revenue assumption) to a range of probability outcomes and to calculating the resulting NPV of the project – this exercise provides greater insights into the sensitivity of a project to changes in underlying variables. A Monte Carlo simulation is carried with a VBA Loop - participants get a ring-side view of the technical issues. This simulation involves 10,000 iterations with each iteration producing a NPV, corresponding to a probability value attached to the Revenue assumption.

### **Simulating a HP Financial Calculator**

This model simulates the financial functions in a HP financial calculator using Visual Basic Code and demonstrates the fact that Excel's built-in financial functions alone such as Present Value, PMT and the others cannot build the simulator - these functions can generate an answer given information on the remaining 4 variables – however, calculation of any of the functions given info on the other variables is ruled out because a cell can be used for entering either a formula or a constant (but not both, as required by the simulator). Thus, Excel functions cannot build the calculator – the use of VBA functions (PV, PMT, I, NPER, FV) is required to build the financial calculator.

### **Risk-Return Pricing Model**

Financial Institutions in developing countries face the stark reality of bad debts and defaults in transactions, especially, on transactions with SMEs. How does a Financial Institution quantify the Risk of a Transaction and translate this Risk into an appropriate Risk Premium that is added to the Risk-Free rate for pricing a Transaction? This case study illustrates the innovative use of VBA Controls to visualize Risk from two perspectives and to translate Risk into Risk Premium. While the functionality of the model can be recreated using a basic spreadsheet, the capability to engage a user in the process is un-paralled with the use of Controls that remove the mathematics and complexity of calculating the Risk Premium from the user interface to be replaced by intuitiveness of controls that spring to life when risk parameters are manipulated.

### **Vehicle Financing Model**

This case is an excellent introduction to participants to get exposed to VBA controls to develop an 'error resistant' model to price vehicle financing transactions using discounted cash flow components of (a) the amount to be financed; (b) the duration of the financing transaction; (c) the rate of interest on the transaction; (d) future value of vehicle (if any); the model enables a user to select from a dealer's inventory of used-cars using a drop-down control and to calculate the period repayment for financing of the vehicle; the model incorporates several features to minimize the risk of errors in entry.

### **An Automation Scenario**

One of the most useful applications of VBA is of automating several tasks; automation enables these tasks to be carried out repeatedly and with no error, thereby leading to enhancement of productivity. This example of a Textile company, presents a situation wherein data is imported from a database and modified to suit company requirements; this overall task is broken into FIVE distinct sub-tasks and participants learn to develop a VBA procedure to address each sub-task. Once the five VBA sub-procedures are tested to ensure they work as expected, a Master Procedure is developed that calls individual procedures to ensure these work in harmony, thereby transforming a time-consuming and error-prone process into a highly productive activity.

## PROGRAM DIRECTOR

Viswanath Tumu is principal consultant of Vish Tumu Associates, a U.S. and India based consulting firm that advises international financial



institutions, including the World Bank, the International Finance Corporation, and the Inter-American Development Bank. He has carried out assignments in more than 24 countries, most recently in Jakarta, where he advised the World Bank and the Government of Indonesia on measures to strengthen and encourage the development of Non-Banking Financial Institutions. Many of his recommendations are in the

process of being codified into law, including, the recommendation to allow leasing companies to claim depreciation in computing taxable income.

Vish has more than 14 years of experience in financial modelling and Microsoft Excel, and has developed *CapInvest* a sophisticated financial model that is used by financial institutions to create a range of financial and savings products.

He holds a Masters degree in International Finance from Columbia University, New York and is a registered Chartered Accountant from the Institute of Chartered Accountants of India. He is a co-author of a book on leasing "*The Principles and Practice of Leasing*" published in the U.K. in 1990, has published several articles, and is a regular contributor to the *World Leasing Yearbook*, published by Euromoney Publications, U.K.

Reflecting his expertise with Excel, he was invited by Microsoft Corporation to beta test the new Office 2007.

In the past, he worked with the ICICI Bank, the premier development bank in India and AF Ferguson & Co. (part of Deloitte), in India.