An Introduction to Excel VBA Programming: with Applications in Finance and Insurance
To all my students.
# Contents

List of Figures xi  
List of Tables xiii  
Preface xv  

## I VBA Preliminaries 1

1 **Introduction to VBA** 3  
   1.1 Getting Started .............................................. 4  
   1.2 Modules .................................................. 9  
   1.3 VBA Classes ................................................ 11  
   1.4 The Excel Macro Recorder ................................. 13  
   1.5 Summary .................................................. 16  

2 **Excel Objects** 17  
   2.1 The Excel Object Model ...................................... 17  
   2.2 The Application Object .................................... 21  
   2.3 The Workbook Objects ..................................... 23  
   2.4 The Worksheet Objects .................................... 28  
   2.5 The Range Object .......................................... 32  
   2.6 The WorksheetFunction Object ............................ 37  
   2.7 Summary .................................................. 41  

3 **Variables, Data Types, and Scopes** 43  
   3.1 Variable Declaration and Data Types ...................... 43  
   3.2 Arrays ................................................... 48  
   3.3 Constants ................................................ 54  
   3.4 Strings ................................................... 57  
   3.5 Dates ..................................................... 65  
   3.6 Scopes ................................................... 69  
   3.7 Summary .................................................. 73
4 Operators and Control Structures  
4.1 Operators .................................................. 75  
4.2 Flow Control .............................................. 81  
4.3 Loops ..................................................... 86  
4.4 Summary ............................................... 93  
5 Functions, Events and File IO  
5.1 User-Defined Functions ................................. 95  
5.2 Events ................................................... 101  
5.3 File IO .................................................. 104  
5.4 Summary ............................................... 108  
6 Error Handling and Debugging  
6.1 Error Handling .......................................... 109  
6.2 Debugging VBA Code .................................. 115  
6.3 Best Practices of VBA Coding .......................... 120  
6.4 Summary ............................................... 125  
II Applications  
7 Generating Payment Schedules  
7.1 Introduction ............................................ 130  
7.2 Public Holidays in the United States ................. 130  
7.3 The Julian and Gregorian Calendars .................. 131  
7.4 Day Count Conventions ................................. 133  
7.5 Business Day Conventions ............................. 134  
7.6 Implementation ......................................... 135  
7.6.1 The MDate Module ................................. 135  
7.6.2 The MHoliday Module .............................. 147  
7.6.3 The MSchedule Module ............................. 151  
7.6.4 The MInterface Module ............................ 156  
7.7 Summary ............................................... 159  
8 Bootstrapping Yield Curves  
8.1 Introduction ............................................ 162  
8.2 Interpolation ............................................. 164  
8.3 Bootstrapping Yield Curves ............................ 164  
8.4 Finding Roots of an Equation ........................... 167  
8.5 Implementation ......................................... 168  
8.5.1 The MCurve Module ............................... 168  
8.5.2 The MInterface Module ............................ 179
Contents

8.6 Summary ..................................................... 181

9 Generating Risk-Neutral Scenarios 183
  9.1 Introduction ............................................. 184
  9.2 The Black-Scholes Model ............................... 184
  9.3 Generating Random Normal Numbers ................. 186
  9.4 Implementation ........................................ 187
    9.4.1 The MGenerator Module ......................... 187
    9.4.2 The MInterface Module ......................... 195
  9.5 Summary ................................................ 197

10 Valuing a GMDB 199
  10.1 Introduction .......................................... 200
  10.2 Life Table Construction .............................. 201
  10.3 GMDB Valuation .................................... 202
  10.4 Greek Calculation .................................... 205
  10.5 Implementation ...................................... 205
    10.5.1 The MLifeTable Module ......................... 206
    10.5.2 The MGMDB Module ............................ 209
    10.5.3 The MInterface Module ......................... 214
  10.6 Summary ................................................ 216

11 Connecting to Databases 217
  11.1 ActiveX Data Objects ................................. 218
  11.2 SQL Queries .......................................... 220
  11.3 Implementation ...................................... 221
    11.3.1 The MDatabase Module ......................... 221
    11.3.2 The MInterface Module ......................... 229
  11.4 Summary ................................................ 232

12 Object-Oriented Programming 233
  12.1 Introduction .......................................... 233
  12.2 Objects ................................................. 234
  12.3 Implementation ...................................... 234
    12.3.1 The CZeroCurve Module .......................... 235
    12.3.2 The CSwap Module ................................ 238
    12.3.3 The CBootstrapper Module ..................... 241
    12.3.4 An OO Bootstrapping Tool ..................... 246
  12.4 Summary ................................................ 249
## Contents

### A Solutions to Selected Exercises  \( \text{251} \)

- A.1 Introduction to VBA \( \text{251} \)
- A.2 Excel Objects \( \text{251} \)
- A.3 Variables, Data Types, and Scopes \( \text{253} \)
- A.4 Operators and Control Structures \( \text{258} \)
- A.5 Functions, Events and File IO \( \text{260} \)
- A.6 Error Handling and Debugging \( \text{262} \)
- A.7 Generating Payment Schedules \( \text{262} \)
- A.8 Bootstrapping Yield Curves \( \text{266} \)
- A.9 Generating Risk-Neutral Scenarios \( \text{268} \)
- A.10 Valuing a GMDB \( \text{270} \)
- A.11 Connecting to Databases \( \text{273} \)

### References  \( \text{275} \)

### Index  \( \text{278} \)

### Index of VBA Keywords  \( \text{281} \)
# List of Figures

1.1 The Excel 2013 interface in a Windows computer. 4
1.2 The Visual Basic Editor in a Windows computer. 5
1.3 The Excel 2010 interface in a Mac computer. 6
1.4 The Ribbon dialog in Excel 2010 in a Mac computer. 7
1.5 The Visual Basic Editor in a Mac computer. 8
1.6 The macro dialog. 8
1.7 A module displayed in the Visual Basic Editor. 9
1.8 Inserting a module in the Visual Basic Editor. 10
1.9 The Record Macro dialog. 14

2.1 The Excel object hierarchy. 18
2.2 The Object Browser in the Visual Basic Editor. 18
2.3 A screen shot of the U.S. Life Tables 1999-2001 - Males. 33
2.4 Worksheet functions in the Object Browser. 41

3.1 An illustration of explicit variable declaration. 48
3.2 VBA’s built-in color constants. 56
3.3 VBA’s built-in constants for variable types. 57

4.1 Conversion functions in the Visual Basic Editor. 77

5.1 Workbook events in the code window. 102

6.1 An example illustrating a run-time error. 110
6.2 An example illustrating another run-time error. 111
6.3 Checking values of VBA statements in the Immediate window in Break mode. 117
6.4 Setting a watch expression in the Watch window. 118
6.5 The Watches window and checking values of VBA statements in the Immediate window in Break mode. 118
6.6 The Locals window in Break mode. 119
6.7 Three tiers of an application and their relationships. 122
List of Figures

7.1 The interface of the payment schedule generator. ....... 129
7.2 The interface of a holiday generator. .................. 159

8.1 The interface of the yield curve bootstrapper. ......... 161
8.2 A yield curve. ........................................... 163

9.1 The interface of the risk-neutral scenario generator. ... 183
9.2 The first few rows and columns of the risk-neutral scenarios. 197

10.1 The interface of the GMDB valuation program. ....... 199

11.1 The interface of the variable annuity inforce tool. .... 217
11.2 The inforce10k table in an Access database. ......... 218
11.3 Checking the reference for Microsoft ActiveX Data Objects 2.8 Library. ........................................... 219
11.4 The output in the worksheet when the first button is clicked. 231
11.5 The new table in the database when the second button is clicked. 231
List of Tables

2.1 Some commonly used properties of the Application object. 21
2.2 Some commonly used methods of the Application object. 22
2.3 Some file extensions of Excel files. ..................... 25
2.4 Some commonly used properties of a Workbook object. 25
2.5 Some commonly used methods of a Workbook object. 26
2.6 Two properties of the Workbooks object. .................. 27
2.7 Some methods of the Workbooks object. .................. 27
2.8 Some commonly used properties of a Worksheet object. 28
2.9 Some commonly used methods of a Worksheet object. 30
2.10 Some methods of the Worksheets collection. ............... 31
2.11 Various ways to refer to a Range object. .................. 32
2.12 Some properties of a Range object. ...................... 35
2.13 Some methods of a Range object. ......................... 36
2.14 Some worksheet functions. .............................. 38

3.1 A list of built-in data types in VBA. ......................... 45
3.2 Some commonly used string functions in VBA. ............... 59
3.3 VBA's built-in date and time functions. .................... 66
3.4 Scopes of a variable. ...................................... 70
3.5 Scopes of a constant. ...................................... 72
3.6 Scopes of a procedure. ..................................... 73

4.1 VBA's arithmetic operators. .................................. 75
4.2 VBA's string operator. ...................................... 78
4.3 VBA's comparison operators. ............................... 79
4.4 VBA's logical operators. .................................... 80
4.5 VBA's programming constructs for flow control. .......... 81
4.6 VBA's loops. ................................................ 87

5.1 Some workbook events. ..................................... 102
5.2 Some worksheet events. .................................... 103

6.1 Usage of the On Error statement. ......................... 113
List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2</td>
<td>Usage of the Resume statement.</td>
<td>113</td>
</tr>
<tr>
<td>6.3</td>
<td>Naming conventions.</td>
<td>120</td>
</tr>
<tr>
<td>6.4</td>
<td>Scope specifiers.</td>
<td>121</td>
</tr>
<tr>
<td>6.5</td>
<td>Array specifiers.</td>
<td>121</td>
</tr>
<tr>
<td>6.6</td>
<td>Data type specifiers.</td>
<td>121</td>
</tr>
<tr>
<td>7.1</td>
<td>Holidays and observances in the United States.</td>
<td>131</td>
</tr>
<tr>
<td>7.2</td>
<td>Parameters for calendar conversion algorithms.</td>
<td>132</td>
</tr>
<tr>
<td>7.3</td>
<td>Range names used by the payment schedule generator.</td>
<td>156</td>
</tr>
<tr>
<td>7.4</td>
<td>Dates of the Easter Sunday from 2010 to 2020.</td>
<td>160</td>
</tr>
<tr>
<td>8.1</td>
<td>Range names used by the yield curve bootstrapper.</td>
<td>162</td>
</tr>
<tr>
<td>8.2</td>
<td>Interest rates of various tenors.</td>
<td>162</td>
</tr>
<tr>
<td>8.3</td>
<td>US swap rates for various maturities on February 8, 2016.</td>
<td>165</td>
</tr>
<tr>
<td>9.1</td>
<td>Range names defined in the interface of the risk-neutral scenario generator.</td>
<td>190</td>
</tr>
<tr>
<td>10.1</td>
<td>Range names used by the GMDB valuation program.</td>
<td>206</td>
</tr>
<tr>
<td>11.1</td>
<td>Range names used by the variable annuity inforce tool.</td>
<td>217</td>
</tr>
</tbody>
</table>
Preface

Visual Basic for Applications (VBA) is a programming language created by Microsoft that can be used to automate operations in Microsoft Excel, which is perhaps the most frequently used computer software program for manipulating data and building models in banks and insurance companies. One advantage of VBA is that it enables you to do anything that you can do manually in Excel and do many things that Excel does not allow you to do manually. As a powerful tool, VBA has been used by actuaries and financial analysts to build actuarial and financial models.

In the spring of 2016, I was assigned to teach the course “Math3550: Programming for Actuaries,” which is taken primarily by junior and senior undergraduate students majoring in actuarial science at the University of Connecticut. This course explores how an actuary uses computers to solve common actuarial problems and teaches students how to design, develop, test and implement programs using Microsoft Excel with VBA. Since existing books on Excel VBA do not have exercises or applications related to actuarial science, I started to write lecture notes for this course. This textbook has grown out of those lecture notes.

This textbook has been written for undergraduate students majoring in actuarial science who wish to learn the basic fundamentals and applications of Excel VBA. In doing so, this book does not assume that readers have any prior programming experience. This book will also be of use to actuaries and financial analysts working in insurance companies and banks who wish to learn Excel VBA.

This textbook is divided into two parts: preliminaries of Excel VBA programming and some applications of VBA in finance and insurance. The preliminaries covered in the first part include how to run VBA programs, modules, best practices of VBA coding, the Excel object model, variables, control statements, functions, and error handling, among many other things. The applications of VBA introduced in the second part include generating regular payment schedules, bootstrapping yield curves, creating risk-neutral scenarios, pricing a guarantee embedded in a variable annuity contract, how to connect to databases, and object-oriented programming in VBA.
The best way to learn programming is by doing. I encourage readers to practice the VBA code presented in the book. The book also contains many exercises. Sample solutions of some exercises are given in the appendix of this book. Readers should explore the exercises before looking at the solutions.

Finally, I would like to take this opportunity to express my thanks to my students, friends, and colleagues from the University of Connecticut who have read and provided valuable feedback on the draft of this book.

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July 27, 2016