

Mortgage-Equity Appraisal Software

Version 1.0

Operating and Use Guide

by Steve Rushmore, MAI

Copyright © 2019

By Hospitality Consulting Services, LLC.

Support Notice

This use guide is provided “as is” without warranty of any kind, either express or implied, respecting the contents of this guide, including but not limited to implied warranties for the guide’s quality, performance, merchantability, or fitness for any particular purpose. Neither the author nor any entity affiliated with the author (including Hospitality Consulting Services, LLC) shall be liable to any person or entity with respect to any liability, loss, or damage caused or alleged to be caused directly or indirectly by this guide or the software. In accordance with the software license, neither the author, nor any entity affiliated with the author, will provide any type of software support as part of the distribution of the software and the use guide.

Table of Contents

Copyright and Support Notice

Table of Contents

**Introduction to the Mortgage-Equity
Appraisal Software**

Mortgage Equity Valuation Model

Acknowledgement

Operating and Use Guide

The Software is Not Supported

About the Author

Commercial Real Estate Valuation

Mortgage-Equity Appraisal Model

**Getting Started Using the Mortgage-Equity
Appraisal Software**

Case Study

Software- Input Sheet

- [Project Information Section](#)
- [Legend](#)
- [Overall Valuation Inputs Section](#)
- [Underwriting Matrix Section](#)

Case Study

Output Pages

- **Valuation Summary**
- **Project Metrics**
- **Mortgage-Equity Cash Flows**
- **Proof of Values**
- **Proof of Value- Total Property**
- **Proof of Value- Mortgage Component**
- **Proof of Value- Equity Component**

Calculations

Software License

The Math Behind the Mortgage-Equity Technique

- **Mortgage-Equity Technique Using a Loan-to-Value Ratio**
- **Mortgage-Equity Technique Using a Debt Coverage Ratio**
- **Mortgage-Equity Technique Using a Debt Yield**

Software License Agreement

Introduction to the Mortgage-Equity Appraisal Software

The Mortgage-Equity Appraisal Software has been designed specifically to assist in the preparation of real estate appraisals using a Mortgage-Equity Discounted Cash Flow technique. The software provides a mathematical framework to perform mortgage-equity appraisals for all types of commercial real estate including properties with projected irregular income flows.

The tool consists of a software program written as Microsoft Excel® workbook and a software manual. The Mortgage-Equity Appraisal Software can run on the following two operating systems:

- Microsoft Excel® on the Windows®
- OSX® operating systems

All output is formatted for a standard laser printer using 8½ by 11-inch or A4 paper.

Mortgage Equity Valuation Model

A discounted cash flow valuation model utilizing the mortgage-equity technique forms the basis for this program which values commercial real estate using three different loan underwriting criteria:

- Loan-to-Value Ratio: Assumes a specific ratio between the size of the loan and the value of the property.
- Debt Coverage Ratio: Assumes a specified ratio of Net Income divided by the Debt Service as of a specific projection year.
- Debt Yield: Assumes a specified ratio of Net Income divided by the amount of the Mortgage as of a specific projection year.

By inputting the terms of typical financing, along with a projection of net income, the program determines the value that provides the stated returns to the mortgage and equity components. The program produces an estimate of value based on a 5-year and a 10-year holding period.

Acknowledgement

The Mortgage-Equity Appraisal Software was developed by Steve Rushmore, MAI. The mortgage-equity appraisal model was based on the work of Suzanne Mellen, CRE, MAI. Professor Jan A, deRoos, PhD. assisted in the development of the software.

Operating and Use Guide

The purpose of this Operating and Use Guide is to provide a complete description of the Mortgage-Equity Appraisal Software: how it works (the calculations) and how it is used- (inputting the data and interpreting the results). In addition, the mathematical calculations are included for those who want to learn the algebra behind the numbers.

The author strongly recommends reading this manual thoroughly prior to attempting to use the software. Try entering the data set forth in the Case Study so you can understand the logic of the software, and the various analytical features it offers.

The Software is Not Supported

The Mortgage-Equity Appraisal Software and the Operating and Use Guide are provided “as is” without warranty of any kind, either express or implied, respecting the contents of this guide and software, including but not limited to implied warranties for the guide’s and software’s quality, performance, merchantability, or fitness for any particular purpose. The author shall not be liable to any person or entity with respect to any liability, loss, or damage caused or alleged to be caused directly or indirectly by this guide and software. In accordance with the software license, neither the author, nor any entity affiliated with the author (including Hospitality Consulting Services, LLC) will provide any type of software support as part of the distribution of the Software and the Use Guide.

About the Author

Steve Rushmore, MAI is the Founder of HVS. Steve has provided consultation services for more than 15,000 properties throughout the world during his 40-year career and specializes in complex issues involving feasibility, valuation and financing.

As a leading authority and prolific author on the topic of hotel feasibility studies and appraisals, Steve Rushmore has written five textbooks and two seminars for the Appraisal Institute covering this subject. He has also authored three reference books on investing and has published more than 300 articles. He is also a frequent lecturer at major universities around the world including Cornell, Hong Kong Polytechnic, Michigan State, Houston, NYU and the Harvard Business School. Steve Rushmore has degrees from Cornell University and University of Buffalo.

Commercial Real Estate Valuation

When valuing commercial real estate, the analyst applies the classic “three approaches” appraisal methodology, using the Income Capitalization approach, the Sales Comparison approach, and Cost approach. Although all three valuation methods are generally given consideration, the inherent strength of each approach and the nature of the subject property must be evaluated to determine which will provide supportable estimates of market value.

For the purpose of this Operating & Use Guide, only the Income Capitalization approach using Mortgage-Equity Technique will be discussed.

Mortgage-Equity Appraisal Model

The Mortgage-Equity Appraisal Software estimates the value of commercial real estate using a Mortgage-Equity Appraisal Model which allows for either a 5-year or 10-year holding period. The projected property cash flows are allocated to the mortgage and equity components based on current lending terms and market rates of returns to each component. The value of the property equals the sum of the mortgage component plus the equity component.

The process of estimating the value of the mortgage and equity components is summarized in the following Seven steps:

1. The terms of typical financing are set forth including: interest rate, amortization term, loan-to-value ratio, the debt coverage ratio, and the debt yield.
2. A before-tax equity yield and terminal capitalization rate are established. The equity yield takes into account the benefits of ownership; it is typical for buyers to base their equity yield on a five or ten-year holding period. The yield explicitly includes annual cash flow distributions and the equity residual. The equity yield implicitly includes refinancing distributions that return any property appreciation and mortgage amortization, income tax benefits, and non-financial considerations such as status and prestige.
3. The terminal capitalization rate is established as that rate appropriate for the property to be sold at the end of the assumed 5-year or a 10-year holding period.
4. The value of the equity component is calculated by first deducting the yearly debt service from the forecasted Net Income, leaving the net income to equity for each forecast year. The Net Income forecast for the year following the end of the holding period is capitalized into a reversionary value. From this figure, the mortgage balance is deducted at of the end of the holding period along with normal selling expenses; the resulting equity residual is discounted back to the date of value at the equity yield rate. The net income to equity for each of the ten projection years also undergoes a similar discounting process. The sum of these discounted

values equates to the value of the equity component. Adding the equity component to the initial mortgage balance yields the overall property value.

5. The mortgage amount, the annual debt service, and the remaining mortgage balance all depend on the value to be calculated. Thus, the preceding calculation must be solved through an algebraic equation that computes the total property value. This software uses the algebraic solution developed by Suzanne Mellen in "Simultaneous Valuation: A New Technique" Appraisal Journal, April 1983.

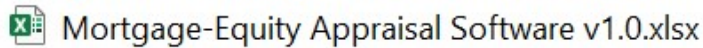
6. In addition to estimating value using a specified loan-to-value ratio, the software also estimates value using a debt coverage ratio and a debt yield. Lenders are increasingly using a debt coverage ratio or a debt yield to size their loans and are placing less emphasis on the loan-to-value ratio.

7. The proof of value is performed by allocating the total property value between mortgage and equity components and verifying that the rates of returns set forth in Steps #1 and #2 can be precisely met from the forecasted net income.

Getting Started Using the Mortgage-Equity Appraisal Software

The best way to learn how to use the Mortgage-Equity Appraisal Software is to actually work with the software while following the instructions in this Guide.

The Excel file for the Mortgage-Equity Appraisal Software looks like this:



The version number (v1.0) will change with any software updates.

Open the Excel file and before using the software do a “Save As” and save the file under a different name so each time the original file is used it starts with a fresh spreadsheet.

The software opens with the “Intro” page which contains information about the author and contributors to the development of the mortgage-equity technique. It also has contact information- web and e-mail as well as the owner of the copyright.

	A	B	C	D	E	F	G	H	I	J	K
1		Mortgage-Equity									
2		Appraisal Software									
3		For All Types of Commercial Real Estate									
4											
5		Mortgage-Equity Appraisal Software v.1.0									
6											
7		Software for Valuing all Types of Commercial Real Estate									
8											
9		Distributed by Hospitality Consulting Services, LLC									
10		www.mortgage-equitysoftware.com									
11											
12		Steve Rushmore, MAI									
13		38B Marlin Lane									
14		Key Largo, FL 33037									
15		steve@hotelvaluationsoftware.com									
16											
17											
18		Copyright © 2019 by Steve Rushmore									
19		All Rights Reserved									
20											
21		Neither the author, nor any entity									
22		associated with Hospitality Consulting Services, LLC									
23		will provide any type of software support									
24		as part of the sale of this software.									
25											
26		Use of this software is subject to the software									
27		license agreement located in the license tab									
28											
29		Assistance with the development of									
30		the Mortgage-Equity Appraisal Software was provided by:									
31		Suzanne Mellen, MAI- HVS									
32		Jan A. deRoos, Ph.D.- Cornell University									
33											
34											

The Mortgage-Equity Appraisal Software Excel workbook employs a common look and feel that includes:

- An opening screen with a black colored tab
- Navigation is via a set of tabs along the bottom of the screen.
 - Tabs are color coded to facilitate navigation; blue tabs are for inputs, yellow tabs are for outputs, red tabs are used for calculations, the black tab is the introductory tab and the purple tab contains the software license.

The software uses the following protocol for cell color:

- Cells with blue text a light blue background are mandatory inputs.
- Cells with blue text and a light-yellow background are optional inputs.
- Cells with black text and a white background are outputs and do not require an input.
- Cells with black text and a grey background are for error checking or for clarity of format.
- Red triangles in the upper right corner of some cells contain important information on how the data needs to be entered into that particular cells- for example- “Enter as a Percentage,” “Enter as a Ratio.” Just move your curser over the red triangle and a box will open showing the information.

Case Study

The Mortgage-Equity Appraisal Software will be demonstrated through the use of a case study.

Subject property is a new 100,000 square foot office building which will be rented out to several office tenants. A market analysis with financial projections have been completed.

The projected Net Income is expected to grow over the first four years as the space is rented and then it is expected to stabilize with further growth equal to the rate of inflation.

Inflation Rate after Stabilization:	3.0%
Number of Years to Stabilization:	4
Stabilized Year's Net Income:	\$1,500

The following is the projection of Net Income:

Projection Year	Forecasted Net Income
Year 1	\$1,000
Year 2	\$1,100
Year 3	\$1,300
Year 4	\$1,500
Year 5	\$1,545
Year 6	\$1,591
Year 7	\$1,639
Year 8	\$1,688
Year 9	\$1,739
Year 10	\$1,791
Year 11	\$1,845

Mortgage Information- The developer has a good relationship with a local bank and was able to obtain a mortgage based on the following terms:

Mortgage Interest Rate:	7.00%
Mortgage Amortization (years):	25
Mortgage payments per year:	12

Equity Information- The developer has a group of investors interested in the property and are looking for the following equity yield:

Equity Yield:	18.0%
---------------	-------

Reversion Information- The developer intends to hold the property for 10-years and projects to sell the building based on the following:

Terminal Cap Rate:	10.00%
Selling Expenses at Reversion:	3.0%

Basis of Valuation- The property will be valued using three mortgage assumptions:

- **Loan-to-Value Ratio:** Assumes a specific ratio between the size of the loan and the value of the property.
- **Debt Coverage Ratio:** Assumes a specified ratio of Net Income divided by the Debt Service as of a specific projection year.
- **Debt Yield:** Assumes a specified ratio of Net Income divided by the amount of the Mortgage as of a specific projection year.

Discussions with the bank indicated they would be evaluating the following mortgage assumptions:

Loan-to-Value Ratio:	75%
Debt Coverage Ratio:	1.3 in Year #3
Debt Yield:	11% in Year #3

Software- Input Sheet

Click on the Input Tab which is the white tab at the bottom of the sheet just to the right of the black Intro Tab. The Input Sheet is where all the information is entered to perform the Mortgage-Equity Technique. The following is the blank Input Sheet:

	A	B	C	D	E	F	G	H	I	J	K
1	Mortgage-Equity Appraisal Software - Input Sheet					www.mortgage-equitysoftware.com					
2											
3	Project Information:					Legend					
4	Job Title						Mandatory Input				
5	Prepared by						Optional Input				
6	Prepared for						Output				
7	Job #										
8								Forecasted Net Income			
9	Overall Valuation Inputs:		10-Year	5-Year	Year	Year Number	10-Year	5-Year			
10	First Projection Year		2020	2020	2020	Year 1					
11	Unit Count			0	2021	Year 2	\$ -	\$ -			
12	Equity Yield				2022	Year 3	\$ -	\$ -			
13	Mortgage Interest Rate				2023	Year 4	\$ -	\$ -			
14	Mortgage Amortization (years)				2024	Year 5	\$ -	\$ -			
15	Mortgage Payments Per Year				2025	Year 6	\$ -	\$ -			
16	Terminal Cap Rate				2026	Year 7	\$ -	\$ -			
17	Selling Expenses at Reversion				2027	Year 8	\$ -	\$ -			
18	Inflation Rate After Stabilization				2028	Year 9	\$ -	\$ -			
19	Number of Years to Stabilization				2029	Year 10	\$ -	\$ -			
20	Stabilized Year's Net Income		#N/A	#N/A	2030	Year 11	\$ -	\$ -			
21											
22	Underwriting Matrix										
23											
24	Inputs for Loan-to-Value Ratio Based Model:		10-Year	5-Year							
25	Loan to Value Ratio										
26											
27	Inputs for Debt Coverage Ratio Based Model:		10-Year	5-Year							
28	Debt Coverage Ratio										
29	Enter the Year of the Net Income Used for Underwriting										
30	Underwritten Net Income to be Used		#N/A	#N/A							
31											
32	Inputs for Debt Yield Based Model:		10-Year	5-Year							
33	Debt Yield										
34	Enter the Year of the Net Income Used for Underwriting										
35	Underwritten Net Income to be Used		#N/A	#N/A							
36											
37											

The Input Sheet is divided into three sections:

- Project Information and Legend
- Overall Valuation Inputs
- Underwriting Matrix

Each of these three sections will be described separately.

Project Information Section

Located at the top left side of the spreadsheet is space to enter information identifying the project, who prepared the spreadsheet and who the sheet is for. The Job Title appears on each of the output sheets. Project Information entered in this area has no effect on the Mortgage-Equity calculations.

Legend

Located to the right of the Project Information is the Legend which is the color coding of the cells:

- Blue Cells: Mandatory Inputs,
- Yellow Cells: Optional Inputs
- White Cells: Output

The following is the Project Information and Legend Section:

	A	B	C	D	E	F	G	H	I
1		Mortgage-Equity Appraisal Software - Input Sheet				www.mortgage-equitysoftware.com			
2									
3		Project Information:					Legend		
4		Job Title					Mandatory Input		
5		Prepared by					Optional Input		
6		Prepared for					Output		
7		Job #							

Overall Valuation Inputs Section

Most of the input information for the Mortgage-Equity Technique is entered into the Overall Valuation Inputs Section.

The following is the Overall Valuation Inputs Section:

						Forecasted Net Income	
8							
9	Overall Valuation Inputs:	10-Year	5-Year	Year	Year Number	10-Year	5-Year
10	First Projection Year	2020	2020	2020	Year 1		
11	Unit Count		0	2021	Year 2	\$ -	\$ -
12	Equity Yield			2022	Year 3	\$ -	\$ -
13	Mortgage Interest Rate			2023	Year 4	\$ -	\$ -
14	Mortgage Amortization (years)			2024	Year 5	\$ -	\$ -
15	Mortgage Payments Per Year			2025	Year 6	\$ -	\$ -
16	Terminal Cap Rate			2026	Year 7	\$ -	
17	Selling Expenses at Reversion			2027	Year 8	\$ -	
18	Inflation Rate After Stabilization			2028	Year 9	\$ -	
19	Number of Years to Stabilization			2029	Year 10	\$ -	
20	Stabilized Year's Net Income	#N/A	#N/A	2030	Year 11	\$ -	

10-Year or 5-Year Holding Period- The Mortgage-Equity Software allows the property to be valued using both a 10-Year or 5-Year Holding Period prior to the assumed sale (reversion). Since the length of the holding period can affect some or all of the Valuation Inputs- this section has specific input cells for a 10-Year and 5-Year Holding Periods.

First Projection Year- (entered as a year) Usually the date of value or the date the projections start. By entering the First Projection Year in cell D-10- that year is replicated in cells E-10 and F-10. In column F the First Projection Year is grown by one; each year for 11 years. (Note: the 11th year's Net Income is not part of the holding period but is used to calculate the reversionary value).

Unit Count- The output sheets have a cell which divides the total value by the unit count producing a value per unit. The Unit Count could be total square footage, total number of apartments, total number of rooms, etc. The Unit Count has no effect on the valuation.

Equity Yield- (entered as a percentage) This is the IRR to the equity investors. It is used to discount the annual cash flow to equity (equity dividend), plus the proceeds to equity (equity reversion) after an assumed sale at the end of the holding period.

Mortgage Interest Rate- (entered as a percentage) The annual interest rate for mortgage debt financing.

Mortgage Amortization (years)- The number of years to fully amortize the mortgage debt financing.

Mortgage Payments Per Year- The frequency of mortgage payments required by the lender. Mortgage payments are usually made monthly- so this number would be 12. The software calculates the debt service constant based on the number of payments per year.

Terminal Cap Rate- (entered as a percentage) At the end of the holding period there is an assumed sale of the property based on the projected 11th (or 6th) year's Net Income divided by the Terminal Capitalization Rate.

Selling Expenses at Reversion- (entered as a percentage of the sales price) To determine the profit to the equity investor from the assumed sale of the property at the end of the holding period all the selling expenses need to be deducted from the proceeds of the sale. These include broker and legal fees incurred during the sales process.

Inflation Rate After Stabilization- (entered as a percentage) Most projections of Net Income assume that at some point in the future the Net Income will stabilize, and any growth of Net Income thereafter will be at the rate of inflation.

Number of Years to Stabilization- The software will grow the Net Income at the inputted Inflation Rate after the year of stabilization. This cell tells the software where to look for the Stabilized Year's Net Income which is used to calculate the Stabilized Going In Cap Rate (see below).

Stabilized Year's Net Income- (this is an output cell) The software calculates the Stabilized Going In Cap Rate which is the Stabilized Year's Net Income (adjusted for inflation) divided by property value. This cell looks up the Stabilized Year's Net Income from the 10-Year or 5-Year Forecast of Net Income based on the Number of Years to Stabilization cell (see above)

10-Year or 5-Year Forecast of Net Income- The software values the property based on a 10-Year or 5-Year Forecast of Net Income. The forecast of Net Income is entered in the two right columns of the Overall Valuation Input Section- in the columns labeled 10-Year or 5-Year. Start by entering the Net Income for Year 1 in the appropriate column. Notice after entering the amount, the Net Income for subsequent years appear and they are increasing at the Inflation Rate After Stabilization. If the assumed Stabilized Year occurs sometime after Year 2, then override the amount in the Year 2 cell with the Year 2 Net Income forecast. Continue entering the Net Income forecast for subsequent years until the Stabilized Year's Net Income is entered. The software will then increase the Net Income for the subsequent years at the Inflation Rate.

Underwriting Matrix Section

The Mortgage-Equity Appraisal Software values the property using three mortgage underwriting assumptions:

- Loan-to-Value Ratio
- Debt Coverage Ratio
- Debt Yield

The following is the Underwriting Matrix Section:

22	Underwriting Matrix		
23			
24	Inputs for Loan-to-Value Ratio Based Model:	10-Year	5-Year
25	Loan to Value Ratio		
26			
27	Inputs for Debt Coverage Ratio Based Model:	10-Year	5-Year
28	Debt Coverage Ratio		
29	Enter the Year of the Net Income Used for Underwriting		
30	Underwritten Net Income to be Used	#N/A	#N/A
31			
32	Inputs for Debt Yield Based Model:	10-Year	5-Year
33	Debt Yield		
34	Enter the Year of the Net Income Used for Underwriting		
35	Underwritten Net Income to be Used	#N/A	#N/A

The Underwriting Matrix Section contains three input areas each with a 10-Year and 5-Year input cell.

Loan to Value Ratio- The assumed Loan-to-Value Ratio is entered as a percentage.

Debt Coverage Ratio- The assumed Debt Coverage Ratio is entered as a ratio- such as 1.3 or 1.5. Enter the Year of the Net Income Used for Underwriting- most lenders will specify when (what year) the Debt Coverage Ratio needs to be applied such as Year 2, Year 3 or Year 4. Enter as a number (2, 3, 4) **not** as a year (2022). The Software will use this information to look up the Net Income to be Used for the Debt Coverage Ratio valuation model.

Debt-Yield- The assumed Debt Yield is entered as a percentage- such as 10% or 11%. Enter the Year of the Net Income Used for Underwriting- most lenders will specify when (what year) the Debt Yield needs to be applied such as Year 2, Year 3 or Year 4. Enter as a number (2, 3, 4) **not** as a year (2022). The Software will use this information to look up the Net Income to be Used for the Debt Yield valuation model.

Case Study

Taking the information set forth in the previously described case study the following are the three sections of the Input Sheet:

Project Information Section

A	B	C	D	E	F	G	H	I
1	Mortgage-Equity Appraisal Software - Input Sheet				www.mortgage-equitysoftware.com			
2								
3	Project Information:				Legend			
4	Job Title	Valuation of the Fairfield Office Building			Mandatory Input			
5	Prepared by	Appraisal Associates			Optional Input			
6	Prepared for	Universal Bank Corp			Output			
7	Job #	3303						

Overall Valuation Inputs Section

							Forecasted Net Income	
Overall Valuation Inputs:	10-Year	5-Year	Year	Year Number	10-Year	5-Year		
First Projection Year	2020	2020	2020	Year 1	\$ 1,000			
Unit Count	100000	100000	2021	Year 2	\$ 1,100	\$ -		
Equity Yield	18.0%		2022	Year 3	\$ 1,300	\$ -		
Mortgage Interest Rate	7.00%		2023	Year 4	\$ 1,500	\$ -		
Mortgage Amortization (years)	25		2024	Year 5	\$ 1,545	\$ -		
Mortgage Payments Per Year	12		2025	Year 6	\$ 1,591	\$ -		
Terminal Cap Rate	10.00%		2026	Year 7	\$ 1,639			
Selling Expenses at Reversion	3.0%		2027	Year 8	\$ 1,688			
Inflation Rate After Stabilization	3.0%		2028	Year 9	\$ 1,739			
Number of Years to Stabilization	4		2029	Year 10	\$ 1,791			
Stabilized Year's Net Income	\$1,500	#N/A	2030	Year 11	\$ 1,845			

Underwriting Matrix Section

22	Underwriting Matrix			
23				
24	Inputs for Loan-to-Value Ratio Based Model:		10-Year	5-Year
25	Loan to Value Ratio		75%	
26				
27	Inputs for Debt Coverage Ratio Based Model:		10-Year	5-Year
28	Debt Coverage Ratio		1.3	
29	Enter the Year of the Net Income Used for Underwriting		3	
30	Underwritten Net Income to be Used		\$1,300	#N/A
31				
32	Inputs for Debt Yield Based Model:		10-Year	5-Year
33	Debt Yield		11.00%	
34	Enter the Year of the Net Income Used for Underwriting		3	
35	Underwritten Net Income to be Used		\$1,300	#N/A

Output Pages

The Mortgage-Equity Appraisal Software contains six Output Pages:

- 10-Year- Loan to Value Ratio
- 10 Year- Debt Coverage Ratio
- 10-Year- Debt Yield
- 5-Year- Loan to Value Ratio
- 5-Year- Debt Coverage Ratio
- 5-Year- Debt Yield

Each Output Page has its own tab:

Intro	Input	10 Yr Output-LTV	10 Yr Output-DCR	10 Yr Output-DY	5 Yr Output-LTV	5 Yr Output-DCR	5 Yr Output-DY
-------	-------	------------------	------------------	-----------------	-----------------	-----------------	----------------

Based on the Case Study information- the following is the Output Page for 10-Year- Loan to Value:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
1		Mortgage-Equity Appraisal Software - 10 Year Output - Loan to Value													
2															
3		10 Yr LTV Model:		Value	% of Total	IRR	Value per	Project Metrics							
4		Valuation of the Fairfield Office	Value	Value	Value	Value	Unit (\$)	Total Appreciation						24.84%	
5		Value of the Property	\$ 14,778	100.0%	10.85%	\$ 148		Annual Appreciation						2.24%	
6		Value of the Mortgage Component	\$ 11,083	75.0%	7.00%	\$ 111		Cash Flow Return						56.78%	
7		Value of the Equity Component	\$ 3,694	25.0%	18.00%	\$ 37		Appreciation Return						43.22%	
8								Stabilized Going In Cap Rate						9.29%	
9								Total Property Yield						10.85%	
10															
11		Cash Flows for IRR Calcs		Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
12		Total Property		\$ (14,778)	\$ 1,000	\$ 1,100	\$ 1,300	\$ 1,500	\$ 1,545	\$ 1,591	\$ 1,639	\$ 1,688	\$ 1,739	\$ 1,789	\$ 19,686
13		Mortgage		\$ (11,083)	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 9,655
14		Equity		\$ (3,694)	\$ 60	\$ 160	\$ 360	\$ 560	\$ 605	\$ 651	\$ 699	\$ 748	\$ 799	\$ 851	\$ 10,030
15		Debt Coverage Ratio			1.06	1.17	1.38	1.60	1.64	1.69	1.74	1.80	1.85	1.91	
16		Debt Yield			9.02%	9.92%	11.73%	13.53%	13.94%	14.36%	14.79%	15.23%	15.69%	16.16%	
17		Equity Dividend Rate			1.62%	4.33%	9.74%	15.16%	16.38%	17.63%	18.92%	20.25%	21.62%	23.04%	
18															
19		Proof of Value		Total Property Present Value				Mortgage Component Present Value				Equity Component Present Value			
20				Forecasted	PV Factor @	Discounted		Mortgage	PV Factor @	Discounted		Net Income	PV Factor @	Discounted	
21				Net Income	10.9%	Cash Flow	Year	Payment	6.93%	Cash Flow	Year	to Equity	18.0%	Cash Flow	
22				2020	\$ 1,000	0.9021	\$ 902	2020	\$ 940	0.9352	\$ 879	2020	\$ 60	0.8475	\$ 51
23				2021	\$ 1,100	0.8138	\$ 895	2021	\$ 940	0.8746	\$ 822	2021	\$ 160	0.7182	\$ 115
24				2022	\$ 1,300	0.7341	\$ 954	2022	\$ 940	0.8179	\$ 769	2022	\$ 360	0.6086	\$ 219
25				2023	\$ 1,500	0.6623	\$ 993	2023	\$ 940	0.7649	\$ 719	2023	\$ 560	0.5158	\$ 289
26				2024	\$ 1,545	0.5974	\$ 923	2024	\$ 940	0.7153	\$ 672	2024	\$ 605	0.4371	\$ 264
27				2025	\$ 1,591	0.5390	\$ 858	2025	\$ 940	0.6690	\$ 629	2025	\$ 651	0.3704	\$ 241
28				2026	\$ 1,639	0.4862	\$ 797	2026	\$ 940	0.6256	\$ 588	2026	\$ 699	0.3139	\$ 219
29				2027	\$ 1,688	0.4386	\$ 740	2027	\$ 940	0.5851	\$ 550	2027	\$ 748	0.2660	\$ 199
30				2028	\$ 1,739	0.3957	\$ 688	2028	\$ 940	0.5472	\$ 514	2028	\$ 799	0.2255	\$ 180
31				2029	\$ 19,686	0.3569	\$ 7,027	2029	\$ 9,655	0.5117	\$ 4,941	2029	\$ 10,030	0.1911	\$ 1,916
32				Total Property Value			\$ 14,778	Mortgage Component Value			\$ 11,083	Equity Component Value			\$ 3,694
33															
34		Year 10 Cash Flow Calculations		Year 10 Cash Flow of			\$ 1,791	Year 10 mort. payment of			\$ 940	Year 10 net inc. to equity of			\$ 851
35				plus reversion of			\$ 17,895	plus the RMB of			\$ 8,715	plus the equity residual of			\$ 9,179
36							\$ 19,686				\$ 9,655				\$ 10,030
37		Reversion Calculations for Proof		Year 11 Cash Flow of \$1845				The reversion is the remaining mortgage				Net Sales Price			\$ 17,895
38				capitalized at 10% equals			\$ 18,448	balance (RMB) of the loan at the end				Less: RMB			\$ 8,715
39				Less: Selling Expenses			\$ 553	of year 10.				Equals: Equity Residual			\$ 9,179
40				Equals: Net sales price			\$ 17,895								

Each Output Page contains six sections:

- Valuation Summary
- Project Metrics
- Mortgage-Equity Cash Flows
- Proof of Value- Total Property
- Proof of Value- Mortgage Component
- Proof of Value- Equity Component

Each Output Page Section will be identified and described:

Valuation Summary

	A	B	C	D	E	F
1	Mortgage-Equity Appraisal Software - 10 Year Output - Loan to Value					
2						
3	10 Yr LTV Model:		Value	% of Total		Value per
4	Valuation of the Fairfield Office Bu		\$(000)	Value	IRR	Unit (\$)
5	Value of the Property		\$ 14,778	100.0%	10.85%	\$ 148
6	Value of the Mortgage Component		\$ 11,083	75.0%	7.00%	\$ 111
7	Value of the Equity Component		\$ 3,694	25.0%	18.00%	\$ 37

The Valuation Summary of the Loan to Value Ratio Page contains the value of the Total Property along with the value of the Mortgage Component and the value of the Equity Component.

The next column shows the percentage relationship of the value of each Component to the Total Property Value. Since this page is based on a specific Loan-to-Value Ratio (75%)- this column proves that the valuation does produce the desired Loan-to-Value Ratio.

The IRR (Internal Rate of Return) column shows the IRR for the Total Property along with the IRR of the Mortgage and Equity Components. The 10.85% IRR for the Total Property is the same as an Unleveraged Yield or what is also called a Property Yield. Many appraisers use a Property Yield to value commercial properties rather than using the Mortgage-Equity Technique. The Mortgage Component IRR is the IRR to the mortgage lender which should be the same as the assumed Mortgage Interest Rate (7%). The Equity Component IRR is the IRR to the equity investor which should be the same as the Equity Yield Rate (18%).

The Value Per Unit is the value of each component divided by the Unit Count enter on the Input Page (100,000).

Project Metrics

H	I	J	K
	www.mortgage-equitysoftware.com		
Project Metrics			
Total Appreciation			24.84%
Annual Appreciation			2.24%
Cash Flow Return			56.78%
Appreciation Return			43.22%
Stabilized Going In Cap Rate			9.29%
Total Property Yield			10.85%

The Project Metrics contains six different metrics which provides important insights on the valuation. Each of the Project Metrics will be described:

Total Appreciation- The percentage change in property value over the holding period.

It is calculated using the following formula:

$$((\text{Residual Value}/\text{Current Value}) - 1) = \text{Total Appreciation}$$

Applying Case Study: $(\$18,448/\$14,778) - 1 = 24.84\%$

Annual Appreciation- The average annual compound property value appreciation rate.

It is calculated using the Excel Rate function:

$$=\text{Rate}(\text{Number of Periods}, \text{Current Value}, -\text{Sales Price}) = \text{Annual Appreciation}$$

Applying Case Study: $=\text{Rate}(10, \$14,778, -\$18,448) = 2.24\%$

Appreciation Return- The proportion of property value attributable to the revision at the end of the holding period.

It is calculated using the following formula:

$$((\text{Net Sales Price}/(1+\text{Unleveraged IRR})^{10})/\text{Current Value}) = \text{Appreciation Return}$$

Applying Case Study: $((\$17,895/1+0.1085)^{10})/\$14,778 = 43.22\%$

What this formula does is calculate the present value of the expected reversion using the overall property IRR as the discount rate. The PV of the reversion is \$6,388 which is 43.22% of the current value of \$14,778.

Cash Flow Return- The proportion of property value attributable to property cash flows over the holding period.

It is calculated using the following formula:

$$1 - \text{Appreciation Return} = \text{Cash Flow Return}$$

Applying Case Study: $1 - 43.22\% = 56.78\%$

Stabilized Going In Cap Rate- The stabilized year's NOI (adjusted for inflation) divided by property value.

It is calculated using the following formula:

$$\text{Stabilized Year's Net Income} * (1 / (1 + \text{Inflation Rate After Stabilization}) ^ (\text{Number of Years to Stabilization} - 1)) / \text{Current Property Value} = \text{Stabilized Going In Cap Rate}$$

Applying Case Study: $\$1,500 * (1 / (1 + .03)^{(4-1)}) / \$14,778 = 9.29\%$

What the formula does is deflates the Stabilized Year's Net Income to Year #1 at the Inflation Rate After Stabilization to get the Stabilized Year's Net Income in current dollars. This deflated Net Income is divided by the Current Property Value to get the Stabilized Going-In Cap Rate.

Total Property Yield- The overall property IRR over the holding period.

It is calculated using the following Excel IRR formula:

$$=IRR(\text{Projected Cash Flows}, 0.1) = \text{Overall Property IRR}$$

Applying Case Study: $=IRR((\$14,778), \$1,000, \$1,100, \$1,300, \$1,500, \$1,545, \$1,591, \$1,639, \$1,688, \$1,739, \$19,686, 0.1) = 10.85\%$

Mortgage-Equity Cash Flows

	Cash Flows for IRR Calcs	Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
12	Total Property		\$ (14,778)	\$ 1,000	\$ 1,100	\$ 1,300	\$ 1,500	\$ 1,545	\$ 1,591	\$ 1,639	\$ 1,688	\$ 1,739	\$ 19,686
13	Mortgage		\$ (11,083)	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 9,655
14	Equity		\$ (3,694)	\$ 60	\$ 160	\$ 360	\$ 560	\$ 605	\$ 651	\$ 699	\$ 748	\$ 799	\$ 10,030
15	Debt Coverage Ratio			1.06	1.17	1.38	1.60	1.64	1.69	1.74	1.80	1.85	1.91
16	Debt Yield			9.02%	9.92%	11.73%	13.53%	13.94%	14.36%	14.79%	15.23%	15.69%	16.16%
17	Equity Dividend Rate			1.62%	4.33%	9.74%	15.16%	16.38%	17.63%	18.92%	20.25%	21.62%	23.04%

The Mortgage-Equity Cash Flows show how the yearly cash flow (Net Income) for the Total Property is divided between the Mortgage Component (Debt Service) and the Equity Component (Equity Dividend). The first column of data shows the Total Property Value along with the Value of the Mortgage and Equity Components. The next nine columns show the yearly cash flows for the Total Property divided between the Mortgage and Equity Components. The last column on

the right contains the Year 10 Cash Flow to the Total Property and to the Mortgage and Equity Components PLUS the total Residual Value which is added to the Total Property Cash Flow, the remaining Mortgage Balance which is added to the Mortgage Cash Flow and the Equity Residual which is added to the Equity Cash Flow. These calculations are as follow:

<u>Total Property</u>	
10th Year Cash Flow	\$1,791
Plus: Reversion Sale:	
Sales Price	\$18,448
Less: Selling Expenses	(\$553)
10th Year Total Property Cash Flow	\$19,686
<u>Mortgage Component</u>	
10th Year Debt Service	\$ 940
Plus: Remaining Mortgage Balance	\$ 8,715
10th Year Mortgage Cash Flow	\$ 9,655
<u>Equity Component</u>	
10th Year Equity Dividend	\$ 851
Plus: Reversion Sale:	
Sales Price	\$18,448
Less: Selling Expenses	(\$553)
Less: Remaining Mortgage Balance	(\$8,715)
10th Year Equity Cash Flow	\$ 10,030

The derivation of some of the items contained in this table will be shown in the Proof of Value sections.

Below the Mortgage-Equity Cash Flows are three additional rows showing the yearly calculations of the Debt Coverage Ratio, the Debt Yield and the Equity Dividend.

The Equity Dividend is the Equity Cash Flow/Value of the Equity Component.

Proof of Values

When performing a valuation using the Mortgage-Equity Technique it is important to prove that the Mortgage and Equity Components will actually obtain their inputted rates of return. The Proof of Values section of the Output Page provides this proof through three Internal Rate of Return (IRR) tables- one for each component- Total Property, Mortgage Component and Equity Component.

Each IRR table has a section that shows the yearly cash flows and how they are discounted using the inputted rate of return as the Present Value Factor. For the sale at the end of the holding period, calculations are made for the different types of reversion assumptions. This reversion amount is added to the 10th year cash flow and discounted using the Present Value Factor. The

yearly discounted cash flows are added together and if they equal the value of that particular Component- then the value is proved.

Each of the three IRR tables will be described:

Proof of Value- Total Property

19	Proof of Value		Total Property Present Value		
20			Forecasted	PV Factor @	Discounted
21		Year	Net Income	10.9%	Cash Flow
22		2020	\$ 1,000	0.9021	\$ 902
23		2021	\$ 1,100	0.8138	\$ 895
24		2022	\$ 1,300	0.7341	\$ 954
25		2023	\$ 1,500	0.6623	\$ 993
26		2024	\$ 1,545	0.5974	\$ 923
27		2025	\$ 1,591	0.5390	\$ 858
28		2026	\$ 1,639	0.4862	\$ 797
29		2027	\$ 1,688	0.4386	\$ 740
30		2028	\$ 1,739	0.3957	\$ 688
31		2029	\$ 19,686	0.3569	\$ 7,027
32			Total Property Value		\$ 14,778
33					
34	Year 10 Cash Flow Calculations		Year 10 Cash Flow of		\$ 1,791
35			plus reversion of		\$ 17,895
36					\$ 19,686
37	Reversion Calculations for Proof		Year 11 Cash Flow of \$1845		
38			capitalized at 10% equals		\$ 18,448
39			Less: Selling Expenses		\$ 553
40			Equals: Net sales price		\$ 17,895

Since the unleveraged IRR or Property Yield is not an input in the Mortgage-Equity Technique, the Proof of Value for the Total Property actually calculates the IRR needed to discount all the cash flows to arrive at the Total Property Value calculated through the Mortgage-Equity Technique (see the algebraic calculations later in this Operating and Use Guide). In this Case Study the IRR is 10.9%.

The Mortgage Equity Technique assumes the sale at the end of the Holding Period which in this Case Study is 10 years. The sales price is calculated by taking the 11th year’s Net Income of \$1,845 and capitalizes it at the Terminal Cap Rate of 10% producing a Sales Price of \$18,448. From this Selling Expenses are deducted based on 3% of the Sales Price or \$553 producing a Net Sales Price of \$17,895.

The Net Sales Price is added to the 10th year’s Net Income of \$1,791 resulting in a 10th year’s Cash Flow of \$19,686.

When the 10 years of cash flows are discounted to the Present Value at the 10.9% discount rate and added together the resulting value is \$14,778 which is identical to the value derived from the Mortgage Equity Technique.

Proof of Value- Mortgage Component

Mortgage Component Present Value			
Year	Mortgage Payment	PV Factor @ 6.93%	Discounted Cash Flow
2020	\$ 940	0.9352	\$ 879
2021	\$ 940	0.8746	\$ 822
2022	\$ 940	0.8179	\$ 769
2023	\$ 940	0.7649	\$ 719
2024	\$ 940	0.7153	\$ 672
2025	\$ 940	0.6690	\$ 629
2026	\$ 940	0.6256	\$ 588
2027	\$ 940	0.5851	\$ 550
2028	\$ 940	0.5472	\$ 514
2029	\$ 9,655	0.5117	\$ 4,941
Mortgage Component Value			\$ 11,083
Year 10 mort. payment of			\$ 940
plus the RMB of			\$ 8,715
			\$ 9,655
The reversion is the remaining mortgage balance (RMB) of the loan at the end of year 10.			

The cash flows to the Mortgage Components is the Debt Service which is calculated by multiplying the Mortgage Constant by the Original Mortgage Balance. The following is the calculation of the Debt Service:

Mortgage Constant of a 25 Year Mortgage at an Interest Rate of 7% with monthly payments is .08481. Multiply the Mortgage Constant by the Original Mortgage Balance produces the Annual Debt Service.

Mortgage Constant	0.08481
Original Mortgage Balance	\$ 11,083
Annual Debt Service	\$ 940

The Reversionary Value to the Mortgage Lender is the Remaining Mortgage Balance at the end of the 10th year which is assumed to be paid off from the proceeds of the sale. The Remaining Mortgage Balance is calculated for this Case Study using the following formulas:

The Percent of the Mortgage Paid at the end of the holding period:

25-Year Mortgage Constant Minus the Mortgage Interest Rate
10-Year Mortgage Constant Minus the Mortgage Interest Rate

	<u>Constant</u>	<u>Interest</u>	=	
25-Year Mortgage Constant	0.08481	-0.07	=	0.0148
10-Year Mortgage Constant	0.13933	-0.07	=	0.0693
		Percent Paid Off:		21.36%
Remaining Mortgage Balance Percentage = (1- Percent Paid Off):				78.64%
Original Mortgage Balance		\$11,083		
Remaining Mortgage Percentage		78.64%		
Remaining Mortgage Balance		\$ 8,715		

The 10th year's Cash Flow to the Mortgage Lender is \$940 + \$8,715= \$9,655

When these annual Cash Flows are discounted at 6.93% and added together, they total the value of the Mortgage Component- \$11,083.

But shouldn't the discount rate equal the Mortgage Interest Rate? The reason this rate (6.93%) is slightly different from the mortgage interest rate (7%) is due to the difference between the monthly payments used to calculate the actual mortgage payments and the yearly discounting used in the proof of value. The annual payment is assumed to be 12 times the monthly payment, which needs to be discounted at a slightly lower rate of interest to obtain the correct answer. Be assured that the software is correctly handling this situation.

Proof of Value- Equity Component

Year	Equity Component Present Value		
	Net Income to Equity	PV Factor @ 18.0%	Discounted Cash Flow
2020	\$ 60	0.8475	\$ 51
2021	\$ 160	0.7182	\$ 115
2022	\$ 360	0.6086	\$ 219
2023	\$ 560	0.5158	\$ 289
2024	\$ 605	0.4371	\$ 264
2025	\$ 651	0.3704	\$ 241
2026	\$ 699	0.3139	\$ 219
2027	\$ 748	0.2660	\$ 199
2028	\$ 799	0.2255	\$ 180
2029	\$ 10,030	0.1911	\$ 1,916
Equity Component Value			\$ 3,694
Year 10 net inc. to equity of			\$ 851
plus the equity residual of			\$ 9,179
			\$ 10,030
Net Sales Price			\$ 17,895
Less: RMB			\$ 8,715
Equals: Equity Residual			\$ 9,179

The annual Cash Flows to Equity is known as the Equity Dividend which is calculated by deducting the annual Debt Service from the Annual Net Income.

At the end of the holding period when the property is sold. The equity investor receives the 10th year's Equity Dividend plus the Equity Residual which is the Net Sales Price of the property (Sales Price less Selling Expenses) less the Remaining Mortgage Balance.

Using the Case Study the Equity Residual is:

Net Sales Price	\$ 17,895
Less: RMB	\$ 8,715
Equals: Equity Residual	\$ 9,179

The 10th year's Cash Flow to Equity is:

Year 10 Net Income to Equity	\$ 851
Plus Equity Residual	\$ 9,179
Cash Flow to Equity	\$ 10,030

When these annual Cash Flows to Equity are discounted the Equity Yield rate of 18% and added together, they total the value of the Equity Component- \$3,694.

Calculations

The red CALC tab contains all the calculations taking place within the software. For those interested in how the software actually calculates the mortgage-equity value see the section below: The Math Behind the Mortgage-Equity Technique.

Software License

The purple License tab contains the software license which sets forth the terms by which the software can be used.

The Math Behind the Mortgage-Equity Technique

For those who want to understand the math behind the Mortgage-Equity Technique, the remainder of this Operating and Use Guide will be devoted to explaining how the formulas actually derive the value based on a Discounted Cash Flow Analysis using the Mortgage-Equity Technique. Formulas for the three different loan underwriting criteria will be described:

- Loan-to-Value Ratio: Assumes a specific ratio between the size of the loan and the value of the property.
- Debt Coverage Ratio: Assumes a specified ratio of Net Income divided by the Debt Service as of a specific projection year.
- Debt Yield: Assumes a specified ratio of Net Income divided by the amount of the Mortgage as of a specific projection year.

Mortgage-Equity Technique Using a Loan-to-Value Ratio

The mortgage-equity technique using a loan-to-value ratio calculates the exact amount of debt and equity that the property will be able to support based on the anticipated cash flow derived from the forecast of net income and the return requirements of the mortgage lender (interest) and the equity investor (equity yield) to produce a specified loan-to-value ratio.

Overall the valuation process is as follows. To solve for the value of the mortgage and equity components, the yearly debt service is deducted from the forecast of net income before debt service; leaving the net income to equity for each year in the forecast. The net income as of Year 11 is capitalized into a reversionary value using the terminal capitalization rate. The equity residual, which is the total reversionary value minus the mortgage balance at that point in time and any broker and legal cost associated with the sale, is discounted to the date of value at the equity yield rate. The net income to equity for each of the forecast years is also discounted. The

sum of these discounted values equates to the value of the equity component. Since the equity component represents a specific percentage of the total value (loan-to-value ratio), the value of the mortgage and the total property value can be easily computed.

The process described above can be expressed in an algebraic equation, which set forth the mathematical relationships between known and unknown variables. The symbols used to represent these variables are listed below.

NI	Net income available for debt service
V	Value
M	Loan-to-value ratio
i	Mortgage interest rate
f	Annual debt service constant
n	Number of years in projection period
d _e	Annual cash available to equity
d _r	Residual equity value
b	Brokerage and legal cost percentage
P*	Fraction of loan paid off in projection period
f _p	Annual constant required to amortize the entire loan during the projection period
R _r	Overall terminal capitalization rate applied to net income to calculate total property reversion (sale price at end of the projection period)
1/S _n	Current worth of 1\$ (discount factor) at the equity yield rate

* $P = (f - i) \div (f_p - i)$ where i = the interest rate of the mortgage

Using these symbols, a series of formulas can be derived to express the components making up this mortgage-equity valuation process.

Debt service. To calculate a property's debt service, the appraiser first determines the amount of the mortgage, which is the total property value (V) multiplied by the loan-to-value ratio (M). Then the amount of the mortgage is multiplied by the annual debt service constant (f) using the following formula:

$$f \times M \times V = \text{debt service}$$

Net income to equity (equity dividend). The net income to equity (d_e) is the property's net income before debt service (NI) minus the debt service. The following formula represents net income to equity:

$$NI - (f \times M \times V) = d_e$$

Reversionary value. The value of the property at the end of Year 10 is calculated by dividing the net income in Year 11 before debt service (NI¹¹) by the terminal capitalization rate (R_r). The following formula calculates the property's reversionary value in Year 10:

$$NI^{11}/R_r = \text{reversionary value}$$

Broker and legal costs. When a property is sold, costs associated with the transaction normally include a broker's commission and attorneys' fees. For a commercial property transaction broker and legal costs typically range from 1% to 4% of the sale price. Because these expenses reduce the proceeds to the seller, they are usually deducted from the reversionary value in mortgage-equity technique. Broker and legal costs (b) expressed as a percentage of the reversionary value (NI¹¹/R_r) can be calculated with the following formula:

$$(b (NI^{11} / R_r)) = \text{broker and legal costs}$$

Ending mortgage balance. The balance of the mortgage at the end of Year 10 must be deducted from the total reversionary value (debt and equity) to isolate the equity residual. A financial formula is used to calculate the fraction of the loan paid off, which is expressed as a percentage of the original loan balance at a particular point in time. The mortgage interest rate (i) is deducted from the annual debt service constant of the loan over the entire amortization period (f) and the result is divided by the annual constant required to amortize the entire loan over the projection period (sub p) minus the mortgage interest rate. The formula is:

$$(f-i) / (fp-i) = P$$

If the fraction of the loan paid off expressed as a percentage of the initial loan balance is P, then the percentage of the loan remaining can be expressed as 1 - P. Thus, the ending mortgage balance is the fraction of the loan remaining (1-P) multiplied by the amount of the initial loan (M x V). The formula is:

$$(1 - P) \times M \times V = \text{ending mortgage balance}$$

Equity residual value. The value of the equity when the property is sold at the end of the projection period (d_r) is the reversionary value minus broker and legal costs and the ending mortgage balance. The following formula represents the equity residual value:

$$(NI^{11} / R_r) - (b(NI^{11} / R_r)) - ((1-P) \times M \times V) = d_r$$

Annual cash flow to equity. The annual cash flow to equity consists of the equity dividend for each of the 10 projection years plus the equity residual at the end of Year 10. The following formulas represent the annual cash flow to equity:

$$\begin{aligned} NI^1 - (f \times M \times V) &= d_e^1 \\ NI^2 - (f \times M \times V) &= d_e^2 \dots \\ NI^{10} - (f \times M \times V) &= d_e^{10} \end{aligned}$$

Value of the equity. If the initial amount of the mortgage is calculated by multiplying the loan-to-value ratio (M) by the value of the property (V), then the equity value will be 1 minus the loan-to-value ratio times the property value. The formula is:

$$(1 - M) V$$

Discounting the cash flow to equity to present value. The cash flow to equity for each of the projection years is discounted to present value at the equity yield rate ($1/S^n$). The sum of all these cash flows is the value of the equity $(1-M)V$. The following formula calculates equity as the sum of the discounted cash flows:

$$\begin{aligned} (d_e^1 \times 1/S^1) + (d_e^2 \times 1/S^2) + \dots + (d_e^{10} \times 1/S^{10}) \\ + (d_r \times 1/S^{10}) = (1 - M)V \end{aligned}$$

Combining equations: annual cash flow to equity and cash flow to equity discounted to present value. The final step in the process is to make one, overall equation that shows that the annual cash flow to equity plus the yearly cash flows discounted to present value equal the value of the equity.

$$\begin{aligned} ((NI^1 - (f \times M \times V)) 1/S^1) + ((NI^2 - (f \times M \times V)) 1/S^2) + \dots \\ \dots + ((NI^{10} - (f \times M \times V)) 1/S^{10}) + \\ \dots + (NI''/ R_r) - (b(NI''/ R_r)) - ((1 - P) \times M \times V) 1/S^{10} = (1-M)V \end{aligned}$$

Since the only unknown is the property value (V), this equation is easy to solve.

Example:

Estimate the market value of a commercial property using the Mortgage-Equity Technique Using a Loan-to-Value Ratio.

A 4-year projection of income and expense was made up to the point where the property is expected to stabilize. After that point the Net Income Before Debt Service is projected to grow at 3% per year.

Year	Net Income Available For Debt Service
1	\$1,000
2	\$1,100
3	\$1,300
4	\$1,500
5	\$1,545
6	\$1,591
7	\$1,639
8	\$1,688
9	\$1,739
10	\$1,791

Mortgage

Based on discussions with lenders and mortgage data from the ACLI the following are the mortgage financing assumptions:

Mortgage Interest Rate (i)	7.0%
Loan-to-Value Ratio (M)	75%
Amortization	25 Years
Constant (f)	.084814
Term	10 Years

Terminal Value

Holding Period	10 Years
Terminal Capitalization Rate (R_r)	10%
Broker and Legal Cost (b)	3%

Equity Requirements

Equity Yield	18%
--------------	-----

The Following Calculations Can be Made with the Available Data

Annual Debt Service

$$f \times M \times V = \text{Debt Service}$$

$$.084181 \times .75 \times V = .06361V$$

Percentage of the Loan Paid Off During Holding Period

$$P = (f-i) \div (fp - i)$$

Mortgage Constant 25 Year Term: .08481

Mortgage Constant 10 Year Term: .13933

$$P = (.08481 - .07000) / (.13933 - 0.07000) = .21367$$

Reversionary Value

NI''/R_r = reversionary value

$$\$1,845 / .10 = \$18,448$$

Broker and Legal Costs

$b (NI'' / R_r)$ = broker and legal costs

$$(.03(\$1,845 / .10)) = \$553$$

The Following Calculations Require an Algebraic Equation to Solve for Value (V)

Ending Mortgage Balance

$(1 - P) \times M \times V$ = ending mortgage balance

$$(1 - .21367) \times .75 \times V = .83975V$$

Equity Residual Value (d_r)

$$(NI'' / R_r) - (b(NI'' / R_r)) - ((1-P) \times M \times V) = d_r$$

$$\$18,448 - \$553 - ((1-.21367) \times .75 \times V) = d_r$$

$$\$17,894 - (.78633 \times .75) = d_r$$

$$\$17,894 - 0.5897V = d_r$$

Annual Cash Flow to Equity

$$NI^1 - (f \times M \times V) = d_e^1$$

$$NI^2 - (f \times M \times V) = d_e^2 \dots$$

$$NI^{10} - (f \times M \times V) = d_e^{10}$$

Year

- 1 (\$1,000 - 0.0636 V) = d_e^1
- 2 (\$1,100 - 0.0636 V) = d_e^2
- 3 (\$1,300 - 0.0636 V) = d_e^3
- 4 (\$1,500 - 0.0636 V) = d_e^4
- 5 (\$1,545 - 0.0636 V) = d_e^5
- 6 (\$1,591 - 0.0636 V) = d_e^6
- 7 (\$1,639 - 0.0636 V) = d_e^7
- 8 (\$1,688 - 0.0636 V) = d_e^8
- 9 (\$1,739 - 0.0636 V) = d_e^9
- 10 (\$1,791 - 0.0636 V) = d_e^{10}

Discounting the Cash Flow and Equity Residual to Present Value

Discount Factors At 18%	
<u>Year</u>	<u>Equity Yield</u>
1	0.84746

Mortgage-Equity Appraisal Software

For All Types of Commercial Real Estate

2	0.71818
3	0.60863
4	0.51579
5	0.43711
6	0.37043
7	0.31393
8	0.26604
9	0.22546
10	0.19106

$$(d_e^1 \times 1/S^1) + (d_e^2 \times 1/S^2) + \dots + (d_e^{10} \times 1/S^{10}) + (d_r \times 1/S^{10}) = (I - M)V$$

Year

1	(\$1,000 -	0.06361 V)	x	0.84746	+
2	(\$1,100 -	0.06361 V)	x	0.71818	+
3	(\$1,300 -	0.06361 V)	x	0.60863	+
4	(\$1,500 -	0.06361 V)	x	0.51579	+
5	(\$1,545 -	0.06361 V)	x	0.43711	+
6	(\$1,591 -	0.06361 V)	x	0.37043	+
7	(\$1,639 -	0.06361 V)	x	0.31393	+
8	(\$1,688 -	0.06361 V)	x	0.26604	+
9	(\$1,739 -	0.06361 V)	x	0.22546	+
10	(\$1,791 -	0.06361 V)	x	0.19106	+
Residual	(\$17,894 -	0.5897 V)	x	0.19106	= (1-M)V

Combine Terms

<u>Year</u>	<u>Total</u>	<u>Total</u>
1	\$847 -	0.05391 V
2	\$790 -	0.04568 V
3	\$791 -	0.03872 V
4	\$774 -	0.03281 V
5	\$675 -	0.02780 V
6	\$589 -	0.02356 V
7	\$515 -	0.01997 V
8	\$449 -	0.01692 V
9	\$392 -	0.01434 V
10	\$342 -	0.01215 V
Residual	<u>\$3,419</u> -	<u>0.11267</u> V
	\$9,584 -	0.39854 V = (1-M)V

Solve for Value (V)

$$\begin{aligned}
 \$9,584 - 0.39854 V &= 0.25 V \\
 \$9,584 &= 0.64854 V \\
 V &= \$14,778
 \end{aligned}$$

Proof

To determine whether all assumptions have been met a proof needs to be performed to determine if the value is actually \$14,778. The following is the proof:

Based on a 75% loan-to-value ratio- the amount of the mortgage component is \$11,083 and the 25% equity component is \$3,694 together equates to \$14,778.

10 Yr LTV Model:	0	Value \$(000)	% of Total Value	IRR
Value of the Property		\$ 14,778	100.0%	10.85%
Value of the Mortgage Component		\$ 11,083	75.0%	7.00%
Value of the Equity Component		\$ 3,694	25.0%	18.00%

Using the debt service constant for a 7%, 25-year mortgage of .08481 results in annual debt service of:

$$\$11,083 \times .08481 = \$940 \text{ (Annual Debt Service)}$$

The annual Cash Flow to the Mortgage and Equity is as follows:

**Mortgage-Equity
Appraisal Software**
For All Types of Commercial Real Estate

Year	1	2	3	4	5	6	7	8	9	10
Total Property	\$ 1,000	\$ 1,100	\$ 1,300	\$ 1,500	\$ 1,545	\$ 1,591	\$ 1,639	\$ 1,688	\$ 1,739	\$ 1,791
Mortgage	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940	\$ 940
Equity	\$ 60	\$ 160	\$ 360	\$ 560	\$ 605	\$ 651	\$ 699	\$ 748	\$ 799	\$ 851

The Equity Residual is calculated as follows:

Year 11 Cash Flow of \$1845 capitalized at 10% = \$18,448
 Less: Selling Expenses \$553
 Equals: Net sales price \$17,895

The Remaining Mortgage Balance
 Amount Paid Off (1 - .21367) = 0.78633
 Original Mortgage \$11,083 x 0.78633 = \$8,715

Net Sales Price	\$17,895
Less: Remaining Mortgage Balance	<u>\$8,715</u>
Equity Residual	\$9,180

The following table proves that when the Net Income to Equity plus the Equity Residual is discounted to the present value at the 18% Equity Yield Rate, the resulting value of the Equity Component is \$3,694.

Mortgage-Equity Appraisal Software

For All Types of Commercial Real Estate

Equity Component Present Value			
Year	Net Income to Equity	PV Factor @ 18.0%	Discounted Cash Flow
1	\$ 60	0.8475	\$ 51
2	\$ 160	0.7182	\$ 115
3	\$ 360	0.6086	\$ 219
4	\$ 560	0.5158	\$ 289
5	\$ 605	0.4371	\$ 264
6	\$ 651	0.3704	\$ 241
7	\$ 699	0.3139	\$ 219
8	\$ 748	0.2660	\$ 199
9	\$ 799	0.2255	\$ 180
10	\$ 10,030	0.1911	\$ 1,916
Equity Component Value			\$ 3,694
Year 10 net inc. to equity of			\$ 851
plus the equity residual of			\$ 9,179
			\$ 10,030
Net Sales Price			\$ 17,895
Less: RMB			\$ 8,715
Equals: Equity Residual			\$ 9,179

The following table proves that when the Annual Debt Service plus the Remaining Mortgage Balance is discounted to the present value at the 7% Mortgage Interest Rate the resulting value of the Mortgage Component is \$11,083.

Mortgage-Equity Appraisal Software

For All Types of Commercial Real Estate

Mortgage Component Present Value			
Year	Mortgage Payment	PV Factor @ 7%	Discounted Cash Flow
1	\$ 940	0.9352	\$ 879
2	\$ 940	0.8746	\$ 822
3	\$ 940	0.8179	\$ 769
4	\$ 940	0.7649	\$ 719
5	\$ 940	0.7153	\$ 672
6	\$ 940	0.6690	\$ 629
7	\$ 940	0.6256	\$ 588
8	\$ 940	0.5851	\$ 550
9	\$ 940	0.5472	\$ 514
10	\$ 9,655	0.5117	\$ 4,941
	Mortgage Component Value		\$ 11,083
	Year 10 mort. payment of		\$ 940
	plus the RMB of		\$ 8,715
			\$ 9,655
	The reversion is the remaining mortgage balance (RMB) of the loan at the end of year 10.		

Combining the Value of the Equity Component of \$3,694 with the Value of the Mortgage Component of \$11,083 proves the Total Value of the Property of \$14,778. Furthermore, the Equity Investor and Mortgage Lender both received their desired rate of return confirming the valuation is correct by this Mortgage-Equity Technique.

If the property were appraised using the Property Yield method- the Property Yield would have to be 10.9% to result in the same \$14,778 Total Property Value as shown in the following table which proves the 10.9% Property Yield.

	Total Property Present Value		
Year	EBITDA less Repl. Reserve	PV Factor @ 10.9%	Discounted Cash Flow
1	\$ 1,000	0.9021	\$ 902
2	\$ 1,100	0.8138	\$ 895
3	\$ 1,300	0.7341	\$ 954
4	\$ 1,500	0.6623	\$ 993
5	\$ 1,545	0.5974	\$ 923
6	\$ 1,591	0.5390	\$ 858
7	\$ 1,639	0.4862	\$ 797
8	\$ 1,688	0.4386	\$ 740
9	\$ 1,739	0.3957	\$ 688
10	\$ 19,686	0.3569	\$ 7,027
	Total Property Value		\$ 14,778
	Year 10 Cash Flow of		\$ 1,791
	plus reversion of		\$ 17,895
			\$ 19,686
	Year 11 Cash Flow of \$1845		
	capitalized at 10% equals		\$ 18,448
	Less: Selling Expenses		\$ 553
	Equals: Net sales price		\$ 17,895

The question is- doesn't the Mortgage-Equity Technique where the 7% Mortgage Interest Rate amounting to 75% of the discount rate have more support than applying a 10.9% Property Yield?

Mortgage-Equity Technique Using a Debt Coverage Ratio

The mortgage-equity technique using a debt coverage ratio calculates the exact amount of debt and equity that the property will be able to support based on the anticipated cash flow derived from the forecast of net income and the return requirements of the mortgage lender (interest) and the equity investor (equity yield) to produce a specified Debt Coverage Ratio as of a specific projection year.

The algebra for the mortgage-equity technique using a debt coverage ratio is simpler than the loan-to-value ratio because the size of the mortgage can immediately be determined. Using the data from the previous example, the following shows how the amount of the mortgage and debt service is calculated.

Assume the mortgage lender wants a Debt Coverage Ratio of 1.3 based on Year 3 projected Net Income which is \$1,300.

The mortgage constant of .08481 is multiplied by the debt coverage ratio of 1.3 producing a mortgage cap rate:

$$.08481 \times 1.3 = .11026$$

The mortgage amount is calculated by dividing the Year 3 projected Net Income by the mortgage cap rate:

$$\$1,300 / .11026 = \$11,791$$

The debt service can then be calculated:

$$\$11,791 \times .08481 = \$1,000$$

Once the mortgage amount and debt service is determined, the net income to equity plus the equity residual can be calculated and discounted to the present value at the equity yield rate and added to the mortgage amount to produce the total property value.

The overall equation for the Mortgage-Equity Technique Using a Debt Coverage Ratio is as follows:

Terms:

Debt Coverage Ratio:	DCR
Year (N) to Achieve the DCR:	DCR ⁿ
Net Income for DCR ⁿ :	NI ^{DCR}
Initial Mortgage Balance:	B ⁰

Initial Mortgage Balance (Value of the Mortgage Component):

$$NI^{DCR} / (f \times DCR) = B^0$$

Mortgage-Equity Technique Using a Debt Coverage Ratio Equation:

$$B^0 + ((NI^1 - (f \times B^0)) / S^1) + ((NI^2 - (f \times B^0)) / S^2) + \dots \\ \dots + ((NI^{10} - (f \times B^0)) / S^{10}) + \\ \dots + (NI'' / R_r) - (b(NI'' / R_r)) - ((1 - P) \times B^0 / S^{10}) = V$$

Example

Using all the Projected Net Income Data and the Mortgage and Equity Data from the previous example the property will be valued using the Mortgage-Equity Technique Using a Debt Coverage Ratio rather than the Loan-to-Value Ratio.

Assume the Mortgage Lender is sizing the loan so a debt coverage ratio of 1.3 is achieved in the third year. The projected 3rd year Net Income is \$1,300.

The initial mortgage balance is:

The mortgage constant of .08481 is multiplied by the debt coverage ratio of 1.3 producing a mortgage cap rate:

$$.08481 \times 1.3 = .11026$$

The initial mortgage balance (or the value of the mortgage component) is calculated by dividing the Year 3 projected Net Income by the mortgage cap rate:

$$\$1,300 / .11026 = \$11,791$$

The debt service can then be calculated by multiplying the initial mortgage balance by the mortgage constant:

$$\$11,791 \times .08481 = \$1,000$$

Discounting the Cash Flow and Equity Residual to Present Value

	<u>Net Income</u>	-	Debt <u>Service</u>	=	<u>NI to Equity</u>	x	<u>Equity Yield</u>	=	
1	\$1,000	-	\$1,000	=	\$0	x	0.84746	=	\$0
2	\$1,100	-	\$1,000	=	\$100	x	0.71818	=	\$72
3	\$1,300	-	\$1,000	=	\$300	x	0.60863	=	\$183
4	\$1,500	-	\$1,000	=	\$500	x	0.51579	=	\$258
5	\$1,545	-	\$1,000	=	\$545	x	0.43711	=	\$238
6	\$1,591	-	\$1,000	=	\$591	x	0.37043	=	\$219
7	\$1,639	-	\$1,000	=	\$639	x	0.31393	=	\$201
8	\$1,688	-	\$1,000	=	\$688	x	0.26604	=	\$183
9	\$1,739	-	\$1,000	=	\$739	x	0.22546	=	\$167
10	\$1,791	-	\$1,000	=	\$791	x	0.19106	=	<u>\$151</u>
					Discounted Net Income to Equity				\$1,671
	Value of the Reversion	\$1,845 / .10 =							\$18,448
	Less Broker and Legal:	\$18,448 x .03							<u>\$553</u>
									\$17,895
	Ending Mortgage Balance	(1 - .21367) = .78633 x \$11,791 =							\$9,271

	Equity Residual	<u>\$8,623</u>
	Discounted Value of Equity Residual ($\$8,623 \times .19106$) =	\$1,648
	Value of Equity Component ($\$1,671 + \$1,648$) =	\$3,319
	Original Mortgage Balance	<u>\$11,791</u>
	Total Property Value	\$15,109

Proof:

The following table shows the Net Income, Mortgage Debt Service, Equity Dividend. It also verifies the 1.3 Debt Coverage Ratio in Year 3.

Year	1	2	3	4	5	6	7	8	9	10
Total Property	\$ 1,000	\$ 1,100	\$ 1,300	\$ 1,500	\$ 1,545	\$ 1,591	\$ 1,639	\$ 1,688	\$ 1,739	\$ 1,791
Mortgage	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000
Equity	\$ -	\$ 100	\$ 300	\$ 500	\$ 545	\$ 591	\$ 639	\$ 688	\$ 739	\$ 791
Debt Coverage Ratio	1.00	1.10	1.30	1.50	1.55	1.59	1.64	1.69	1.74	1.79

The following table shows the Total Property Value, the value of the Mortgage and Equity Components. Because the size of the mortgage was determined by the debt coverage ratio rather than the loan-to-value ratio the mortgage is 78% of the total property value. The last column shows the mortgage component having a yield of 7% (which is the assumed interest rate) and the equity receiving an 18% equity yield.

10 Yr DCR Model:	0	Value \$(000)	% of Total Value	IRR
Value of the Property		\$ 15,109	100.0%	10.51%
Value of the Mortgage Component		\$ 11,791	78.0%	7.00%
Value of the Equity Component		\$ 3,319	22.0%	18.00%

The following table shows each component receiving the desired rate of return.

Mortgage-Equity Appraisal Software

For All Types of Commercial Real Estate

Year	Total Property Present Value			Year	Mortgage Component Present Value			Year	Equity Component Present Value		
	EBITDA less Repl. Reserve	PV Factor @ 10.51%	Discounted Cash Flow		Mortgage Payment	PV Factor @ 7%	Discounted Cash Flow		Net Income to Equity	PV Factor @ 18.00%	Discounted Cash Flow
1	\$ 1,000	0.9049	\$ 905	1	\$ 1,000	0.9352	\$ 935	1	\$ -	0.8475	\$ -
2	\$ 1,100	0.8188	\$ 901	2	\$ 1,000	0.8746	\$ 875	2	\$ 100	0.7182	\$ 72
3	\$ 1,300	0.7409	\$ 963	3	\$ 1,000	0.8179	\$ 818	3	\$ 300	0.6086	\$ 183
4	\$ 1,500	0.6704	\$ 1,006	4	\$ 1,000	0.7649	\$ 765	4	\$ 500	0.5158	\$ 258
5	\$ 1,545	0.6066	\$ 937	5	\$ 1,000	0.7153	\$ 715	5	\$ 545	0.4371	\$ 238
6	\$ 1,591	0.5489	\$ 874	6	\$ 1,000	0.6690	\$ 669	6	\$ 591	0.3704	\$ 219
7	\$ 1,639	0.4967	\$ 814	7	\$ 1,000	0.6256	\$ 626	7	\$ 639	0.3139	\$ 201
8	\$ 1,688	0.4494	\$ 759	8	\$ 1,000	0.5851	\$ 585	8	\$ 688	0.2660	\$ 183
9	\$ 1,739	0.4067	\$ 707	9	\$ 1,000	0.5472	\$ 547	9	\$ 739	0.2255	\$ 167
10	\$ 19,686	0.3680	\$ 7,244	10	\$ 10,271	0.5117	\$ 5,256	10	\$ 9,414	0.1911	\$ 1,799
	Total Property Value				Mortgage Component Value				Equity Component Value		
			\$ 15,109				\$ 11,791				\$ 3,319
	Year 10 Cash Flow of				Year 10 mort. payment of				Year 10 net inc. to equity of		
			\$ 1,791				\$ 1,000				\$ 791
	plus reversion of				plus the RMB of				plus the equity residual of		
			\$ 17,895				\$ 9,271				\$ 8,623
			\$ 19,686				\$ 10,271				\$ 9,414
	Year 11 Cash Flow of \$1845				The reversion is the remaining mortgage				Net Sales Price		
			\$ 18,448								\$ 17,895
	Less: Selling Expenses				balance (RMB) of the loan at the end				Less: RMB		
			\$ 553								\$ 9,271
	Equals: Net sales price				of year 10.				Equals: Equity Residual		
			\$ 17,895								\$ 8,623

The mortgage-equity technique using a debt coverage ratio is the method which probably best reflects the actions of typical real estate buyers. When a buyer looks at a potential acquisition of a commercial property the size of the mortgage becomes the critical factor. Once a lender provides guidance as to the debt coverage ratio, the buyer can determine how much can be borrowed and apply the mortgage-equity technique using a debt coverage ratio to determine the price that can be paid. The precision of this analysis cannot be matched by applying a discounted cash flow with a property yield.

Mortgage-Equity Technique Using a Debt Yield

The mortgage-equity technique using a debt yield calculates the exact amount of debt and equity that the property will be able to support based on the anticipated cash flow derived from the forecast of net income and the return requirements of the mortgage lender (interest) and the equity investor (equity yield) to produce a specified Debt Yield as of a specific projection year.

The algebra for the mortgage-equity technique using a debt yield is similar to the mortgage-equity technique using a debt coverage ratio because the size of the mortgage can immediately be determined. Using the data from the previous example, the following shows how the amount of the mortgage and debt service is calculated.

Assume the Mortgage Lender is sizing the loan so a debt yield of 11% is achieved in the third year. The projected 3rd year Net Income is \$1,300.

The initial mortgage balance is:

The 3rd year Net Income of \$1,300 divided by the debt yield of 11%:

$$\$1,300 / .11 = \$11,818$$

The debt service can then be calculated by multiplying the initial mortgage balance by the mortgage constant:

$$\$11,818 \times .08481 = \$1,002$$

The remaining mortgage-equity technique calculations are the same as those used with the debt coverage ratio.

Proof

The following table shows the Net Income, Mortgage Debt Service, Equity Dividend. It also verifies the 11% Debt Yield in Year 3.

Total Property	\$ 1,000	\$ 1,100	\$ 1,300	\$ 1,500	\$ 1,545	\$ 1,591	\$ 1,639	\$ 1,688	\$ 1,739	\$ 1,791
Mortgage	\$ 1,002	\$ 1,002	\$ 1,002	\$ 1,002	\$ 1,002	\$ 1,002	\$ 1,002	\$ 1,002	\$ 1,002	\$ 1,002
Equity	\$ (2)	\$ 98	\$ 298	\$ 498	\$ 543	\$ 589	\$ 637	\$ 686	\$ 737	\$ 789
Debt Coverage Ratio	1.00	1.10	1.30	1.50	1.54	1.59	1.64	1.68	1.73	1.91
Debt Yield	8.46%	9.31%	11.00%	12.69%	13.07%	13.47%	13.87%	14.29%	14.71%	15.15%

The following table shows the Total Property Value, the value of the Mortgage and Equity Components. Because the size of the mortgage was determined by the debt yield rather than the loan-to-value ratio the mortgage is 78.2% of the total property value. The last column shows the mortgage component having a yield of 7% (which is the assumed interest rate) and the equity receiving an 18% equity yield.

10 Yr Debt Yield Model:	Value \$ (000)	% of Total Value	IRR
Value of the Property	\$ 15,122	100.0%	10.50%
Value of the Mortgage Component	\$ 11,818	78.2%	7.00%
Value of the Equity Component	\$ 3,304	21.8%	18.00%

Mortgage-Equity Appraisal Software

For All Types of Commercial Real Estate

The following table shows each component receiving the desired rate of return.

Total Property Present Value				Mortgage Component Present Value				Equity Component Present Value			
Year	EBITDA less Repl. Reserve	PV Factor @ 10.50%	Discounted Cash Flow	Year	Mortgage Payment	PV Factor @ 6.93%	Discounted Cash Flow	Year	Net Income to Equity	PV Factor @ 18.00%	Discounted Cash Flow
1	\$ 1,000	0.9050	\$ 905	1	\$ 1,002	0.9352	\$ 937	1	\$ (2)	0.8475	\$ (2)
2	\$ 1,100	0.8190	\$ 901	2	\$ 1,002	0.8746	\$ 877	2	\$ 98	0.7182	\$ 70
3	\$ 1,300	0.7411	\$ 963	3	\$ 1,002	0.8179	\$ 820	3	\$ 298	0.6086	\$ 181
4	\$ 1,500	0.6707	\$ 1,006	4	\$ 1,002	0.7649	\$ 767	4	\$ 498	0.5158	\$ 257
5	\$ 1,545	0.6070	\$ 938	5	\$ 1,002	0.7153	\$ 717	5	\$ 543	0.4371	\$ 237
6	\$ 1,591	0.5493	\$ 874	6	\$ 1,002	0.6690	\$ 671	6	\$ 589	0.3704	\$ 218
7	\$ 1,639	0.4971	\$ 815	7	\$ 1,002	0.6256	\$ 627	7	\$ 637	0.3139	\$ 200
8	\$ 1,688	0.4499	\$ 759	8	\$ 1,002	0.5851	\$ 586	8	\$ 686	0.2660	\$ 182
9	\$ 1,739	0.4071	\$ 708	9	\$ 1,002	0.5472	\$ 548	9	\$ 737	0.2255	\$ 166
10	\$ 19,686	0.3684	\$ 7,253	10	\$ 10,295	0.5117	\$ 5,268	10	\$ 9,390	0.1911	\$ 1,794
Total Property Value			\$ 15,122	Mortgage Component Value			\$ 11,818	Equity Component Value			\$ 3,304
Year 10 Cash Flow of			\$ 1,791	Year 10 mort. payment of			\$ 1,002	Year 10 net inc. to equity of			\$ 789
plus reversion of			\$ 17,895	plus the RMB of			\$ 9,293	plus the equity residual of			\$ 8,602
			\$ 19,686				\$ 10,295				\$ 9,390
Year 11 Cash Flow of \$1845 capitalized at 10% equals			\$ 18,448	The reversion is the remaining mortgage balance (RMB) of the loan at the end of year 10.				Net Sales Price			\$ 17,895
Less: Selling Expenses			\$ 553					Less: RMB			\$ 9,293
Equals: Net sales price			\$ 17,895					Equals: Equity Residual			\$ 8,602

Software License Agreement

Hospitality Consulting Services, LLC.

DO NOT USE THE SOFTWARE UNTIL YOU HAVE READ THE TERMS AND CONDITIONS OF THIS LICENSE AGREEMENT GOVERNING YOUR USE OF THE SOFTWARE AND THE USE GUIDE. USING THE SOFTWARE CONSTITUTES ACCEPTANCE OF THE TERMS AND CONDITIONS OF THIS LICENSE AGREEMENT. IF YOU DO NOT AGREE TO THESE TERMS AND CONDITIONS, YOU SHOULD DISPOSE OF THE SOFTWARE AND ERASE IT FROM ANY COMPUTERS THAT YOU HAVE INSTALLED IT UPON.

License. You acknowledge that you acquired the software from Hospitality Consulting Services, LLC a distributor for Mortgage-Equity Appraisal Software. (MEAS). MEAS hereby grants to you as the recipient of Mortgage-Equity Appraisal Software, a perpetual, non-exclusive, non-transferable license to use the software program and related documentation on a single computer and solely for your own personal use. You may not reverse engineer, decompile, disassemble or modify, or make any copies of, the software. The rights and license granted hereunder are restricted solely and exclusively to you and may not in any way, directly or indirectly, be licensed, assigned, sublicensed, leased, or otherwise transferred by you without the prior written consent of MEAS.

Ownership. Ownership of the software and documentation, and of any copyright, patent, trade secret or other intellectual and property rights therein, are and remain in the future solely and exclusively in MEAS.

Limited Warranty. MEAS warrants that it has the right to grant this license to you. The software program and related documentation are licensed "AS IS" without any warranty or representation, and without any support or right to any corrections, bug fixes, maintenance, modifications, enhancements, improvements or extensions, now or in the future. MEAS, Hospitality Consulting Services, LLC, Stephen Rushmore and HVS do not warrant or represent that the software program will meet your requirements or that the operation of the software program will be uninterrupted or error free. Should the software program prove defective, MEAS, Hospitality Consulting, LLC, Stephen Rushmore and HVS have no obligation or responsibility to you whatsoever. Nevertheless, in the event that MEAS does provide assistance to any user of the software program, all of the limitations with respect to warranties and remedies shall apply to any assistance so rendered. THE WARRANTY IN THE FIRST SENTENCE OF THIS PARAGRAPH IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Limitation of Remedies. IN NO EVENT SHALL MEAS, HOSPITALITY CONSULTING SERVICES, LLC, STEPHEN RUSHMORE AND HVS BE LIABLE TO YOU OR ANYONE ELSE FOR ANY LIABILITY, LOSS OR DAMAGE, INCLUDING WITHOUT LIMITATION, INDIRECT, INCIDENTAL, SPECIAL, PUNITIVE OR CONSEQUENTIAL DAMAGES OF ANY KIND, OR LOSS OR USE OR OTHER ECONOMIC LOSS, EVEN IF MEAS, HOSPITALITY CONSULTING SERVICES, LLC, STEPHEN RUSHMORE AND HVS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. NOTWITHSTANDING THE FOREGOING, IN THE EVENT MEAS, HOSPITALITY CONSULTING SERVICES, LLC, STEPHEN RUSHMORE AND HVS IS DETERMINED TO BE LIABLE FOR DAMAGES WITH RESPECT TO THE SOFTWARE AND RELATED DOCUMENTATION, IN NO EVENT SHALL THE AMOUNT OF DAMAGES EXCEED THE AMOUNT OF THE LICENSE FEE PAID THEREFOR.

General. This Agreement may not be modified or waived, in whole or in part, except by a writing, executed by authorized representatives of both parties. This Agreement shall be governed by the internal, domestic laws of the State of New York and shall inure to the benefit of MEAS, its successors and assigns.

YOU ACKNOWLEDGE THAT YOU HAVE READ THIS AGREEMENT, UNDERSTAND IT, AND AGREE TO BE BOUND BY ITS TERMS AND CONDITIONS. YOU FURTHER AGREE THAT IT IS THE SOLE AND EXCLUSIVE STATEMENT BETWEEN US WHICH SUPERSEDES ANY COMMUNICATIONS BETWEEN US RELATING TO THE SUBJECT MATTER OF THIS AGREEMENT, AND THAT THERE ARE NO PROMISES, COVENANTS OR UNDERTAKINGS OTHER THAN THOSE EXPRESSLY SET FORTH IN THIS AGREEMENT.