Cash Flow Spreadsheet for a Single Family Rental (Preliminary Version)

Floyd Vest, Jan. 2015

This property was purchased April 15, 1977. The property became vacant on March 31, 1986 and was immediately placed on the market and the owner began repairs to make the property presentable. Repair expenses are given below. The property sold on Jan. 3, 1987. Selling expenses includes brokerage fee and closing costs. Adjusted tax basis in Column (19) is original purchase costs ($19,052.20) less accumulated depreciation (8025.78) plus Capitalized Expenses from Column 3.1. Taxable gain is given in Column (21) and Tax on gain in Column (22) is based on a 28% capital gains rate for 1987 leaving after tax proceeds in Column (23) of $23,654.80 .

Column (24) presents a summary of the yearly after tax cash flows for the investment. Initial investment includes closing and purchase costs of $3950.64 taken from closing statements (4-15-1977) and are entered for the end of 1976. Net after tax cash flows in Column (24) come from Column (14) and Column (23). The IRR is 26.39%. This is the after tax rate of return on the investment.

A mortgage of $15,217.54 was assumed with an annual interest rate of 7.5% with 23 years remaining. The monthly payment for principal and interest was $117.60.

Project Analysis

		(1)	(3)	(3.1)	(4)=(1)-(3)-(3.1)	(6)	(7)
Month	Year	Goss Income	Operating Expense	Capitalized Expense	Net Operating Income	Interest Expense	Principal
4/15	1977	1752.50	596.94	0	1155.56	826.94	113.86
	1978	2215.00	1698.73		516.27	1117.55	293.65
	1979	3180.00	496.96		2683.04	1094.74	316.46
	1980	3130.00	641.60		2488.40	1070.08	341.02
	1981	3600.00	532.40		3067.60	1043.72	367.48
	1982	3600.00	664.68		2935.32	1015.20	396.00
	1983	4461.29	983.73		3477.56	984.44	426.76
	1984	4700.00	1471.23		3228.77	951.31	459.89
	1985	4800.00	702.39		4097.61	915.60	496.04
	1986	1200.00	2957.35	906.51	-1906.35	877.12	534.08

Month	Year	(8)=(4)-(6)-(7) Before Tax Cash Flow	(9) Depreciation Expense	(9.1) Marginal Tax Rate	(10)=(1)-(3)-(6)-(9) Taxable Income	(13)=(9.1)× (10) Tax Paid (-Savings)	(14)=(8)-(13) After tax Cash Flow
	1977	-255.64	754.93	.36	-426.31	-153.47	-102.17
	1978	-894.93	1018.60	.36	-1619.88	-583.16	-311.77
	1979	1271.84	954.12	.37	633.38	234.45	1037.49
	1980	1277.20	895.23	.37	522.99	224.89	852.31
	1981	1656.84	839.29	.4246	1184.59	502.98	1153.42
	1982	1524.12	786.83	.39	1133.29	441.98	1082.14
	1983	2066.36	737.65	.35	1755.47	614.41	1451.95
	1984	1817.57	691.55	.33	1582.91	522.36	1295.21
	1985	2686.41	648.33	.38	2533.68	962.80	1723.61
	1986	-3317.55	698.45	.33	-3481.92	-1149.03	-2168.52

Month	Year	(15) Selling Price	(16) Selling Expense	(17) Selling Price-Selling Expense	(18) Mortgage Balance
Jan.	1987	49,000	4959	44,250	11,402.43

Jan. 1987	(19) Adjusted Tax Basis	(21)=(17)-(19) Taxable Gain	(22)=.28× (21) Tax on Gain	(23)=(17)-(18)-(22) After Tax Proceeds
	11,932.93	32,117.07	8992.78	23,654.80

(24) Net After Tax Cash Flow

1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
-3950.64	-102.17	-311.77	1037.49	852.31	1153.42	1082.14	1451.95	1295.21	1723.61

1986

21,486.28 3950.64 was the initial equity. IRR = 26.39%

The 1986 net after tax cash flow is 21,486.29 = 23,654.80 – 2168.52 = after tax proceeds from sale – cash flow for 1986.

Including 1978 with gross income of $2215 and 1985 with gross income of $4800, the yearly sum of rent (gross income) increased annually at an average 10%. Using an original cost of $15,317.54 for the initial mortgage and closing cost to purchase, the initial price was $19,168.18 and selling price was $49,000 giving a yearly appreciation rate of 9.8%.

For expenses, property taxes averaged 12.9% of each yearly actual rent. Insurance averaged 4.2%. Variable operating expense averaged 13.3%. The annual vacancy rate was 2.2% of 12 × annual expected monthly rent. The Texas A&M yellow book gave property taxes 11% to 12 %, insurance 2.5% to 4%, variable operating expense 2.5% to 4%, and vacancy rate of 5%.

Calculating the mirr. (See page 14-8 of the TI 83/84 manual for the irr(function. We will use the irr(function to calculate the mir.) We assume that beginning negative cash flows are financed at 5% giving

P_1 (1+.05) = 102.17 so $P_1 = 102.17(1.05)^{-1} = 97.30$, P_2 $(1.05)^2 = 311.77$, $P_2 = 311.77(1.05)^{-2} = 282.78$. Adding 3950.64 + 97.30 + 282.78 = 3427.72 as initial equity for mirr. For mirr on the TI 83/84 we will use the irr(function and enter zeros for negative cash flows on the home screen: Code: 2^{nd} { 0, 0, 1037.49, 852.31, 1153.42, 1082.14, 1451.95, 1295.21, 1723.61, 21,486.28 } STO> 2^{nd} L4 Enter . Then

2^{nd} Finance 8. You see irr(. write (-)3427.72, 2^{nd} L4) Enter and read 26.00% as the mirr. Notice that this mirr is slightly less than the above irr = 26.39% . (See the article in this course "Evaluating Investments, irr, mirr, AM, TR, and HM.")

Side Bar Notes: Many of the Side Bar Notes are exercises.

Meet the millionaire. Millions of people have become millionaires by investing in rental property. Chances are that the millionaire is sixty-something, and married. Sixty percent are males. Eighty six percent have a college degree. To account for their success, 95% say hard work, 89% say education, 81% say smart investing, 79% say frugality, 42% say luck, 9% said family connections. How would you describe someone who made the million by managing rental property? Of millionaires, only 6% of their assets were in real estate. Of the world's millionaires 40% live in the U.S. Eighty one percent said their wealth is self-made. Nineteen percent said they inherited their wealth. For someone who rented their first rent house in 1977, how many rent houses would be required for a million dollars in 2015? Or better yet, to pay for your retirement? (Money, Aug. 2012) What is a million dollars in 2015 worth in 1977? What is a million in 1977 worth in 2015. For you, how many million do you need by age 60? See the article in this course "Approximating the Return from Rental Property." There are a lot of people who are a multimillionaires for financing retirement that are not counted as millionaires in the above surveys. There are dozens of ways to calculate a person's net worth. The average

person would not understand this. If you told them you are a millionaire, they would laugh at you. They don't know financial mathematics. This is an example of the rampart financial ignorance in our society, primarily caused by schools. Think about it, Who is not interested in financial mathematics and why?

Proportion of millionaire households: Singapore 17%, Qatar 14%, Kuwait 12%, Switzerland 10%, Hong Kong 9%, U.A.E. 5%, U.S. 4%. In 2011, there were 8.6 million millionaire households in the U.S. Millennials (born after 1982) consider wealth more important than other considerations. (Kiplinger's Personal Finance, 6/2012). Why is it important to be a multimillionaire? Show the math.

Refinancing a mortgage. Write an article on the several criterion for whether to refinance or not. Run the numbers with a refinancing calculator at mtgprofessor.com. Explain all of the numbers and how they are calculated.

The housing affordability index (Published by the National Association of Realtors) reached 200.7 in 2013. The higher the index, the more affordable is housing. An income of only $30,768 would qualify to buy the median priced single family home. The median family income was $61,752. Dividing gives (100)(61,752/30,768) gives 200.7 The median price was $177,000. In 2006 during the housing bubble, the index was down to 101.1 . (Median price $230,900, mortgage interest rate 6.82%, median family income $58,590) The annual sum of payments for principal and interest is what percent of family income? The affordability depends on the price of the house and mortgage interest rates. (Scott Burns, Denton Record Chronicle, Feb. 3, 2013). Would you advise that a median family buy a $215,000 house?

Investing for one-tenth the cost in the past. Scott says that we can invest for about one-tenth the cost most investors faced in the 1970's and we can get better results than about 70 percent of all current managed mutual funds. In the 1970's mutual funds often had a 8.5 percent front-end commission and had a 1.5 percent expense ratio or greater. Today you can buy an ETF or a mutual fund without paying a commission and which has an expense ratio as low as .05 percent. Do the calculations to compare the long term outcome. (Scott Burns, "Endurance Investing Rewards the Patient," Denton Record Chronicle, Dec. 25, 2011)

Investing has been as bad as during the Great Depression. The S&P 500 Index of stocks represents about 74 percent of all the U.S. equity market value. At the end of 2011, it was below its March 2000 peak. This is close to being worse than the great Depression which was the longest period of negative returns the stock market had experienced. In terms of inflation adjusted real return, this period is already as bad at the Great Depression. This market may eventually beat the 15-year loss from 1968 to 1982. (See Wikipedia.org, S&P 500 for later results, and see articles in this course on stocks.)

The bull markets of the 1980s and 1990s provided a 17.7 percent nominal return, and a 13.3% real return. This would turn savings equal to one year of income into 30 years of income in 20 years. (Scott Burns, Denton Record Chronicle, Dec. 31, 2011) (See Wikipedia.org, and articles on stocks in this course.) Do the math to check these figures. Discuss how investing in rental property compares to investing in the stock market.

What does your 401k cost, .03 percent or 2.25 percent? If you have an insurance product-based plan-as thousands of schoolteachers do annual expense charge is 2.25 percent or

more. If you have the Federal Thrift Savings Plan, its expenses are .03 percent. The difference could outpace a healthy employer match. Texas Instruments recently reorganized its 401k plan down to 0.15 percent expense. As a consequence of reduced costs, an employee who saves 6 percent of income for 35 years, and invests in a balanced portfolio that has a gross return of 8 percent, will accumulate about 5.3 years more of final income. (Scott Burns, Denton Record Chronicle, Oct. 17, 2010) Do the math to explain Scott's statements.

Different investment portfolios. See Scott Burns' 14 portfolios compared for the last five years before Nov. 28, 2010 at scottburns.com. For later comparisons see his website. His "lazy portfolios" outperformed the average moderate allocation mutual fund.

Today we use the word billionaire to replace the past use of the word millionaire. Today, a million dollars does not make you rich. If you visit Philip Slater's website, you can download a free PDF copy of his 1983 book, "Wealth Addiction." (Scott Burns, Denton Record Chronicle, Dec. 9, 2012) What is the 1983 one million dollars worth today? Will it come close to paying for your retirement?

Who supports the government? According to Internal Revenue Service's data for 2009, available at ntu.org/tax-basics/who-pays-income-taxes.html, the top 1 percent of American income earners paid 37 percent of federal income taxes. The top 10 percent paid almost 70 percent of federal income taxes. The top 50 percent paid nearly 98 percent. Roughly 48 percent pay no income taxes. What kind of mentality does this foster? Many people pay no income tax but file a return and get money. See the above website and see where you will fit in. Are you in favor of the lower capital gains tax rate? What does it apply to? What is the capital gains tax rate for those with very low income? (Walter Williams, Denton Record Chronicle, April 27, 2012)

Decline in Household net worth. From 2001 to 2010, the bottom 20 percent went from a modest net worth of $1400 to a negative net worth. The largest decline in net worth was in the second quintile. Every household category but the top 10 percent suffered a decline. Do the research. See federalreserve.gov/pubs/bulletin/2012/pdf/scf12.pdf (Page 77). (Scott Burns, Denton Record Chronicle, June 17, 2012) Where do you plan to fit? How many rent houses would put you in the top 10 percent? Calculate and report.

Does paying more for management pay off? (From Scott Burns, July 29, 2012)

For Managed Funds	Annualized Return, Last Five Years	Average Net Expense Ratio
Of 194 moderate allocation funds	0.94%	1.17%
Top 25 funds by expense ratio > 1.35%	0.21%	1.8%
Twenty-five percent least expensive	1.4%	0.88%
Top largest funds	1.33%	0.75%
Fourteen lazy portfolios	1.45%	about .10%

For an update see scottburns.com. Compare this to index funds which are called unmanaged. Has the market done better since 2012?

Zero percent student loans.

Name	Number of loans In 2012	Limited to college student who are:	Maximum annual loan limit
Massachusetts No-Interest Loan	2000	Residents	$4000
Military Officers Association of America	1700	Children of officers	$5,500
Int. Association of Hebrew-Free Loans	1000+	Living in a community	$2500 to 6000
Abe and Annie Seibel Foundation	900	Texans	$6000
Scholarship Foundation of St. Louis	660	Residents of St. Louis area	$14,000

Do the calculations of how much is saved in interest. See the article in this course on 528 Student Loans.

Financial heroes.

Dick K. P. Yue: He pioneered free online university education. MIT OpenCourseWare now offers 2100 free courses and has reached over 125 million people.

Robert Shireman: He is credited with selling Congress on federal direct loans, with lower interest rates, income-based repayment, and simplification of the loan process.

Jane Wellman: Her Delta Cost Project focused attention on how colleges spend their money.

Irving Fradkin: Pioneered Scholarship America, which has awarded more than $2.7 billion in scholarships through 1042 local chapters in 38 states.

Stock dividends. Stock dividends have averaged 4.2% since 1926. In the early 1980s, the yield was 5%. As recently as 1991, the yield was 3.8%. Today the average yield for the S&P 500 is 1.9%. A large percentage of historical total returns on stocks was from dividend yield. The future performance of stocks may not repeat the historical returns. (Kiplinger's Personal Finance, Aug. 2006) See the S&P High Yield Dividend Aristocrats. On

finance.yahoo.com, look up Bank of America (BAC) 4.2%, Vectren (VVC) 4.7%, U.S. Bancorp (USB) 4.2%.

Buying ETFs without commission. See certain ETFs at Fidelity, Schwab, TD Ameritrade, and Vanguard. ETFs (Electronically Traded Funds) are like mutual funds except they are traded on the stock market, sometimes at a discount to NAV. Do the research and report? Closed end funds are similar.

Buy ETFs for the long term. With a small account in ETFs, trading in and out of the market can reduce your return by more than one percentage point. You could put $1000 in the Schwab U.S. Broad Market ETF with an expense ratio of only .06 percent, or the Vanguard Total Market Index ETF with an expense ratio of .07 percent. There will be no commission to purchase from these companies. But when you sell, there will be a commission. A small discount commission on $1000 is $8.95 which amounts to .895 percent, a reduction in the return of about one percentage point. There is also the ask-buy spread to consider. You should check if there is a maintenance fee for a small account.

Exercises: Show your work. Label answers, variables, and numbers. Conduct discussions in complete sentences.

#1. For the above cash flow spreadsheet, choose a short term rate of return and a marginal income tax rate of 25% and calculate the after tax sum (future value) of the reinvested positive after tax flows. You can include the first two negative cash flows in the initial equity as in the above calculation of mirr. Then you can calculate the rate of return for the initial equity to get the sum of net 1986 proceeds and future value of reinvestment of cash flows.

#2. Use USInflationCalculator.com to calculate the average inflation rate during the years of the spreadsheet. The appreciation rate of rental property tends to follow the inflation rate. See the article in this course "Using USInflationCalculator.com." What would you guess this rent house is worth in 2015? What would it rent for? What kind of house would you guess it to be?

#3. Apply to the property in the spreadsheet, the algorithms in the article in this course "Approximating the Return on Rental Property". Follow Example 1 and Appendix. Discuss the differences between your estimates and the actual developments in the spreadsheet.

#4. Build a monthly amortization schedule for the mortgage for the spreadsheet and calculate the annual interest and principal for one year. You can find an amortization schedule on Excel.

Calculate by hand calculator and explain the first two rows in the spreadsheet.

#5. For the spreadsheet: What was the capital gains tax rate? What is your current capital gains tax rate? What are the components of Operating Expenses? How was Depreciation Expenses calculated? What was the range of marginal income tax rates? What would you use for the current marginal income tax rate? What is the Selling Expenses composed of? How is Adjusted Tax Basis calculated? How is it applied? When was the house first rented? What does the 1976, Net After Tax Flow of -3950.64 consist of? Define IRR. What are Capitalized Expenses? You might look up some of these terms on the internet such as Investopedia.com.

#6. Calculate the money required for your retirement at your retirement age. Calculate the number of rent houses, with an additional rental acquired each year, which would be required to

finance your retirement. Show all your work and state all your assumptions, define all your variables. Name the retirement withdrawal strategy you used. (See the References.)

#7. From Money, Jan./Feb., 2011: Consider investing starting at age 30 and retirement at age 65. Start with $25,000 on hand and a starting salary of $50,000 increasing with inflation. There is a 3% employer match. The savings rate is 15% of salary. The investment is 50% in stocks and 50% in bonds. By age 65, the accumulation is $626,000. Write out the yearly terms which accumulate to the future value of $626,000 in 35 years with average investment return of r and average rate of inflation of I. Then use a value for I such as the long term inflation rate of 3.2%. Build a formula for the future value sum and solve for r. If this doesn't work, make adjustments. Since World War II, stocks have delivered a real rate of return of 5.8% a year, and bonds have earned a real rate of 1.8%, and cash 0.4%. What has been the average inflation rate since World War II?

References:

"Approximating the Return from Rental Property."

See the Unit in this course on investing in rental property.

Since long term investing in rental property is about long term financial planning, see the Unit in this course on long term financial planning including the articles which compare retirement withdrawal strategies including "The RMD Strategy for Retirement Income Withdrawals," and the soon to appear "Evaluation of Five Methods of Retirement Withdrawals".

A 2010 Vanguard Group paper, for example, found that combining an immediate inflation-adjusted annuity with a RMD approach produced stable cash flows that grew at a faster rate than those of other rules of thumb. (Kiplinger's Retirement Report, May 2014). A MassMutual study claimed that a portfolio incorporating stocks, bonds, and incremental purchase of annuity income benefits over time –a process called retirement annuity laddering – produces more guaranteed lifetime income, develops more liquidity, and builds more long term wealth, than other commonly used income strategies (massmutual.com).

See irs.gov Publication 527, Residential Rental Property, which includes such topics as depreciation, which irs forms to use, and others.

For a free course in financial mathematics, with emphasis on personal finance, for upper high school and undergraduate college, see COMAP.com. Register and they will e-mail you a password. Simply click on an article in the annotated bibliography, download it, and teach it. Unit 1: The Basics of Mathematics of Finance, Unit 2: Managing Your Money, Unit 3: Long-Term Financial Planning, Unit 4: Investing in Bonds and Stocks, Unit 5: Investing in Real Estate, Unit 6: Solving Financial Formulas for Interest Rate, For about thirteen more advance or technical articles, see the UMAP Journal at COMAP. The last section is Additional Articles on Financial Mathematics or Related to Personal Finance. In all, there are about eighty articles.