Risk adjusted asset valuation using a probabilistic approach with optimized asking rents and resale timing options

by

Sarwesh Paradkar

BTech & MTech Mechanical Engineering, 2009

Indian Institute of Technology Bombay

Submitted to the Program in Real Estate Development in Conjunction with the Center for Real Estate in Partial Fulfillment of the Requirements for the Degree of Master of Science in Real Estate Development

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ABSTRACT

The model developed here provides an enhancement of the traditional DCF asset acquisition valuation template, in Excel. It provides a relatively transparent and user-friendly yet flexible risk-adjusted valuation of a subject individual acquisition, structured to consider the asset either as a core asset or a value-add asset.

This study applies a basic stock flow model of space market dynamics to address the question of covariance among input variables. The model is designed with optional probabilistic inputs and historical data for the local space market (employment, rents, net rentable area, occupied space, new completions, vacancy and absorption) and the asset market (cap rates history) to produce a 15-year forecast for the relevant space and asset market for the subject property. An optional optimal rent module in the model uses the forecasted cap rates and consequent opportunity cost of capital to arrive at optimal asking rents for the subject property. The existing rent roll is combined with the future rents and vacancies along with asset level projections of operating costs and capital expenditures to arrive at the cash flow projections. Renewal probability and probability to lease up are major differentiating factors between the core and value add asset.

The model also enables the user to optionally consider how flexibility in resale timing can improve the overall return performance from a probabilistic perspective. The output of the model includes an apprehension of the entire going-in risk return relationship, depicted relative to a relevant security market line generated by the input risk free interest rate and the opportunity cost of capital in the relevant asset market.

Key words: Probabilistic, risk adjusted valuation, forecast, optimal rent, flexibility, renewal probability, probability to lease up

Thesis Supervisor: David Geltner
Title: Professor of Real Estate Finance

ACKNOWLEDGEMENTS

I would like to thank Jacques Gordon, Global Head of Research & Strategy at MIT/CRE Industry Partner firm LaSalle Investment Management for providing me with the opportunity to work with LaSalle on this thesis, and helping me with his valuable guidance. I also would like to thank Nathan Kane, Vice President at LaSalle Investment Management and his team for providing the data required to calibrate the model.

I would like to thank Professor David Geltner from the MIT Center for Real Estate for advising me on the thesis and for providing his invaluable insight on the topic. Throughout this thesis experience and all the previous courses I have taken with him, he has been a source of knowledge and inspiration for me. His book, Commercial Real Estate Analysis and Investment has been a great source of reference for developing the financial model used in this thesis.

I would like to thank Lisa Thoma, Associate Director at the MIT Center for Real Estate and my classmate Ryan Butler for helping me network with LaSalle Investment Management and set up the first meeting with Jacques Gordon, where the idea of this thesis was generated.

Last but not the least, I would like to thank my mother, Sujata Paradkar for encouraging me to go for my second post graduation and attend the Real Estate Program at MIT.

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A snapshot of the excel template is attached after the introduction.

The substance and content of this thesis consists of an Excel model template. In this narrative written component we only present a brief introduction to the model.

INTRODUCTION

The discounted cash flow (DCF) pro-forma has been the classical work horse for estimating property value and analyzing individual asset investment acquisition decisions for over a generation now in the professional real estate world. But with the recent experiences in the Financial Crisis of 2008, many prudent investment managers are seeking to upgrade this trusty work horse a bit. As commercial property market data has become richer and more available, there is a desire to incorporate local market data into the cash flow projections for the subject asset. And there is growing interest in explicitly recognizing and somehow accounting for risk and uncertainty in the forecasted future values, within the DCF valuation framework, effectively to examine the investment's likely IRR outcome probability distribution. This initiative in acquisition DCF modeling complements growing academic interest in places like the MIT Center for Real Estate in using basic economic and engineering systems models to improve real estate and infrastructure investment decision making. Analytical tools such as optimal search and risk simulation models can help decision makers understand and quantify the value of flexibility in real estate investment. For acquisitions of existing properties such flexibility prominently includes the ability of the investor (landlord) to choose optimal asking rents and vacancy management for the asset, and/or to choose the timing of asset resale (reversion). The present thesis consists of an original Excel model (DCF 2.0), which aims to reflect and incorporate all of these considerations and enhancements in a tool that is user-friendly and relatively transparent, a "new generation" valuation model.

The model developed here provides a risk-adjusted valuation of a subject individual acquisition, structured to consider the asset either as a "core" asset (stabilized leased-up) or a "value-add" asset (substantial vacancy initially). Acquisition managers have been interested in understanding if they are sufficiently compensated for the lease up risk involved in making a relatively high return, high vacancy value add asset acquisition against a lower return, lower vacancy core asset acquisition, and this model should help in such understanding.

Users of risk simulation in DCF valuation have also been concerned to adequately reflect not only the individual uncertainty surrounding individual variables of interest (such as rents and vacancy), but also the correlation or covariance between the individual variables. This study applies a basic stock flow model of space market dynamics (of the type first introduced into the real estate literature by Wheaton) to address the covariance question. The model is designed with optional probabilistic inputs, so that the user does not have to employ uncertainty where s/he does not wish to. But the model is set up to facilitate calibration of the uncertainty inputs based on historical data for the local space market (employment, rents, net rentable area, occupied space, new completions, vacancy and absorption) and the asset market (cap rates history). The model uses the historical data to produce a 15-year forecast for the relevant space and asset market for the subject property. If the user invokes the optional "optimal rent" module in the model, then the forecasted cap rates and consequent opportunity cost of capital are used to arrive at optimal asking rents for the subject property. The existing rent roll is combined with the future rents and vacancies along with asset level projections of operating costs and capital expenditures to arrive at the cash flow projections. Renewal probability and probability to lease up are major differentiating factors between the core and value add asset.

The model also enables the user to optionally consider how flexibility in resale timing can improve the overall return performance from a probabilistic perspective. The output of the model includes not just a single valuation number, but an apprehension of the entire going-in risk return relationship, depicted relative to a relevant security market line generated by the input risk free interest rate and the opportunity cost of capital in the relevant asset market.

Some of the specific features of the model include (but are not limited to) the following:

- Use of a stock-flow model of the local real estate market to reflect the relationships between the various space market variables.
- Linkage of the space market replacement rent (long-run equilibrium rent) to the asset market via the cap rate, and explicit forecasting of cap rates based on user input (such as bond yields or empirical cap rate histories allowing explicit incorporation of cyclicality in the asset market).
- Optional explicit modeling of optimal asking rent and lease-up timing.
- Optional consideration of a valuation mean reversion based decision rule for strategic resale timing to improve reversion value and lifetime IRR result.
- Explicit comparison of ex ante core asset investment risk/return performance with that of corresponding or otherwise similar value-add asset.
- Optional valuation based on direct capitalization and DCF analysis.

For further instructions on using the model, the user should refer to the "Index" worksheet of the accompanying Microsoft Excel File "DCF 2.0". In the same package is a "NO SIM" version labeled "DCF NO SIM" which can be used for calibrating the parameters so that long run times are avoided at calibration stage. The full model including the simulations (activated by "recalculation" – such as F9 on a PC) can take up to 3-4 minutes to run on a laptop. The "NO SIM" version runs instantaneously but produces only one future forecast or scenario. (The simulation runs 2000 randomly generated "trials.) The NO SIM file can therefore be used to "play around" with input parameters, particularly for the uncertainty inputs (such as volatilities), to see what the future space and asset market (cap rate) forecasts look like (based on graphical output). When the user is satisfied with the input parameters, then the full simulation model can be invoked to generate the implied ex post performance probability outcome distributions for the subject investment. The passwords for opening the files in read only format and editable format are "sujata" and "psujata" respectively.

This model was invited for a presentation and received wide appreciation at the Global Planning Session of LaSalle Investment Management, Chicago, July 22-23, 2013, attended by the Global CEO, and heads of Europe, Asia and North America.

Index	Sheet Name	Information
1	Executive Summary	This sheet summarizes the goal of this financial model and the interpretation of the results obtained. It also presents the major sources of data used to calibrate this model. The overall architecture of the model is also presented in this sheet.
2	Historical Data	Enter the historic data for gross rent, cap rates, net rentable area, occupied stock, absorption, completions, vacancy and employment for the period under consideration in this sheet. The data has to be recorded on a quarterly basis for 94 quarters. This data is used in the different modules of the model for future projection.
3	Control Panel	Enter the different parameter values to be used as input to the different modules of this model. The user can change the specified inputs based on the market under consideration. Note that, it is possible to enter uncertainty into the parameters and exogenous variables, but that such uncertainty input is optional. Further instructions are provided on the sheet.
4	Forecast	This is the forecasting module of this financial model. It uses the stock flow appraoch to connect and co-vary the rent, vacancy, occupied stock, net rentable area and new completions using the sensitivity and trigger parameters entered by the user in the control panel. A forecast for 60 quarters in the future is generated by this model. The forecast generated is used by the down stream modules for risk assessment.
5	Forecast Sim	This is the simulation for the forecasting model. Depending on choice, the user can view how the different components of the forecast vary over time. If the uncertainty is activated in the control panel, the relationships between the variables would be dynamic and would change with every run of the simulation. The user can choose a particular quarter in the future to see how the different components vary across trials in the same cross section in time.
6	Optimal Rent	This is an add on module to the forecasting module. It uses the forecasted cap rates, rent, vacancy and gross absorption data from the market to calculate an optimal rent which the land lord would settle for depending on the market conditions. The optimal search algortihm embedded in this module reflects the amount of uncertainty or volatility in the forecasted rents. The optimal decision is based on maximizing the present value of the property. The higher the volaitlity, higher is the optimal asking rent, optimal long term vacancy and the maximum building value.
7	Core Asset	This module creates an asset level occupancy and rent for the core asset under consideration. The module considers four possibilties namely, already occupied, renewed, new lease and vacant. Depending on this, the rents, occupancy levels, costs and final net operating income and 5 year hold IRR is estimated.
8	VA Asset	This module creates an asset level occupancy and rent for the value add asset under consideration. The value add asset has a considerable larger vacancy than the core asset. The amount of vacancy can be asjusted using the level switches in the control panel. The module considers four possibilties namely, already occupied, renewed, new lease and vacant. Depending on this, the rents, occupancy levels, costs and final net operating income and 5 year hold IRR is estimated.
9	Flexibility	This module presents an option for the user to have the asset holding period flexible between 5 and 15 years. The HOLD/SELL decision is taken based on the ex post knowledge of the investor. The reversion price is compared with the current expected value based on a long term growth trajectory plus a premium to trigger the resale under the prediction of a future mean reversion.
10	IRR Sim	This is the simulation of the 5 year hold IRRs for both the core and value add asset. Simulations for both, the fixed holding period and the flexible holding period. The higher the uncertainty activated in the control panel, the more valuable is the felxibility in holding periods. This module allows the user to look at the statistical parameters of the distribution of the IRRs over 2000 trials.
11	Results	This sheet summarizes the risk return relationship for the core and value add assets for both the fixed 5 year hold and for the flsxible holding period between 5 and 10 years. The ex ante risk is measured in terms of the Treynor ratios. The user input risk free rate of interest and the opportunity cost of capital (with a unit risk) are used to generate the security market line.

Intent

The intent of this model is to develop a risk adjusted asset valuation model for a single core and value add asset using a probabilistic abpproach combined with optimized asking rents and selling options.

Strategy

The strategy adopted is to use the historical data for the local space market (employment, rent, occupied space, net rentable area, new completions, vacancy, and absorption) and asset market (cap rates history) in order to produce a 15 year forecast of the relevant space and asset market for the subject property. We then use the rent roll data for the asset under consideration to project cash flows for the specific subject asset. We assume the asset to be almost 100% occupied for the core investment and the same asset 50% occupied for the value add investment. Renewal probability and expected time to lease up are major inputs differentiating the two types of assets.

Source

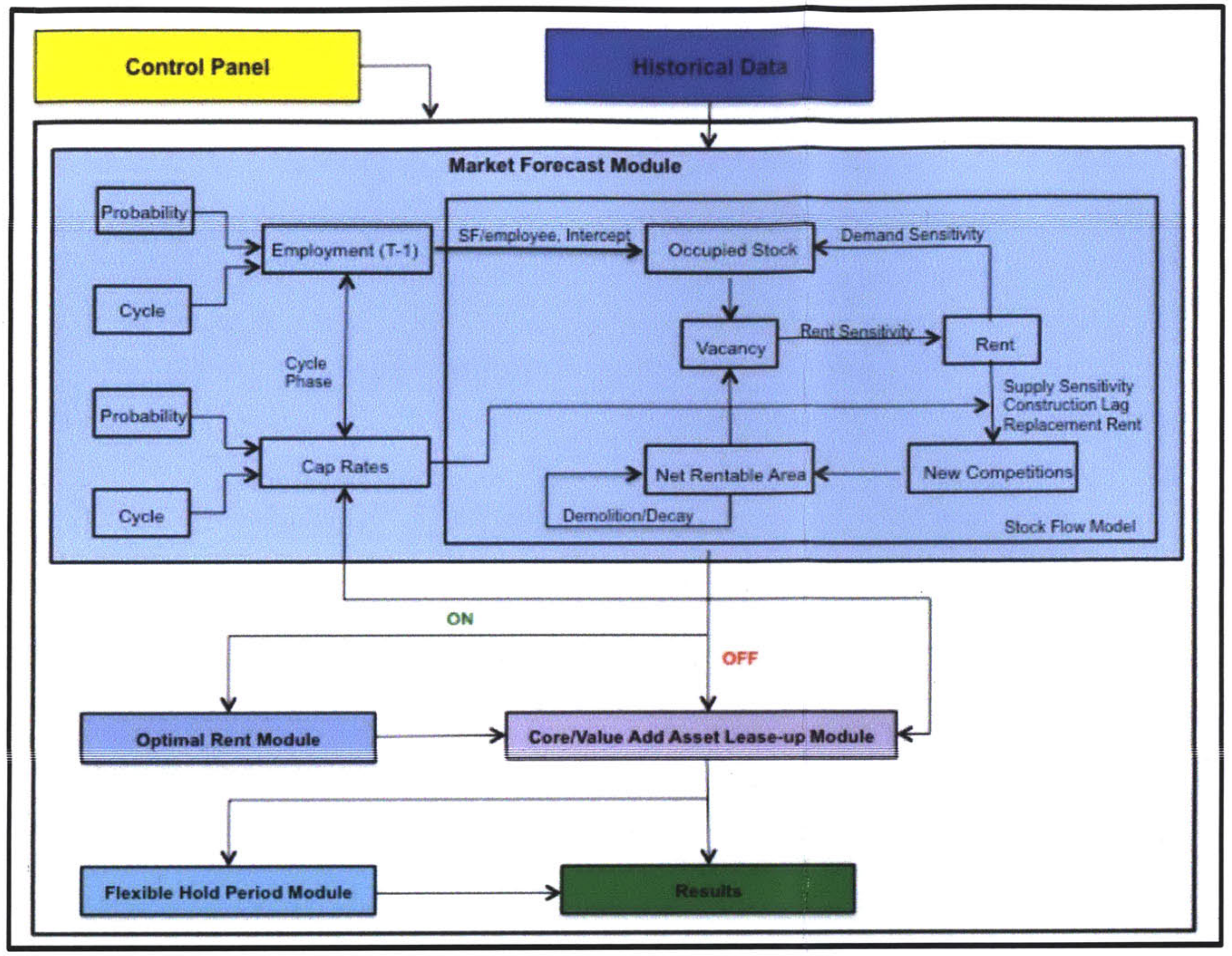
In the present example, the rent, occupied space, net rentable area, new completions, vacancy and absorption is obtained from CBRE. Employment data is obtained from the New York Labor Department. The cap rate data is obtained by assuming Moody's BAA bond ratings as an unbiased estimator.

Developer

Sarwesh Paradkar under the guidance of Professor David Geltner.

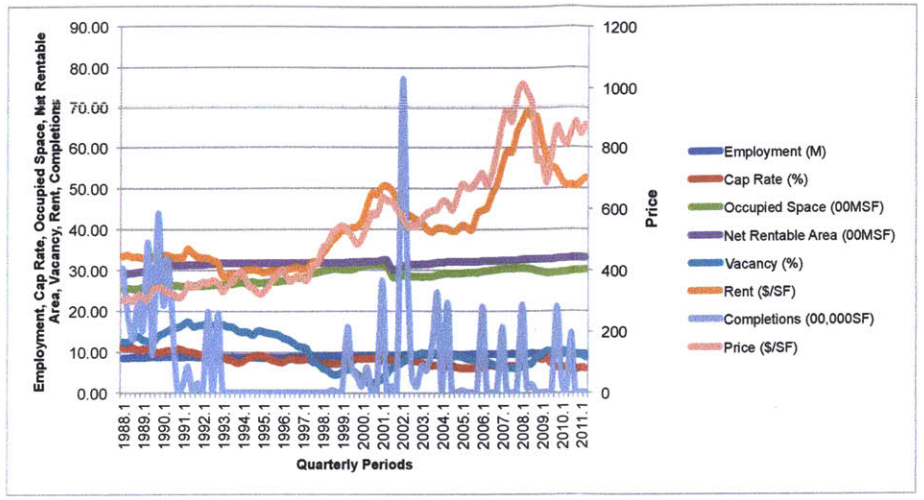
Academic Reference

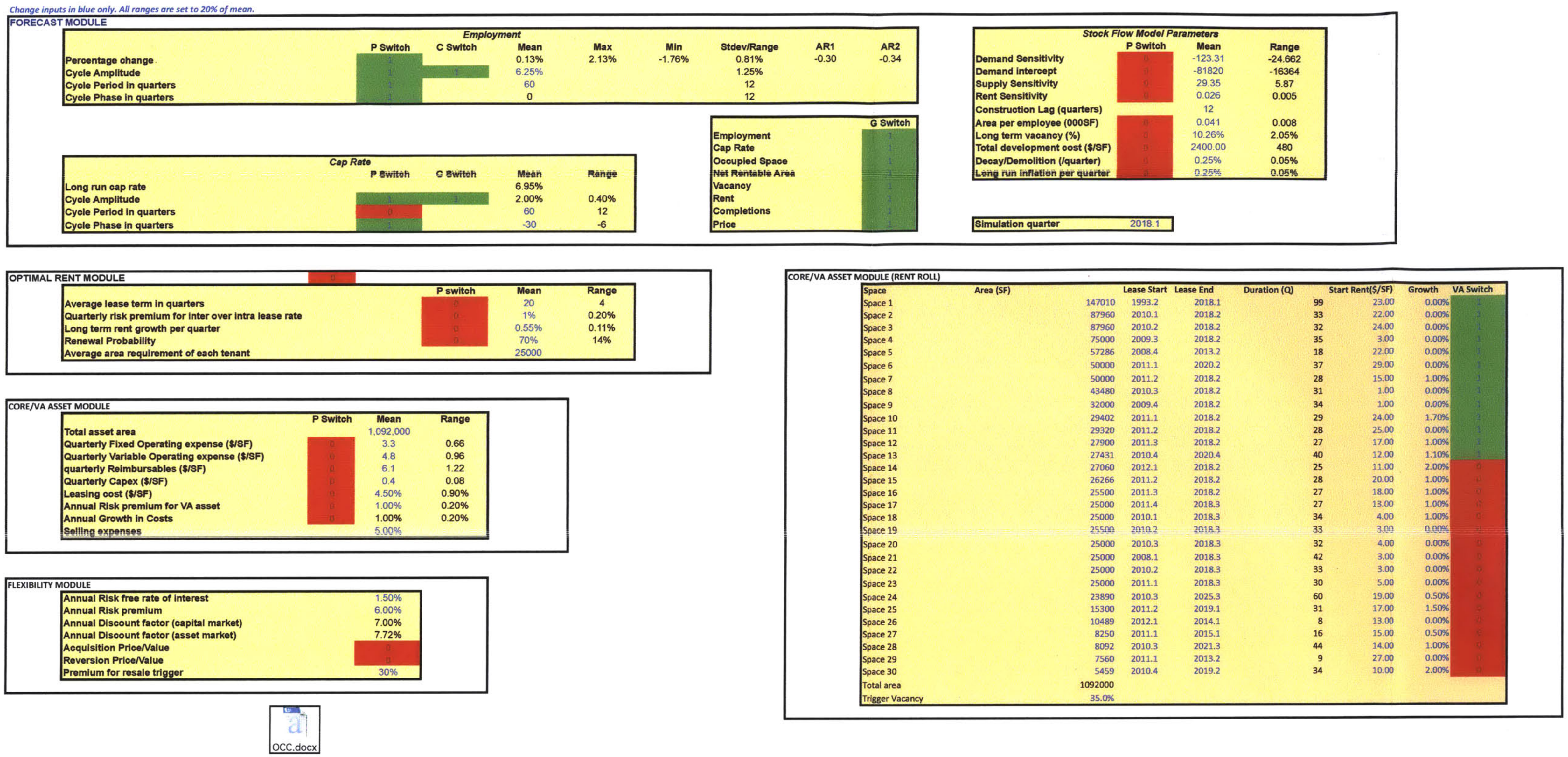
Commercial Real Estate Analysis and Investments (Third Edition) - David Geltner



This model is designed for 94 quarters of historical data. However, if the user has better parameter estimates, sh/e can override the parameters in the control panel.

Period	Nominal Gross Rent ($/SF)	Cap rates (%)	Net Rentable Area (000SF)	Occupied space (000SF)	Absorption (000SF)	Completions (000SF)	Price ($/SF)	Vacancy (%)	Employment
1988.1	33.29	11.07%	289,714	253,789	1,128	3,036	301	12.40%	8,463,900
1988.2	33.71	10.90%	291,529	255,379	1,395	1,815	309	12.40%	8,489,967
1988.3	33.17	11.11%	292,866	253,915	-1,386	1,337	299	13.30%	8,670,533
1988.4	33.31	10.41%	295,101	254,377	550	2,235	320	13.80%	8,601,433
1989.1	32.99	10.65%	296,657	258,388	3,966	1,556	310	12.90%	8,620,433
1989.2	32.78	10.61%	300,336	262,494	4,097	3,679	309	12.60%	8,691,900
1989.3	33.31	9.87%	301,284	264,527	2,045	948	337	12.20%	8,790,033
1989.4	33.71	9.81%	305,666	263,484	-1,167	4,382	344	13.80%	8,739,167
1990.1	33.64	9.94%	307,826	263,191	-365	2,160	338	14.50%	8,767,433
1990.2	33.64	10.30%	311,087	263,802	802	3,261	327	15.20%	8,808,900
1990.3	33.18	10.20%	312,529	263,149	-647	1,442	325	15.80%	8,896,033
1990.4	33.27	10.74%	312,529	262,524	-718	0	310	16.00%	8,763,033
1991.1	33.18	10.45%	312,707	260,485	-1,936	178	318	16.70%	8,740,967
1991.2	35.29	9.94%	313,345	258,823	-1,649	638	355	17.40%	8,791,033
1991.3	34.16	9.89%	313,345	262,583	3,673	0	345	16.20%	8,819,467
1991.4	33.29	9.49%	313,575	261,835	-785	230	351	16.50%	8,667,233
1992.1	33.02	9.13%	313,575	261,522	-253	0	362	16.60%	8,672,467
1992.2	33.00	9.21%	315,551	262,854	1,133	1,976	358	16.70%	8,732,733
1992.3	32.42	8.84%	315,551	263,485	705	0	367	16.50%	8,844,967
1992.4	31.71	8.84%	317,496	264,792	1,490	1,945	359	16.60%	8,689,567
1993.1	28.61	8.67%	317,496	264,474	-365	0	330	16.70%	8,664,200
1993.2	28.72	8.14%	317,496	266,062	1,611	0	353	16.20%	8,691,133
1993.3	29.07	7.93%	317,496	266,379	162	0	367	16.10%	8,774,933
1993.4	28.57	7.31%	317,496	269,554	3,336	0	391	15.10%	8,665,500
1994.1	29.93	7.65%	317,496	270,189	545	0	391	14.90%	8,664,767
1994.2	30.06	8.52%	317,496	270,189	-103	0	353	14.90%	8,659,867
1994.3	30.23	8.80%	317,496	272,412	2,189	0	344	14.20%	8,753,067
1994.4	30.03	9.20%	317,496	268,919	-3,461	0	326	15.30%	8,650,267
1995.1	29.52	9.08%	317,496	269,872	1,212	0	325	15.00%	8,642,467
1995.2	29.67	8.60%	317,496	270,824	661	0	345	14.70%	8,666,267
1995.3	29.95	8.04%	317,496	271,459	644	0	373	14.50%	8,763,700
1995.4	29.92	7.75%	317,496	272,094	919	0	386	14.30%	8,634,933
1996.1	30.00	7.47%	317,496	274,634	2,289	0	402	13.50%	8,655,167
1996.2	30.28	8.19%	317,496	275,904	1,341	0	370	13.10%	8,745,200
1996.3	30.51	8.35%	317,496	278,126	2,118	0	365	12.40%	8,886,600
1996.4	30.73	8.07%	317,496	280,984	2,967	0	381	11.50%	8,835,200
1997.1	30.29	8.09%	317,496	281,936	823	0	374	11.20%	8,898,333
1997.2	30.65	8.34%	317,496	283,524	1,750	0	368	10.70%	8,983,500
1997.3	32.07	7.75%	317,496	293,049	9,382	0	414	7.70%	9,107,333
1997.4	32.08	7.57%	317,496	294,001	1,134	0	424	7.40%	9,000,833
1998.1	33.85	7.19%	317,496	298,129	3,954	0	471	6.10%	9,026,867
1998.2	35.42	7.33%	317,496	299,716	1,753	0	483	5.60%	9,025,467
1998.3	37.17	7.15%	317,561	302,953	3,117	65	520	4.60%	9,122,500
1998.4	38.27	7.18%	317,561	303,271	331	0	533	4.50%	9,060,367
1999.1	39.69	7.29%	317,561	301,365	-1,854	0	544	5.10%	9,082,167
1999.2	39.79	7.48%	319,161	300,969	-514	1,600	532	5.70%	9,106,567
1999.3	40.34	7.95%	319,742	301,517	628	581	507	5.70%	9,214,333
1999.4	40.54	8.38%	320,160	305,433	4,130	418	484	4.60%	9,133,300
2000.1	41.96	8.33%	320,330	308,478	2,886	170	504	3.70%	9,162,233
2000.2	45.64	8.40%	320,947	312,602	4,209	617	543	2.60%	9,157,767
2000.3	48.77	8.35%	320,947	312,602	-57	0	584	2.60%	9,205,200
2000.4	48.41	8.34%	320,947	312,602	-14	0	580	2.60%	9,142,600
2001.1	50.32	7.93%	323,684	312,355	-366	2,737	635	3.50%	9,145,467
2001.2	50.50	8.07%	323,684	308,795	-3,541	0	626	4.60%	9,140,133
2001.3	49.51	7.97%	302,255	283,515	-25,121	157	621	6.20%	9,250,033
2001.4	47.18	7.91%	302,255	282,608	-872	0	596	6.50%	9,237,400
2002.1	45.19	7.87%	309,927	286,992	4,436	7,672	574	7.40%	9,259,233
2002.2	43.65	8.03%	313,126	286,823	-240	3,199	544	8.40%	9,282,467
2002.3	43.02	7.90%	313,541	284,695	-2,086	415	545	9.20%	9,359,600
2002.4	42.05	7.73%	313,697	284,523	-162	156	544	9.30%	9,294,833
2003.1	41.63	7.35%	314,347	283,541	-1,081	650	566	9.80%	9,303,100
2003.2	40.04	6.85%	314,917	284,685	1,166	570	585	9.60%	9,293,633
2003.3	39.28	6.62%	316,038	284,750	62	1,121	593	9.90%	9,326,067
2003.4	40.26	6.73%	318,468	287,895	3,171	2,430	598	9.60%	9,273,233
2004.1	40.23	6.44%	318,498	290,470	2,384	30	625	8.80%	9,321,033
2004.2	40.14	6.46%	320,693	291,831	1,366	2,195	621	9.00%	9,326,300
2004.3	39.49	6.62%	320,693	292,151	528	0	597	8.90%	9,427,667
2004.4	39.69	6.21%	320,693	291,510	-770	0	639	9.10%	9,365,400
2005.1	40.98	6.02%	320,749	292,523	1,207	56	681	8.80%	9,315,067
2005.2	40.51	6.05%	320,749	294,127	1,583	0	670	8.30%	9,386,967
2005.3	39.88	5.95%	320,749	294,768	569	0	670	8.10%	9,513,733
2005.4	43.75	6.30%	320,749	294,127	-799	0	694	8.30%	9,469,700
2006.1	44.70	6.24%	322,852	297,347	3,186	2,103	716	7.90%	9,442,567
2006.2	45.28	6.68%	322,852	298,315	1,032	0	678	7.60%	9,486,300
2006.3	48.66	6.76%	322,852	299,930	1,615	0	720	7.10%	9,567,300
2006.4	50.95	6.42%	322,852	301,867	2,179	0	794	6.50%	9,503,333
2007.1	55.71	6.34%	324,452	303,687	1,574	1,600	879	6.40%	9,478,933
2007.2	59.13	6.39%	324,452	304,660	1,180	0	925	6.10%	9,496,233
2007.3	58.93	6.65%	324,452	304,660	-79	0	886	6.10%	9,601,800
2007.4	63.83	6.48%	324,452	304,985	240	0	985	6.00%	9,551,233
2008.1	66.30	6.54%	326,600	305,698	609	2,148	1,014	6.40%	9,552,167
2008.2	68.71	6.97%	326,739	304,194	-1,267	139	986	6.90%	9,612,633
2008.3	67.46	7.16%	326,936	303,070	-1,139	197	942	7.30%	9,713,100
2008.4	67.47	8.88%	326,936	298,493	-4,634	0	760	8.70%	9,639,067
2009.1	61.95	8.14%	326,936	296,531	-1,895	0	761	9.30%	9,621,667
2009.2	57.48	8.39%	326,936	293,262	-3,456	0	685	10.30%	9,659,600
2009.3	55.35	7.09%	326,936	293,915	696	0	781	10.10%	9,710,667
2009.4	54.56	6.29%	329,036	295,145	1,182	2,100	867	10.30%	9,559,300
2010.1	52.16	6.25%	329,367	295,442	275	331	835	10.30%	9,572,867
2010.2	50.68	6.25%	329,367	295,772	491	0	811	10.20%	9,619,833
2010.3	50.91	6.01%	330,826	298,736	2,764	1,459	847	9.70%	9,648,267
2010.4	50.60	5.72%	330,826	300,059	1,518	0	885	9.30%	9,513,400
2011.1	51.41	6.09%	330,826	300,059	96	0	844	9.30%	9,486,467
2011.2	52.58	6.02%	330,826	302,044	1,739	0	873	8.70%	9,506,267





Change inputs in blue only. All ranges are set to 20% of mean.

FORECAST MODULE

	Employment							
	P Switch	C Switch	Mean	Max	Min	Stdev/Range	AR1	AR2
Percentage change	1		0.13%	2.13%	-1.76%	0.81%	-0.30	-0.34
Cycle Amplitude	1	1	6.25%			1.25%		
Cycle Period in quarters	1		60			12		
Cycle Phase in quarters	1		0			12		

	Stock Flow Model Parameters		
	P Switch	Mean	Range
Demand Sensitivity	0	-123.31	-24.662
Demand intercept	0	-81820	-16364
Supply Sensitivity	0	29.35	5.87
Rent Sensitivity	0	0.026	0.005
Construction Lag (quarters)		12	
Area per employee (000SF)	0	0.041	0.008
Long term vacancy (%)	0	10.26%	2.05%
Total development cost ($/SF)	0	2400.00	480
Decay/Demolition (/quarter)	0	0.25%	0.05%
Long run inflation per quarter	0	0.25%	0.05%

	G Switch
Employment	1
Cap Rate	1
Occupied Space	1
Net Rentable Area	1
Vacancy	1
Rent	1
Completions	1
Price	1

	Cap Rate			
	P Switch	C Switch	Mean	Range
Long run cap rate			6.95%	
Cycle Amplitude	1	1	2.00%	0.40%
Cycle Period in quarters	0		60	12
Cycle Phase in quarters	1		-30	-6

Simulation quarter	2018.1

OPTIMAL RENT MODULE 0

	P switch	Mean	Range
Average lease term in quarters	0	20	4
Quarterly risk premium for inter over intra lease rate	0	1%	0.20%
Long term rent growth per quarter	0	0.55%	0.11%
Renewal Probability	0	70%	14%
Average area requirement of each tenant		25000	

CORE/VA ASSET MODULE

	P Switch	Mean	Range
Total asset area		1,092,000	
Quarterly Fixed Operating expense ($/SF)	0	3.3	0.66
Quarterly Variable Operating expense ($/SF)	0	4.8	0.96
quarterly Reimbursables ($/SF)	0	6.1	1.22
Quarterly Capex ($/SF)	0	0.4	0.08
Leasing cost ($/SF)	0	4.50%	0.90%
Annual Risk premium for VA asset	0	1.00%	0.20%
Annual Growth in Costs	0	1.00%	0.20%
Selling expenses		5.00%	

FLEXIBILITY MODULE

Annual Risk free rate of interest	1.50%
Annual Risk premium	6.00%
Annual Discount factor (capital market)	7.00%
Annual Discount factor (asset market)	7.72%
Acquisition Price/Value	0
Reversion Price/Value	0
Premium for resale trigger	30%

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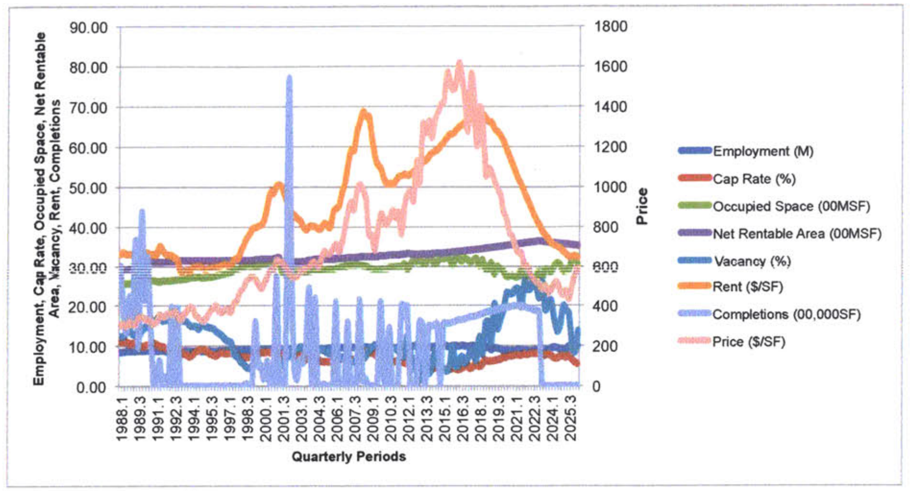
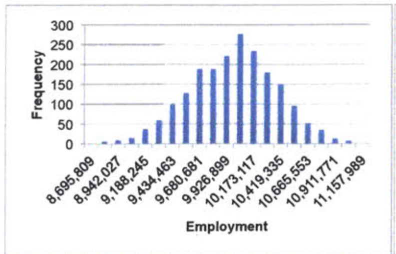
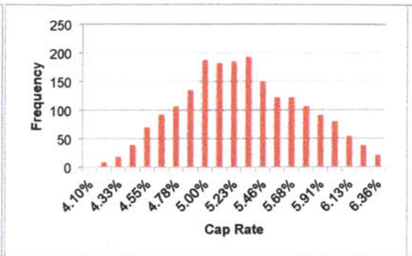
CORE/VA ASSET MODULE (RENT ROLL)

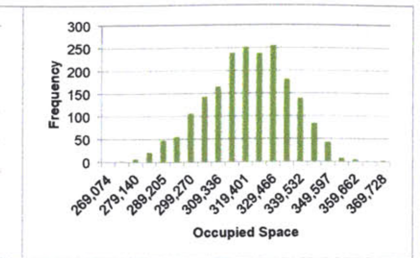
Space	Area (SF)	Lease Start	Lease End	Duration (Q)	Start Rent($/SF)	Growth	VA Switch
Space 1	147010	1993.2	2018.1	99	23.00	0.00%	1
Space 2	87960	2010.1	2018.2	33	22.00	0.00%	1
Space 3	87960	2010.2	2018.2	32	24.00	0.00%	1
Space 4	75000	2009.3	2018.2	35	3.00	0.00%	1
Space 5	57286	2008.4	2013.2	18	22.00	0.00%	1
Space 6	50000	2011.1	2020.2	37	29.00	0.00%	1
Space 7	50000	2011.2	2018.2	28	15.00	1.00%	1
Space 8	43480	2010.3	2018.2	31	1.00	0.00%	1
Space 9	32000	2009.4	2018.2	34	1.00	0.00%	1
Space 10	29402	2011.1	2018.2	29	24.00	1.70%	1
Space 11	29320	2011.2	2018.2	28	25.00	0.00%	1
Space 12	27900	2011.3	2018.2	27	17.00	1.00%	1
Space 13	27431	2010.4	2020.4	40	12.00	1.10%	1
Space 14	27060	2012.1	2018.2	25	11.00	2.00%	0
Space 15	26266	2011.2	2018.2	28	20.00	1.00%	0
Space 16	25500	2011.3	2018.2	27	18.00	1.00%	0
Space 17	25000	2011.4	2018.3	27	13.00	1.00%	0
Space 18	25000	2010.1	2018.3	34	4.00	1.00%	0
Space 19	25500	2010.2	2018.3	33	3.00	0.00%	0
Space 20	25000	2010.3	2018.3	32	4.00	0.00%	0
Space 21	25000	2008.1	2018.3	42	3.00	0.00%	0
Space 22	25000	2010.2	2018.3	33	3.00	0.00%	0
Space 23	25000	2011.1	2018.3	30	5.00	0.00%	0
Space 24	23890	2010.3	2025.3	60	19.00	0.50%	0
Space 25	15300	2011.2	2019.1	31	17.00	1.50%	0
Space 26	10489	2012.1	2014.1	8	13.00	0.00%	0
Space 27	8250	2011.1	2015.1	16	15.00	0.50%	0
Space 28	8092	2010.3	2021.3	44	14.00	1.00%	0
Space 29	7560	2011.1	2013.2	9	27.00	0.00%	0
Space 30	5459	2010.4	2019.2	34	10.00	2.00%	0
Total area	1092000						
Trigger Vacancy	35.0%						

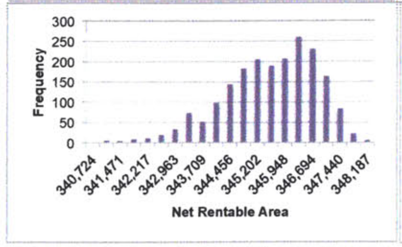
Period			Employment					Cap Rate		Occupied space	Net Rentable Area	Vacancy	Rent	Completions	Property value	Net Absorption	Gross Absorption	(Vacant)
	Initial	Innovations Vol.	Cumulative Vol.	Vol. Effect	Cycle	Cycle+Vol. Effect	Initial	Cycle	Cycle Effect	(000SF)	(000SF)		($/SF)	(000SF)	($/SF)	(000SF)	(000SF)	
1988.1						8,463,900			11.07%	253,789	289,714	12.40%	33.29	3,036	301	1,128		
1988.2						8,489,967			10.90%	255,379	291,529	12.40%	33.71	1,815	309	1,395	5,202	86%
1988.3						8,670,533			11.11%	253,915	292,866	13.30%	33.17	1,337	299	-1,386	2,445	94%
1988.4						8,601,433			10.41%	254,377	295,101	13.80%	33.31	2,235	320	550	4,359	89%
1989.1						8,620,433			10.65%	258,388	296,657	12.90%	32.99	1,556	310	3,966	7,782	80%
1989.2						8,691,900			10.61%	262,494	300,336	12.60%	32.78	3,679	309	4,097	7,973	79%
1989.3						8,790,033			9.87%	264,527	301,284	12.20%	33.31	948	337	2,045	5,982	84%
1989.4						8,739,167			9.81%	263,484	305,666	13.80%	33.71	4,382	344	-1,167	2,801	93%
1990.1						8,767,433			9.94%	263,191	307,826	14.50%	33.64	2,160	338	-365	3,587	92%
1990.2						8,808,900			10.30%	263,802	311,087	15.20%	33.64	3,281	327	802	4,750	90%
1990.3						8,896,033			10.20%	263,149	312,529	15.80%	33.18	1,442	325	-647	3,310	93%
1990.4						8,763,033			10.74%	262,524	312,529	16.00%	33.27	0	310	-718	3,229	94%
1991.1						8,740,967			10.45%	260,485	312,707	16.70%	33.18	178	318	-1,936	2,002	96%
1991.2						8,791,033			9.94%	258,823	313,345	17.40%	35.29	638	355	-1,649	2,258	96%
1991.3						8,819,467			9.89%	262,583	313,345	16.20%	34.16	0	345	3,673	7,555	85%
1991.4						8,667,233			9.49%	261,835	313,575	16.50%	33.29	230	351	-785	3,154	94%
1992.1						8,672,467			9.13%	261,522	313,575	16.60%	33.02	0	362	-253	3,675	93%
1992.2						8,732,733			9.21%	262,854	315,551	16.70%	33.00	1,976	358	1,133	5,056	90%
1992.3						8,844,967			8.84%	263,485	315,551	16.50%	32.42	0	367	705	4,648	91%
1992.4						8,689,567			8.84%	264,792	317,496	16.60%	31.71	1,945	359	1,490	5,442	90%
1993.1						8,664,200			8.67%	264,474	317,496	16.70%	28.61	0	330	-365	3,607	93%
1993.2						8,691,133			8.14%	266,062	317,496	16.20%	28.72	0	353	1,611	5,578	89%
1993.3						8,774,933			7.93%	266,379	317,496	16.10%	29.07	0	367	162	4,153	92%
1993.4						8,665,500			7.31%	269,554	317,496	15.10%	28.57	0	391	3,336	7,332	85%
1994.1						8,664,767			7.65%	270,189	317,496	14.90%	29.93	0	391	545	4,588	90%
1994.2						8,659,867			8.52%	270,189	317,496	14.90%	30.06	0	353	-103	3,950	92%
1994.3						8,753,067			8.80%	272,412	317,496	14.20%	30.23	0	344	2,189	6,242	86%
1994.4						8,650,267			9.20%	268,919	317,496	15.30%	30.03	0	326	-3,461	625	99%
1995.1						8,642,467			9.08%	269,872	317,496	15.00%	29.52	0	325	1,212	5,246	89%
1995.2						8,666,267			8.60%	270,824	317,496	14.70%	29.67	0	345	661	4,709	90%
1995.3						8,763,700			8.04%	271,459	317,496	14.50%	29.95	0	373	644	4,706	90%
1995.4						8,634,933			7.75%	272,094	317,496	14.30%	29.92	0	386	919	4,991	89%
1996.1						8,655,167			7.47%	274,634	317,496	13.50%	30.00	0	402	2,289	6,370	85%
1996.2						8,745,200			8.19%	275,904	317,496	13.10%	30.28	0	370	1,341	5,461	87%
1996.3						8,886,600			8.35%	278,126	317,496	12.40%	30.51	0	385	2,118	6,257	84%
1996.4						8,835,200			8.07%	280,984	317,496	11.50%	30.73	0	381	2,967	7,139	80%
1997.1						8,898,333			8.09%	281,936	317,496	11.20%	30.29	0	374	823	5,038	86%
1997.2						8,983,500			8.34%	283,524	317,496	10.70%	30.65	0	368	1,750	5,979	82%
1997.3						9,107,333			7.75%	293,049	317,496	7.70%	32.07	0	414	9,382	13,635	44%
1997.4						9,000,833			7.57%	294,001	317,496	7.40%	32.08	0	424	1,134	5,530	76%
1998.1						9,026,867			7.19%	298,129	317,496	6.10%	33.85	0	471	3,954	8,364	57%
1998.2						9,025,467			7.33%	299,716	317,496	5.60%	35.42	0	483	1,753	6,225	65%
1998.3						9,122,500			7.15%	302,953	317,561	4.60%	37.17	65	520	3,117	7,613	48%
1998.4						9,060,367			7.18%	303,271	317,561	4.50%	38.27	0	533	331	4,875	66%
1999.1						9,082,167			7.29%	301,365	317,561	5.10%	39.69	0	544	-1,854	2,695	83%
1999.2						9,106,567			7.48%	300,969	319,161	5.70%	39.79	1,600	532	-514	4,006	78%
1999.3						9,214,333			7.95%	301,517	319,742	5.70%	40.34	581	507	628	5,143	72%
1999.4						9,133,300			8.38%	305,433	320,160	4.60%	40.54	418	484	4,130	8,653	41%
2000.1						9,162,233			8.33%	308,478	320,330	3.70%	41.96	170	504	2,886	7,467	37%
2000.2						9,157,767			8.40%	312,602	320,947	2.60%	45.64	617	543	4,209	8,836	0%
2000.3						9,205,200			8.35%	312,602	320,947	2.60%	48.77	0	584	-57	4,632	44%
2000.4						9,142,600			8.34%	312,602	320,947	2.60%	48.41	0	580	-14	4,675	44%
2001.1						9,145,467			7.93%	312,355	323,684	3.50%	50.32	2,737	635	-366	4,323	62%
2001.2						9,140,133			8.07%	308,795	323,684	4.60%	50.50	0	626	-3,541	1,144	92%
2001.3						9,250,033			7.97%	283,515	302,255	6.20%	49.51	157	621	-25,121	-20,489	100%
2001.4						9,237,400			7.91%	282,608	302,255	6.50%	47.18	0	596	-872	3,381	83%
2002.1						9,259,233			7.87%	286,992	309,927	7.40%	45.19	7,672	574	4,436	8,675	62%
2002.2						9,282,467			8.03%	286,823	313,126	8.40%	43.65	3,199	544	-240	4,065	85%
2002.3						9,359,600			7.90%	284,695	313,541	9.20%	43.02	415	545	-2,086	2,216	92%
2002.4						9,294,833			7.73%	284,523	313,697	9.30%	42.05	156	544	-162	4,108	86%
2003.1						9,303,100			7.35%	283,541	314,347	9.80%	41.63	650	566	-1,081	3,187	90%
2003.2						9,293,633			6.85%	284,685	314,917	9.60%	40.04	570	585	1,166	5,419	82%
2003.3						9,326,067			6.62%	284,750	316,038	9.90%	39.28	1,121	593	62	4,332	86%
2003.4						9,273,233			6.73%	287,895	318,468	9.60%	40.26	2,430	598	3,171	7,442	76%
2004.1						9,321,033			6.44%	290,470	318,498	8.80%	40.23	30	625	2,384	6,702	76%
2004.2						9,326,300			6.46%	291,831	320,693	9.00%	40.14	2,195	621	1,366	5,723	80%
2004.3						9,427,667			6.62%	292,151	320,693	8.90%	39.49	0	597	528	4,905	83%
2004.4						9,365,400			6.21%	291,510	320,693	9.10%	39.69	0	639	-770	3,612	88%
2005.1						9,315,067			6.02%	292,523	320,749	8.80%	40.98	56	681	1,207	5,580	80%
2005.2						9,386,967			6.05%	294,127	320,749	8.30%	40.51	0	670	1,583	5,971	78%
2005.3						9,513,733			5.95%	294,768	320,749	8.10%	39.88	0	670	569	4,981	81%
2005.4						9,469,700			6.30%	294,127	320,749	8.30%	43.75	0	694	-799	3,623	86%
2006.1						9,442,567			6.24%	297,347	322,852	7.90%	44.70	2,103	716	3,186	7,598	70%
2006.2						9,486,300			6.68%	298,315	322,852	7.60%	45.28	0	678	1,032	5,492	78%
2006.3						9,567,300			6.76%	299,930	322,852	7.10%	48.66	0	720	1,615	6,090	73%
2006.4						9,503,333			6.42%	301,867	322,852	6.50%	50.95	0	794	2,179	6,678	68%
2007.1						9,478,933			6.34%	303,687	324,452	6.40%	55.71	1,600	879	1,574	6,102	71%
2007.2						9,496,233			6.39%	304,660	324,452	6.10%	59.13	0	925	1,180	5,735	71%
2007.3						9,601,800			6.65%	304,660	324,452	6.10%	58.93	0	886	-79	4,491	77%
2007.4						9,551,233			6.48%	304,985	324,452	6.00%	63.83	0	985	240	4,810	75%
2008.1						9,552,167			6.54%	305,698	326,600	6.40%	66.30	2,148	1014	609	5,184	75%
2008.2						9,612,633			6.97%	304,194	326,739	6.90%	68.71	139	986	-1,267	3,318	85%
2008.3						9,713,100			7.16%	303,070	326,936	7.30%	67.46	197	942	-1,139	3,424	86%
2008.4						9,639,067			8.88%	298,493	326,936	8.70%	67.47	0	760	-4,634	-88	100%
2009.1						9,621,667			8.14%	296,531	326,936	9.30%	61.95	0	761	-1,895	2,582	92%
2009.2						9,659,600			8.39%	293,262	326,936	10.30%	57.48	0	685	-3,456	992	97%
2009.3						9,710,667			7.09%	293,915	326,936	10.10%	55.35	0	781	696	5,095	85%
2009.4						9,559,300			6.29%	295,145	329,036	10.30%	54.56	2,100	867	1,182	5,591	84%
2010.1						9,572,867			6.25%	295,442	329,367	10.30%	52.16	331	835	275	4,702	86%
2010.2						9,619,833			6.25%	295,772	329,367	10.20%	50.66	0	811	491	4,923	85%
2010.3						9,648,267			6.01%	298,736	330,826	9.70%	50.91	1,459	847	2,764	7,201	78%
2010.4						9,513,400			5.72%	300,059	330,826	9.30%	50.60	0	885	1,518	5,999	81%
2011.1						9,486,467			6.09%	300,059	330,826	9.30%	51.41	0	844	96	4,597	85%
2011.2						9,506,267			6.02%	302,044	330,826	8.70%	52.58	0	873	1,739	6,240	78%
2011.3	9,506,267	-0.46%	-0.46%	9,462,879	1.02	9,680,223	6.02%	0.89%	6.91%	301,453	332,016	9.21%	52.72	2,017	763	-591	3,940	87%
2011.4	9,506,267	-0.92%	-0.92%	9,375,798	0.99	9,280,532	6.02%	-0.21%	5.81%	308,568	333,165	7.38%	53.10	1,980	913	7,115	11,637	53%
2012.1	9,506,267	-0.45%	-0.02%	9,374,138	1.03	9,612,781	6.02%	-0.56%	5.46%	292,133	334,313	12.62%	52.79	1,980	966	-16,435	-11,806	100%
2012.2	9,506,267	0.31%	0.62%	9,432,641	1.05	9,922,711	6.02%	-0.59%	5.43%	305,796	333,477	8.30%	53.05	0	976	13,661	18,043	35%
2012.3	9,506,267	0.24%	0.06%	9,438,294	1.04	9,800,857	6.02%	-0.23%	5.79%	318,470	332,643	4.26%	53.86	0	930	12,675	17,262	0%
2012.4	9,506,267	1.43%	1.20%	9,551,605	1.06	10,161,757	6.02%	-1.20%	4.82%	313,374	331,812	5.56%	54.50	0	1130	-5,095	-318	100%
2013.1	9,506,267	-1.47%	-1.86%	9,374,042	1.03	9,670,923	6.02%	-0.56%	5.46%	328,092	332,584	1.35%	55.73	1,601	1021	14,718	19,418	0%
2013.2	9,506,267	-0.38%	-0.22%	9,353,288	1.03	9,669,621	6.02%	-1.75%	4.27%	307,816	333,283	7.64%	56.10	1,531	1313	-20,276	-15,355	100%
2013.3	9,506,267	0.16%	0.85%	9,432,723	1.06	10,031,588	6.02%	-1.57%	4.45%	307,717	332,450	7.44%	56.50	0	1268	-99	4,518	82%
2013.4	9,506,267	0.51%	0.32%	9,463,326	1.06	9,984,711	6.02%	-1.69%	4.33%	322,508	333,113	3.18%	57.51	1,494	1329	14,791	19,407	0%
2014.1	9,506,267	-0.68%	-1.07%	9,362,522	1.03	9,641,072	6.02%	-1.32%	4.70%	320,461	333,765	3.99%	58.43	1,485	1242	-2,047	2,791	79%
2014.2	9,506,267	0.59%	0.80%	9,437,752	1.04	9,813,494	6.02%	-1.63%	4.39%	306,259	334,440	8.43%	58.70	1,509	1336	-14,202	-9,395	100%
2014.3	9,506,267	0.15%	0.26%	9,462,569	1.06	10,030,923	6.02%	-1.70%	4.32%	313,295	335,147	6.52%	59.25	1,543	1371	7,036	11,630	47%
2014.4	9,506,267	0.62%	0.27%	9,487,789	1.05	9,984,009	6.02%	-1.75%	4.27%	322,141	334,309	3.64%	60.25	0	1412	8,846	13,545	0%
2015.1	9,506,267	0.33%	0.16%	9,503,384	1.06	10,072,400	6.02%	-1.73%	4.29%	320,095	335,032	4.46%	61.13	1,559	1427	-2,046	2,786	81%
2015.2	9,506,267	-0.28%	-0.42%	9,463,160	1.06	10,021,056	6.02%	-2.06%	3.96%	323,610	335,744	3.61%	62.16	1,549	1569	3,515	8,316	31%
2015.3	9,506,267	-0.23%	-0.16%	9,448,475	1.02	9,598,807	6.02%	-1.87%	4.15%	321,378	336,461	4.48%	63.07	1,557	1521	-2,232	2,622	83%
2015.4	9,506,267	0.19%	0.38%	9,483,986	1.06	10,009,621	6.02%	-1.76%	4.26%	303,953	337,201	9.86%	63.14	1,581	1481	-17,424	-12,604	100%
2016.1	9,506,267	0.17%	0.11%	9,494,656	1.06	10,053,348	6.02%	-1.78%	4.24%	320,789	337,957	5.08%	63.97	1,600	1509	16,836	21,395	0%
2016.2	9,506,267	-0.79%	-0.95%	9,404,242	1.05	9,858,528	6.02%	-2.01%	4.01%	322,479	338,748	4.80%	64.85	1,636	1618	1,691	6,902	60%
2016.3	9,506,267	0.55%	0.80%	9,479,586	1.06	10,021,304	6.02%	-1.77%	4.25%	314,383	339,548	7.41%	65.32	1,646	1537	-8,097	-3,259	100%
2016.4	9,506,267	-0.85%	-0.78%	9,405,994	1.06	9,971,960	6.02%	-1.41%	4.61%	320,999	340,357	5.69%	66.08	1,658	1433	6,616	11,332	41%
2017.1	9,506,267	-1.71%	-1.74%	9,241,889	1.06	9,806,002	6.02%	-0.80%	5.22%	318,882	341,194	6.54%	66.70	1,688	1278	-2,116	2,899	88%
2017.2	9,506,267	0.27%	1.06%	9,339,752	1.06	9,918,125	6.02%	-1.73%	4.29%	312,001	342,056	8.79%	66.95	1,715	1561	-6,881	-2,098	100%
2017.3	9,506,267	1.34%	1.61%	9,489,819	1.06	10,034,867	6.02%	-1.35%	4.67%	316,568	342,924	7.69%	67.39	1,723	1444	4,566	9,246	65%
2017.4	9,506,267	1.34%	0.50%	9,536,931	1.00	9,577,984	6.02%	-0.35%	5.67%	321,300	343,805	6.55%	68.02	1,739	1200	4,733	9,481	58%
2018.1	9,506,267	0.18%	-0.51%	9,488,015	1.05	9,965,050	6.02%	-1.18%	4.84%	302,490	344,714	12.25%	67.68	1,768	1398	-18,810	-13,991	100%
2018.2	9,506,267	-2.31%	-2.32%	9,267,821	1.01	9,332,887	6.02%	-0.90%	5.12%	318,402	345,647	7.88%	68.08	1,794	1330	15,912	20,449	25%
2018.3	9,506,267	0.57%	1.45%	9,401,755	0.99	9,320,966	6.02%	0.35%	6.37%	292,433	346,607	15.63%	67.16	1,825	1055	-25,969	-21,193	100%
2018.4	9,506,267	-0.75%	-0.40%	9,363,777	1.04	9,772,160	6.02%	0.04%	6.06%	292,058	347,592	15.98%	66.19	1,851	1092	-374	4,012	93%
2019.1	9,506,267	-0.07%	-0.43%	9,323,481	0.96	8,974,573	6.02%	0.14%	6.16%	310,677	348,576	10.87%	66.08	1,853	1073	18,619	23,000	39%
2019.2	9,506,267	-1.36%	-1.09%	9,221,756	1.03	9,523,125	6.02%	0.23%	6.25%	277,989	349,582	20.48%	64.37	1,877	1030	-32,688	-28,028	100%
2019.3	9,506,267	-1.11%	-0.83%	9,163,455	1.02	9,344,816	6.02%	0.43%	6.45%	300,690	350,611	14.24%	63.72	1,903	988	22,702	26,871	46%
2019.4	9,506,267	1.60%	2.16%	9,360,958	0.98	9,198,276	6.02%	0.51%	6.53%	293,460	351,652	16.55%	62.71	1,917	961	-7,231	-2,720	100%
2020.1	9,506,267	-0.09%	-0.53%	9,311,302	0.95	8,813,344	6.02%	1.00%	7.02%	287,577	352,712	18.47%	61.40	1,939	875	-5,883	-1,481	100%
2020.2	9,506,267	-0.92%	-1.48%	9,173,054	0.96	8,840,634	6.02%	1.02%	7.04%	271,956	353,788	23.13%	59.40	1,958	844	-15,621	-11,308	100%
2020.3	9,506,267	-0.07%	0.56%	9,224,715	0.96	8,858,222	6.02%	1.43%	7.45%	273,321	354,869	22.98%	57.49	1,965	772	1,366	5,445	93%
2020.4	9,506,267	0.29%	0.62%	9,282,210	0.94	8,763,680	6.02%	1.39%	7.41%	274,279	355,959	22.95%	55.64	1,978	751	957	5,057	94%
2021.1	9,506,267	1.11%	0.73%	9,349,991	0.94	8,795,995	6.02%	1.66%	7.68%	270,630	357,066	24.21%	53.67	1,996	699	-3,648	466	99%
2021.2	9,506,267	-0.56%	-0.99%	9,257,574	0.99	9,200,697	6.02%	1.71%	7.73%	272,198	358,159	24.00%	51.80	1,986	670	1,567	5,627	93%
2021.3	9,506,267	-0.25%	-0.20%	9,239,422	0.94	8,647,828	6.02%	1.51%	7.53%	289,021	359,262	19.55%	50.58	1,998	671	16,823	20,906	70%
2021.4	9,506,267	0.35%	0.74%	9,308,238	0.95	8,838,125	6.02%	2.03%	8.05%	266,504	360,335	26.04%	48.56	1,971	603	-22,517	-18,182	100%
2022.1	9,506,267	-0.45%	-0.61%	9,251,129	0.96	8,840,796	6.02%	1.73%	7.75%	274,555	361,377	24.03%	46.87	1,943	605	8,052	12,049	86%
2022.2	9,506,267	-0.67%	-0.74%	9,182,757	0.94	8,635,143	6.02%	2.05%	8.07%	274,874	362,413	24.15%	45.22	1,940	560	318	4,437	95%
2022.3	9,506,267	1.94%	2.37%	9,400,520	0.94	8,836,509	6.02%	2.15%	8.17%	266,645	363,396	26.62%	43.34	1,889	531	-8,228	-4,105	100%
2022.4	9,506,267	0.48%	0.01%	9,401,530	0.97	9,081,631	6.02%	2.07%	8.09%	275,133	364,358	24.49%	41.78	1,870	517	8,487	12,487	86%
2023.1	9,506,267	0.57%	-0.23%	9,380,284	0.93	8,701,969	6.02%	1.98%	8.00%	285,375	365,288	21.88%	40.55	1,840	507	10,243	14,370	82%
2023.2	9,506,267	0.49%	0.55%	9,431,873	0.99	9,293,010	6.02%	2.08%	8.10%	269,961	364,374	25.91%	38.94	0	481	-15,414	-11,134	100%
2023.3	9,506,267	-1.02%	-1.11%	9,327,454	0.98	9,147,924	6.02%	1.57%	7.59%	294,392	363,463	19.00%	38.08	0	502	24,431	28,480	59%
2023.4	9,506,267	0.66%	0.81%	9,402,992	0.96	9,050,453	6.02%	1.94%	7.96%	288,550	362,555	20.41%	37.10	0	466	-5,842	-1,426	100%
2024.1	9,506,267	0.27%	0.39%	9,440,128	1.00	9,443,407	6.02%	1.56%	7.58%	284,674	361,648	21.28%	36.06	0	476	-3,876	453	99%
2024.2	9,506,267	-0.47%	-0.87%	9,358,306	1.04	9,691,388	6.02%	1.03%	7.05%	300,913	360,744	16.59%	35.48	0	503	16,239	20,509	66%
2024.3	9,506,267	2.46%	2.59%	9,600,651	1.00	9,554,220	6.02%	0.79%	6.81%	311,151	359,842	13.53%	35.19	0	517	10,238	14,752	70%
2024.4	9,506,267	-0.02%	-0.51%	9,551,681	0.95	9,097,515	6.02%	1.25%	7.27%	305,564	358,943	14.87%	34.78	0	478	-5,588	-920	100%
2025.1	9,506,267	0.42%	-0.30%	9,523,320	0.96	9,183,147	6.02%	1.49%	7.51%	286,890	358,045	19.87%	33.93	0	452	-18,674	-14,091	100%
2025.2	9,506,267	1.50%	1.76%	9,690,946	0.95	9,216,418	6.02%	1.00%	7.02%	290,505	357,150	18.66%	33.21	0	473	3,615	7,919	88%
2025.3	9,506,267	1.73%	1.30%	9,816,652	1.01	9,940,303	6.02%	1.54%	7.56%	291,958	356,257	18.05%	32.55	0	430	1,453	5,811	91%
2025.4	9,506,267	-0.62%	-1.60%	9,659,469	1.04	10,016,466	6.02%	0.66%	6.68%	321,718	355,367	9.47%	32.82	0	488	29,760	34,139	0%
2026.1	9,506,267	-0.78%	-0.73%	9,589,018	0.99	9,533,196	6.02%	-0.11%	5.91%	324,833	354,478	8.36%	32.77	0	555	3,115	7,940	73%
2026.2	9,506,267	0.05%	0.81%	9,666,288	1.03	9,983,712	6.02%	-0.52%	5.50%	305,000	353,592	13.74%	32.49	0	590	-19,833	-14,961	100%

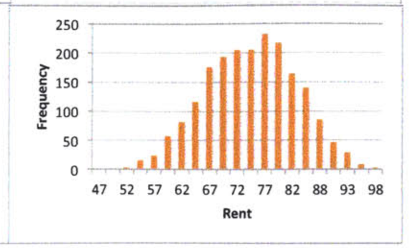










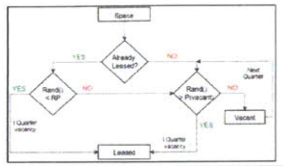


	Employment	Cap Rate	Occupied Space	Net Rentable Area	Vacancy	Rent	Completions	Price
Max	11,034,880	6.36%	369,728	348,187	21.77%	98	2,070	2,100
95%ile	10,565,363	6.04%	341,681	347,089	15.73%	87	1,952	1,769
Mean	9,925,133	5.24%	317,970	345,366	7.97%	74	1,807	1,418
5%ile	9,264,543	4.51%	291,010	343,063	1.08%	60	1,656	1,109
Min	8,695,809	4.10%	269,074	340,724	0.09%	47	1,536	865
Stdev	392,490	0.46%	15,287	1,252	4.32%	8	89	201
Skewness	-0.13	0.14	-0.19	-0.63	0.30	-0.06	-0.13	0.28
Kurtosis	-0.13	-0.60	-0.18	0.13	-0.38	-0.40	-0.25	-0.11

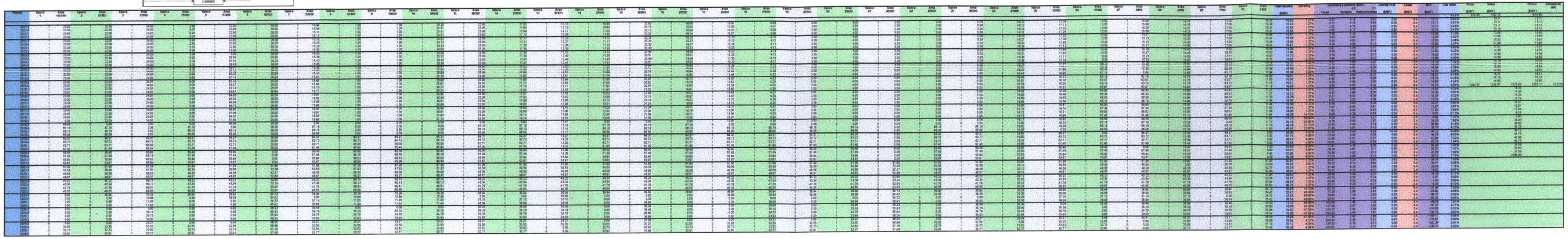
	Employment Bins			*Cap Rate Bins*			*Occupied Space Bins*			*Net Rentable Area Bins*			*Vacancy Bins*			*Rent Bins*			*Completions Bins*			*Price Bins*		
	Bound	**Count**	**Frequency**	**Bound**	**Count**	**Frequency**	**Bound**	**Count**	**Frequency**	**Bound**	**Count**	**Frequency**	**Bound**	**Count**	**Frequency**	**Bound**	**Count**	**Frequency**	**Bound**	**Count**	**Frequency**	**Bound**	**Count**	**Frequency**
0	8,695,809	1	1	4.10%	1	1	269,074	1	1	340,724	1	1	0.09%	1	1	47	1	1	1,536	1	1	865	1	1
1	8,818,918	7	6	4.22%	9	8	274,107	3	2	341,098	6	5	1.17%	105	104	50	2	1	1,562	5	4	927	3	2
2	8,942,027	16	9	4.33%	27	18	279,140	10	7	341,471	10	4	2.26%	187	82	52	5	3	1,589	19	14	988	15	12
3	9,065,136	31	15	4.44%	66	39	284,172	31	21	341,844	18	8	3.34%	309	122	55	20	15	1,616	40	21	1050	42	27
4	9,188,245	68	37	4.55%	136	70	289,205	79	48	342,217	29	11	4.42%	442	133	57	43	23	1,643	77	37	1112	103	61
5	9,311,354	127	59	4.67%	228	92	294,238	135	56	342,590	48	19	5.51%	604	162	60	100	57	1,669	129	52	1174	230	127
6	9,434,463	226	99	4.78%	334	106	299,270	242	107	342,963	80	32	6.59%	808	204	62	182	82	1,696	223	94	1235	362	132
7	9,557,572	354	128	4.89%	469	135	304,303	385	143	343,336	153	73	7.67%	986	178	65	298	116	1,723	343	120	1297	572	210
8	9,680,681	543	189	5.00%	657	188	309,336	550	165	343,709	204	51	8.76%	1177	191	67	474	176	1,749	528	185	1359	816	244
9	9,803,790	732	189	5.12%	839	182	314,368	789	239	344,082	302	98	9.84%	1355	178	70	667	193	1,776	724	196	1421	1054	238
10	9,926,899	954	222	5.23%	1024	185	319,401	1041	252	344,456	447	145	10.93%	1514	159	72	872	205	1,803	941	217	1482	1268	214
11	10,050,008	1231	277	5.34%	1217	193	324,434	1279	238	344,829	630	183	12.01%	1629	115	75	1077	205	1,830	1177	236	1544	1478	210
12	10,173,117	1466	235	5.46%	1366	149	329,466	1534	255	345,202	836	206	13.09%	1737	108	77	1309	232	1,856	1390	213	1606	1658	180
13	10,296,226	1647	181	5.57%	1488	122	334,499	1716	182	345,575	1026	190	14.18%	1820	83	80	1526	217	1,883	1590	200	1668	1771	113
14	10,419,335	1797	150	5.68%	1610	122	339,532	1855	139	345,948	1234	208	15.26%	1884	64	82	1690	164	1,910	1739	149	1730	1852	81
15	10,542,444	1893	96	5.79%	1716	106	344,564	1940	85	346,321	1495	261	16.35%	1926	42	85	1830	140	1,937	1846	107	1791	1920	68
16	10,665,553	1945	52	5.91%	1807	91	349,597	1983	43	346,694	1726	231	17.43%	1965	39	88	1915	85	1,963	1936	90	1853	1952	32
17	10,788,662	1980	35	6.02%	1887	80	354,630	1991	8	347,067	1890	164	18.51%	1983	18	90	1961	46	1,990	1974	38	1915	1977	25
18	10,911,771	1993	13	6.13%	1941	54	359,662	1996	5	347,440	1973	83	19.60%	1994	11	93	1989	28	2,017	1993	19	1977	1991	14
19	11,034,880	2000	7	6.25%	1979	38	364,695	1997	1	347,814	1995	22	20.68%	1998	4	95	1997	8	2,044	1995	2	2038	1998	7
20	11,157,989	2000	0	6.36%	2000	21	369,728	2000	3	348,187	2000	5	21.77%	2000	2	98	2000	3	2,070	2000	5	2100	2000	2


Period
Average Lease Term (Quarters)
Inter Lease Rate (per quarter)
Intra Lease Rate (per quarter)
Arrival Rate (Tenants/quarter)
Market Rent ($/SF)
Rent Uncertainty
Asking Rents ($/SF) 0 1 2 3 4 5 6 7 8 9 10
Refusal Probability 0 1 2 3 4 5 6 7 8 9 10
E(1st Arrival) (Quarters)
E(Wait Period) (quarters) 0 1 2 3 4 5 6 7 8 9 10
PV(Lease) ($/SF) 0 1 2 3 4 5 6 7 8 9 10
Value ($/SF) 0 1 2 3 4 5 6 7 8 9 10
Long term vacancy 0 1 2 3 4 5 6 7 8 9 10
Optimal Rent ($/SF)
P(vacant)

0	Vacant
1	Existing lease/Renewed Lease
2	New Lease
RP	Renewal Probability
P(vacant)	Probability of being vacant

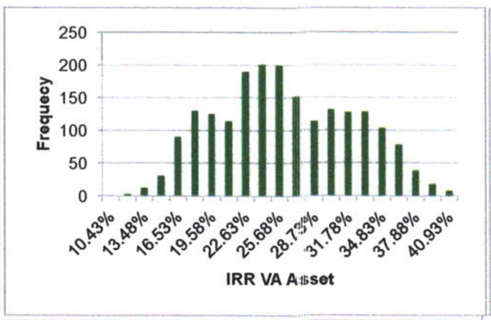


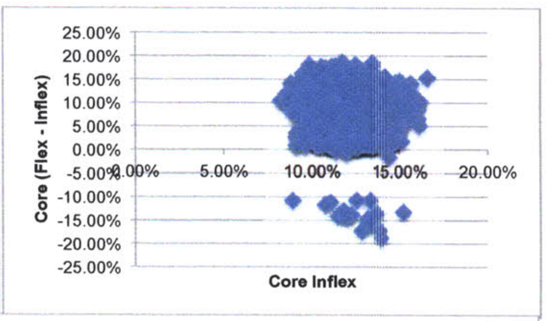
The algorithm first looks at the rent roll occupancy check in cells T23 to T53 to check if the space is occupied at acquisition or not. If it is occupied, then after lease expiry, if the random number generated is less than the renewal probability, the lease renews, else the space is treated as vacant and we proceed with the next check to see if the random number generated exceeds the probability of the space remaining vacant. If this condition is satisfied, the space is leased up. If not, then it remains vacant for that quarter. A single quarter vacancy is assumed between any two new or renewed leases. All renewed or new leases are assumed to occur at the market/optimal rent and within the lease, the rent in the first quarter is assumed to grow in the future quarters with the long term rent growth which is input by the user in the control panel.

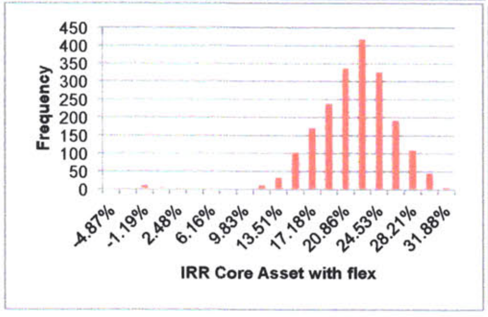


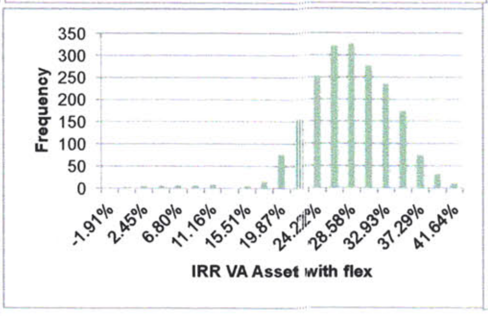
Period	Space 1	Area 147010	Space 2	Area 87960	Space 3	Area 87960	Space 4	Area 75000	Space 5	Area 87296	Space 6	Area 50000	Space 7	Area 50000	Space 8	Area 40480	Space 9	Area 32000	Space 10	Area 29400	Space 11	Area 28920	Space 12	Area 27900	Space 13	Area 27401	Space 14	Area 27060	Space 15	Area 26256	Space 16	Area 26000	Space 17	Area 26000	Space 18	Area 26000	Space 19	Area 26000	Space 20	Area 26000	Space 21	Area 26000	Space 22	Area 26000	Space 23	Area 26000	Space 24	Area 23880	Space 25	Area 15300	Space 26	Area 10400	Space 27	Area 9250	Space 28	Area 8082	Space 29	Area 7560	Space 30	Area 5400	Total Income ($/SF)	Vacancy	Operating Expenses ($/SF) Fixed	4.6 Variable	6.1 Reimbursables

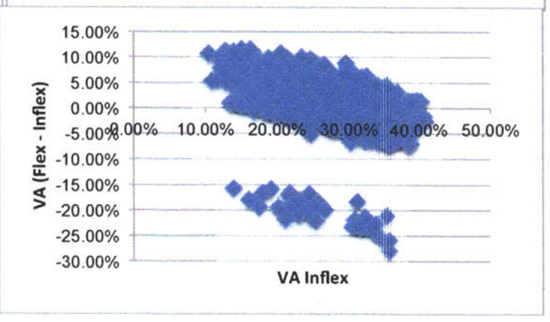
Period	Core Asset							Value Add Asset						
	NOI	Cap rate	Price	Value factor	Decision		IRR	NOI	Cap rate	Price factor	Premium	Decision		IRR
2011.2		6.02%				-871.05	17.28%		6.02%				-917.145193	27.52%
2011.3	13.11	6.91%				13.11	28	9.50	6.91%				9.50	20
2011.4	13.11	5.81%				13.11		10.10	5.81%				10.10	
2012.1	13.11	5.46%				13.11		17.68	5.46%				17.68	
2012.2	13.10	5.43%				13.10		17.94	5.43%				17.94	
2012.3	13.09	5.79%				13.09		21.20	5.79%				21.20	
2012.4	13.06	4.82%				13.06		26.18	4.82%				26.18	
2013.1	13.03	5.46%				13.03		26.23	5.46%				26.23	
2013.2	12.98	4.27%				12.98		26.27	4.27%				26.27	
2013.3	11.51	4.45%				11.51		25.08	4.45%				25.08	
2013.4	14.88	4.33%				14.88		25.32	4.33%				25.32	
2014.1	14.86	4.70%				14.86		28.15	4.70%				28.15	
2014.2	14.69	4.39%				14.69		28.17	4.39%				28.17	
2014.3	15.10	4.32%				15.10		28.17	4.32%				28.17	
2014.4	15.10	4.27%				15.10		28.16	4.27%				28.16	
2015.1	15.04	4.29%				15.04		28.13	4.29%				28.13	
2015.2	14.83	3.96%				14.83		28.09	3.96%				28.09	
2015.3	15.21	4.15%				15.21		28.03	4.15%				28.03	
2015.4	15.10	4.26%				15.10		27.95	4.26%				27.95	
2016.1	14.90	4.24%				14.90		27.85	4.24%				27.85	
2016.2	14.73	4.01%	1342.37	0.80	0 HOLD	14.73		27.73	4.01%	2266.64	1.07	1 SELL	2266.64	
2016.3	14.55	4.25%	1239.64	0.73	0 HOLD	14.55		27.58	4.25%	1913.83	0.89	2 END	0.00	
2016.4	14.30	4.61%	1115.51	0.65	0 HOLD	14.30		18.33	4.61%	1894.73	0.88	2 END	0.00	
2017.1	14.04	5.22%	957.74	0.56	0 HOLD	14.04		26.67	5.22%	1673.79	0.77	2 END	0.00	
2017.2	13.74	4.29%	1053.73	0.61	0 HOLD	13.74		23.05	4.29%	2034.79	0.94	2 END	0.00	
2017.3	13.37	4.67%	878.23	0.51	0 HOLD	13.37		17.57	4.67%	1856.17	0.85	2 END	0.00	
2017.4	12.97	5.67%	921.54	0.53	0 HOLD	12.97		24.65	5.67%	1719.56	0.78	2 END	0.00	
2018.1	12.54	4.84%	1558.60	0.89	0 HOLD	12.54		26.70	4.84%	2248.40	1.02	2 END	0.00	
2018.2	8.70	5.12%	1975.24	1.12	1 SELL	1975.24		22.96	5.12%	2461.30	1.11	2 END	0.00	
2018.3	8.92	7.37%	1705.24	0.96	2 END	0.00		16.86	7.37%	2007.45	0.90	2 END	0.00	
2018.4	24.83	7.06%	2046.57	1.15	2 END	0.00		36.10	6.06%	2635.46	1.17	2 END	0.00	
2019.1	36.95	6.16%	2438.40	1.36	2 END	0.00		38.63	6.16%	2721.08	1.20	2 END	0.00	
2019.2	35.75	6.25%	2477.52	1.38	2 END	0.00		41.06	6.25%	2737.59	1.20	2 END	0.00	
2019.3	34.72	6.45%	2422.08	1.34	2 END	0.00		39.89	6.45%	2667.95	1.17	2 END	0.00	
2019.4	44.70	6.53%	2232.05	1.23	2 END	0.00		48.56	6.53%	2483.82	1.08	2 END	0.00	
2020.1	42.89	7.02%	1922.57	1.05	2 END	0.00		46.86	7.02%	2165.64	0.94	2 END	0.00	
2020.2	40.73	7.04%	1747.45	0.95	2 END	0.00		44.84	7.04%	1999.48	0.86	2 END	0.00	
2020.3	36.09	7.45%	1506.04	0.81	2 END	0.00		40.84	7.45%	1743.35	0.75	2 END	0.00	
2020.4	33.62	7.41%	1399.87	0.75	2 END	0.00		38.09	7.41%	1597.92	0.68	2 END	0.00	
2021.1	31.59	7.68%	1214.55	0.65	2 END	0.00		36.23	7.68%	1282.93	0.54	2 END	0.00	
2021.2	28.12	7.73%	1056.77	0.56	2 END	0.00		32.94	7.73%	1026.48	0.43	2 END	0.00	
2021.3	24.74	7.53%	907.83	0.48	2 END	0.00		29.43	7.53%	753.33	0.32	2 END	0.00	
2021.4	24.71	8.05%	615.17	0.32	2 END	0.00		26.01	8.05%	338.94	0.14	2 END	0.00	
2022.1	20.60	7.75%	368.70	0.19	2 END	0.00		15.32	7.75%	94.80	0.04	2 END	0.00	
2022.2	15.92	8.07%	67.93	0.04	2 END	0.00		12.74	8.07%	-216.59	-0.09	2 END	0.00	
2022.3	10.76	8.17%	-312.78	-0.16	2 END	0.00		5.66	8.17%	-512.74	-0.21	2 END	0.00	
2022.4	4.87	8.09%	-878.66	-0.45	2 END	0.00		-5.00	8.09%	-935.48	-0.38	2 END	0.00	
2023.1	-1.48	8.00%	-1540.31	-0.79	2 END	0.00		-5.88	8.00%	-1482.20	-0.60	2 END	0.00	
2023.2	-8.38	8.10%	-2175.18	-1.11	2 END	0.00		-13.38	8.10%	-2030.75	-0.82	2 END	0.00	
2023.3	-21.90	7.59%	-3168.23	-1.60	2 END	0.00		-20.02	7.59%	-2891.16	-1.16	2 END	0.00	
2023.4	-43.04	8.96%	-3260.63	-1.64	2 END	0.00		-40.55	8.96%	-2947.88	-1.18	2 END	0.00	
2024.1	-56.37	8.58%	-4052.55	-2.03	2 END	0.00		-50.83	8.58%	-3677.37	-1.46	2 END	0.00	
2024.2	-64.20	8.05%	-5150.04	-2.56	2 END	0.00		-61.79	7.05%	-5321.63	-2.10	2 END	0.00	
2024.3	-89.56	7.81%	-6141.62	-3.04	2 END	0.00		-77.86	6.81%	-6466.22	-2.54	2 END	0.00	
2024.4	-97.53	8.27%	-6734.64	-3.31	2 END	0.00		-87.67	7.27%	-7212.58	-2.81	2 END	0.00	
2025.1	-114.63	8.51%	-7530.84	-3.68	2 END	0.00		-104.73	7.51%	-8219.75	-3.19	2 END	0.00	
2025.2	-134.75	8.02%	-9230.59	-4.49	2 END	0.00		-124.73	7.02%	-10327.13	-3.98	2 END	0.00	
2025.3	-158.17	8.56%	-6890.67	-3.33	2 END	0.00		-146.58	7.56%	-7744.76	-2.97	2 END	0.00	
2025.4	-178.97	6.68%	-6283.06	-3.02	2 END	0.00		-176.18	6.68%	-6258.17	-2.39	2 END	0.00	
2026.1	-202.38	5.91%	-3856.21	-1.85	2 END	0.00		-201.94	5.91%	-3835.18	-1.46	2 END	0.00	
2026.2	-239.75	5.50%	0.00	0.00	2 END	0.00		-238.44	5.50%	0.00	0.00	2 END	0.00	





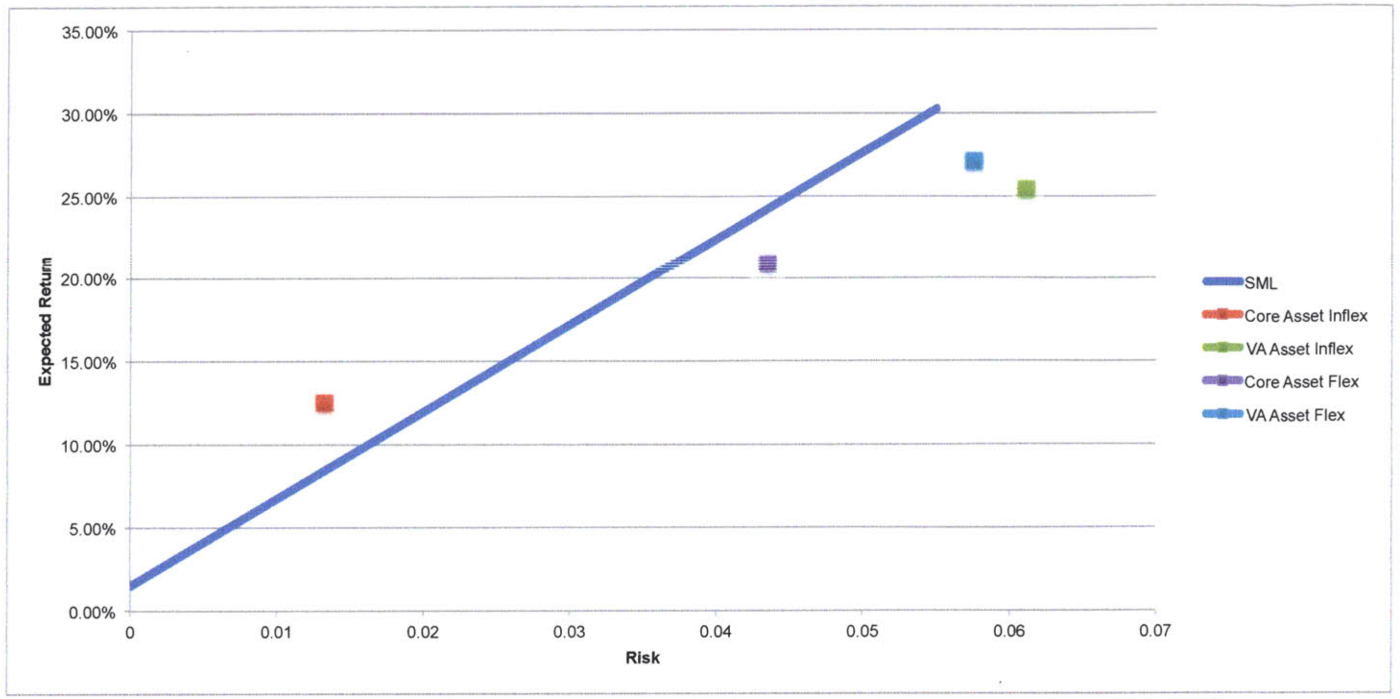






	IRR Core	IRR VA	RR Core fle:	IRR VA flex	Core (F-I)	VA (F-I)
Max	16.60%	40.93%	31.88%	41.64%	18.63%	11.61%
95%ile	14.65%	35.57%	27.12%	35.66%	14.25%	7.26%
Mean	**12.51%**	**25.43%**	**20.91%**	**27.09%**	8.40%	1.66%
5%ile	10.32%	16.05%	14.29%	19.16%	1.83%	-4.10%
Min	8.23%	10.43%	-4.87%	-1.91%	-18.81%	-27.92%
Stdev	**1.33%**	**6.11%**	**4.35%**	**5.75%**	4.19%	4.55%
Skewness	-0.12	0.14	-1.36	-0.99	-1.51	-2.46
Kurtosis	-0.09	-0.78	5.74	3.33	6.97	11.08

	IRR Core			*IRR VA*			*IRR Core flex*			*IRR VA flex*		
	Bound	**Count**	**Frequency**	**Bound**	**Count**	**Frequency**	**Bound**	**Count**	**Frequency**	**Bound**	**Count**	**Frequency**
0	8.23%	1	1	10.43%	1	1	-4.87%	1	1	-1.91%	1	1
1	8.65%	6	5	11.95%	4	3	-3.03%	3	2	0.27%	4	3
2	9.07%	12	6	13.48%	17	13	-1.19%	13	10	2.45%	10	6
3	9.49%	29	17	15.00%	48	31	0.65%	17	4	4.63%	16	6
4	9.90%	60	31	16.53%	138	90	2.48%	20	3	6.80%	24	8
5	10.32%	99	39	18.05%	268	130	4.32%	20	0	8.98%	32	8
6	10.74%	186	87	19.58%	393	125	6.16%	20	0	11.16%	41	9
7	11.16%	316	130	21.10%	507	114	8.00%	20	0	13.34%	42	1
8	11.58%	480	164	22.63%	697	190	9.83%	20	0	15.51%	48	6
9	12.00%	694	214	24.15%	898	201	11.67%	31	11	17.69%	64	16
10	12.41%	914	220	25.68%	1098	200	13.51%	63	32	19.87%	141	77
11	12.83%	1169	255	27.20%	1250	152	15.35%	165	102	22.05%	295	154
12	13.25%	1403	234	28.73%	1364	114	17.18%	334	169	24.22%	548	253
13	13.67%	1609	206	30.25%	1496	132	19.02%	571	237	26.40%	870	322
14	14.09%	1773	164	31.78%	1624	128	20.86%	907	336	28.58%	1197	327
15	14.51%	1866	93	33.30%	1753	129	22.70%	1324	417	30.75%	1474	277
16	14.92%	1940	74	34.83%	1857	104	24.53%	1650	326	32.93%	1709	235
17	15.34%	1977	37	36.35%	1935	78	26.37%	1841	191	35.11%	1883	174
18	15.76%	1989	12	37.88%	1974	39	28.21%	1950	109	37.29%	1958	75
19	16.18%	1999	10	39.40%	1992	18	30.05%	1995	45	39.46%	1989	31
20	16.60%	2000	1	40.93%	2000	8	31.88%	2000	5	41.64%	2000	11



			Inflexible		Flexible	
	Risk-free Asset	OCC	Core Asset	VA Asset	Core Asset	VA Asset
Return	1.50%	7.00%	12.51%	25.43%	20.91%	27.09%
Risk	0.00%	1.00%	1.33%	6.11%	4.35%	5.75%
Treynor ratio			8.28	3.91	4.46	4.45

The security market line (SML) in the adjoining graph is generated using the risk free rate of interest and the ex ante opportunity cost of capital having a risk of 1 unit. The SML is used to price the assets under the assumption that the risk premium per unit of risk equals the market price of risk.