

GHOST IN THE SHELL
Econometric Forecast of Singapore's Office Market and
Where is Architect in Financial Time

by

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Submitted to Center for Real Estate and Department of Architecture in Partial Fulfillment of the
Requirements for the Degrees
of
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ABSTRACT

Inspired by Singapore's recent effort in building its new skyline in Marina Bay, the thesis intends to employ econometric structural modeling techniques to Singapore's office market for the period from 1975 to 2011. Using data collected from Singapore's Urban Redevelopment Authority, the regression models established by rent, demand and supply equations, dissect the market behavior and project an understanding of the underlying correlation and market mechanism. With which, the thesis forecasts for the next 10 years, in quarterly interval, the movement trajectory of Singapore's office market.

Living and working as activities in this current milieu where role play in the system of power are essential to success was problematized; In the era when social and financial "cloud participation" has given rise to ebay, Facebook, Twitter and Wikipedia, what does work, live and play mean in this current environment where indulgence and consumption for its very own sake is very much part of the cultural lifestyle.

Where is Architect in this financial time? In as much as it is about providing plausible answers, this thesis challenges the existing power system in the Real Estate industry, instead of taking dweller's spatial appropriation as guerrilla activities, the thesis proposes ways that channels private equity "financial cloud participation" into system of value production. Architectural proposition therefore works in way which turns these underlying power struggle scenarios into formal expression.

Thesis Advisors:

William C. Wheaton | Professor of Economics

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03 | Acknowledgement

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“People know what they do; frequently they know why they do what they do; but what they don't know is what what they do does.”

— Michel Foucault

Chapter 01 | Time Series Econometric Forecast Model for Singapore Office Market

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1.1 Literature Review/Dynamic Models Of The Office Market

1.1 Literature Review/Studies On Dynamic Models Of The Office Market

The discipline of econometric forecast in the property market has its origin in labor economics, where real wage inflation has been related to deviations of the employment rate. The followings are the reasearch trajectory developed by seniors in this field:

- 1953** Blank et al. are credited as the first economist who explicate the relationship between change of rent and vacancy.
- 1984** Rosen proposed a methodology for forecasting key variables of the office market: the stock of office space, new office construction, vacancy rate, and rent.
- 1984** Hekman estimated the rental price adjustment mechanism and investment response in 14 metropolitan office markets by using a two-equation model.
- 1987** Schilling et al. considered office markets and also employed the pooled approach for 17 U.S. cities.

- 1987** Wheaton developed a contingent econometric forecasting model with three behavioral equations and three identities. The demand equation, the supply equation and the real rents equation.
- 1995** Grenadier building on Voith et al. (1988), analyzes office vacancy rates directly, using semiannual data for 20 cities over the period 1960 to 1991
- 1996** Hendershott developed a model of rent adjustment by first specifying an equation for long-run equilibrium.
- 1997** Wheaton examined and forecasted the London Office market using the structural econometric methodology based on time analysis data from 1970 to 1995.

Chapter 01 | Time Series Econometric Forecast Model for Singapore Office Market

1.2 Historical Trends Of Singapore's Office Market

1.21 Rent Index

1.22 Supply Of Office Space

1.23 Office Employment

1.24 Vacancy Rate

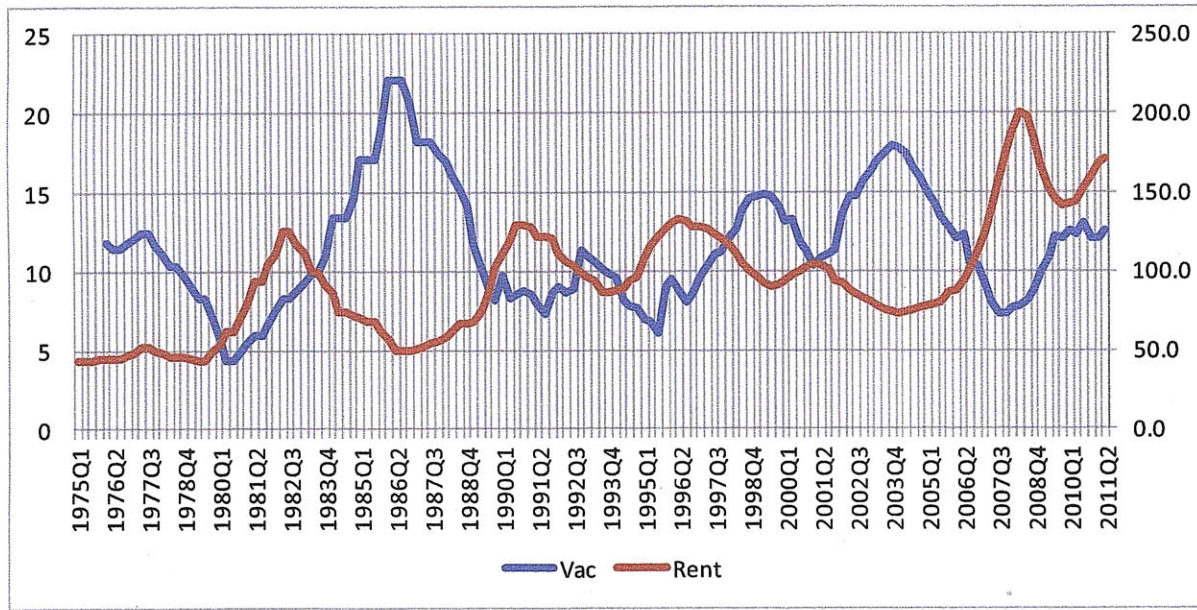


Fig01 Singapore Office Rent vs. Vacancy
(Source Author)

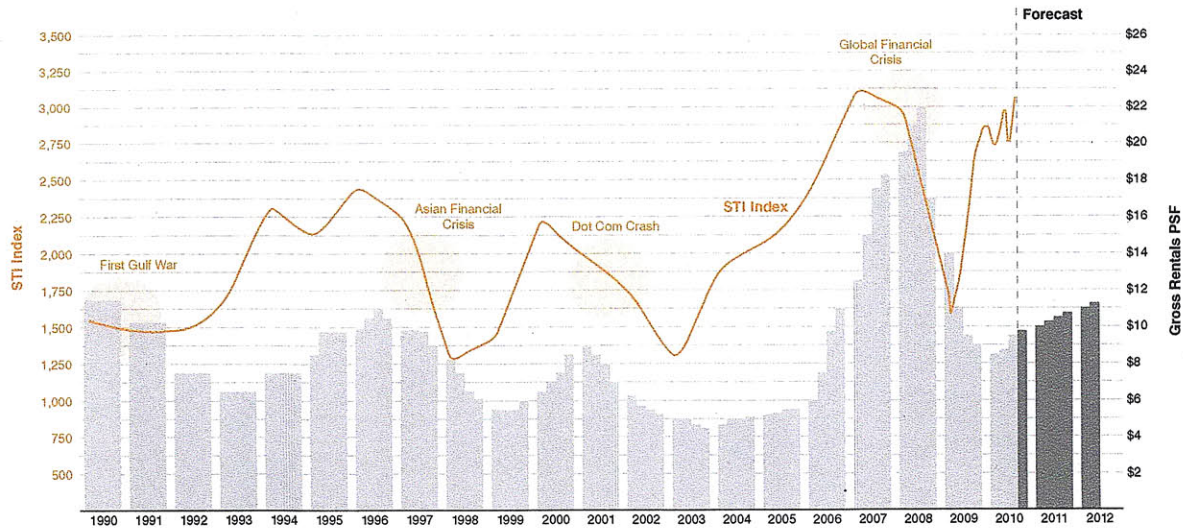


Fig02 Singapore Office Rent Index with STI Index
(Source JLL Research)

1.21 Real Rent Index

To construct a historical office rent index, two different sources are used in this thesis: rent data from URA's historic data base which starts from the year 1982 and the yearly data collected from CBRE Econometrics Advisors. URA has published quarterly surveyed rental rates and other related items for offices in Singapore since 1975 in their REALIS data base, which is exclusively to authorized users only. Closely examined the period where the two sets of data overlaps, conclusions has been drawn out as such: first, the two data has presented with very similar data range and moment orientation; The REALIS Index data is around the range of 80-90% of CBRE Econometrics data. The yearly data of CBRE Econometrics are spread equally over the four quarters and adjusted with up and down movement tendency to create a smoother curve movement. Since both sets of data are already CPI adjusted real rent index, therefore there is no need to further adjust the value. Based on these observations and statistical techniques, the quarterly real rent index group is therefore constructed.

In this index, the highest rent is obtain in 2008 Q2 reaching a 199.7. This high rent could be partially explained by the record low vacancy rate and chronic shortage in supply. There was likely more Singapore specific reasons to this phenomenon, which are hard to quantify in statistical terms. For instance, the limited land and strong governmental control has made the market less mechanical to adjust on its own. From the rent trajectory itself, one could observe a strong cyclical up and down, as shown in the diagram, the rental market is quite sensitive to the global financial market volatility. It is also correlated with the CPI curve movement within the country.

During the study period from 1975 to 2011, the office market rent has peaked four times, curiously for the first three times, the peak rents are very similar in level: 1982 Q1, 1990 Q3, 1996 Q1, the index value is around 130. The fourth peak however, in 2008 Q2 reached an unbelievable level of 199, a 53% in peak value. This abnormal behavior in the market is later the center of back-testing discussion.

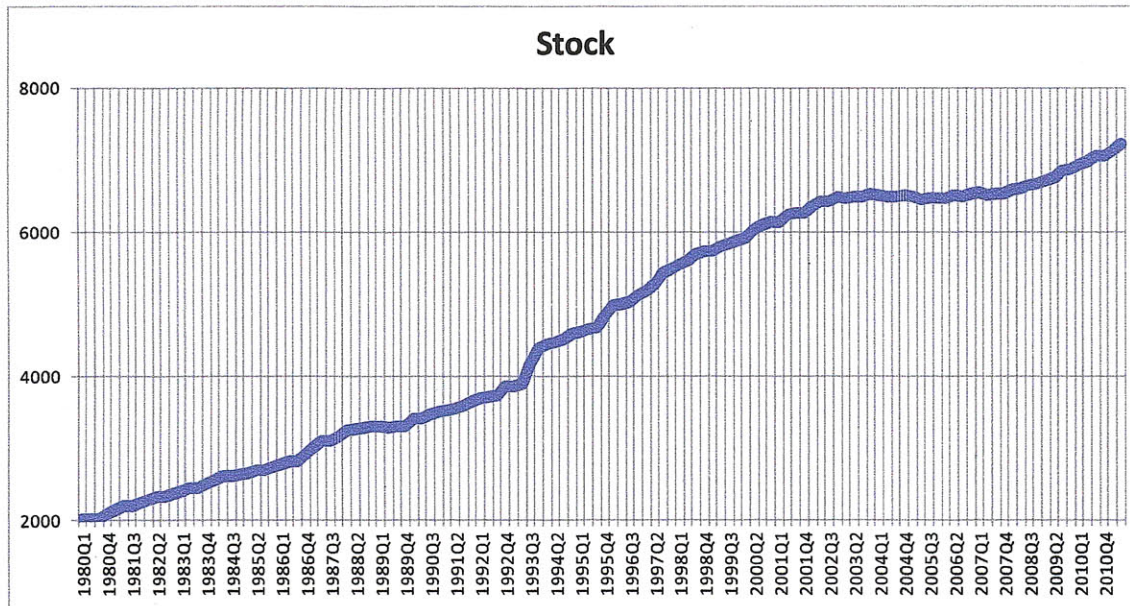


Fig03 Singapore Office Market Stock
(Source: Author)

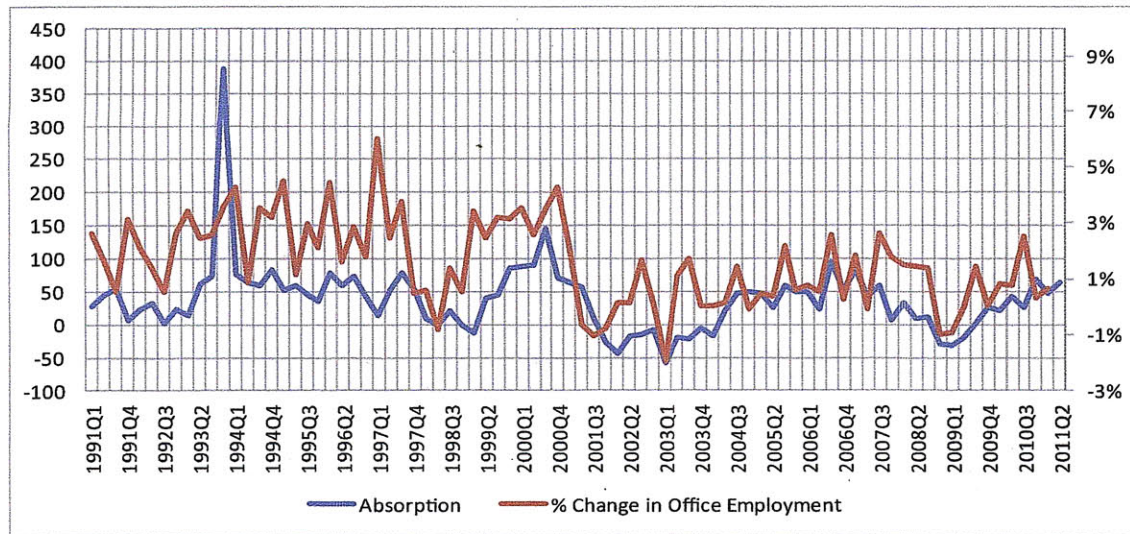


Fig04 Absorption vs. Change in Office Employment
(Source: Author)

1.22 Supply Of Office Space

For the last 30 years, the Singapore office market has experienced strong and sustained growth, the trend lasted for almost 20 years up until 2003. The accumulative stock of office spaces starts to fall in the year 2003. According to this data set also a combination of URA quarterly data and CBRE Econometrics yearly data, by the end of 2010, Singapore's total office stock reached a 356% increase, an average a stunning 12% annual increment in office stock.

As shown in Fig , there is a cyclical movement in the supply of office space in the market. During 30 years period from 1980 to 2011, there were five major peaks in 1985, 1990s, and after 2008. The peak in 1985 can be mainly explained by the high rent period from 1980 to 1984, given the long lag-time for planning and construction of office buildings. The several peaks in 1990 can be explained by another boom in the office rental market, therefore the supply of office spaces is quickly catching up with the demand. The slope in the rent curve looks like will inspire another supply trend in the market.

For the past 36 years, Singapore's office market has experienced a almost 400% increase in office spaces. Four major peaks in the history of the country if Office demand happened in 1986, 1993, 2000 and 2007. These trends generally follow the employment and GDP growth over the years and could be explain by simple demand and supply mechanism in the market within five years cyclical interval.

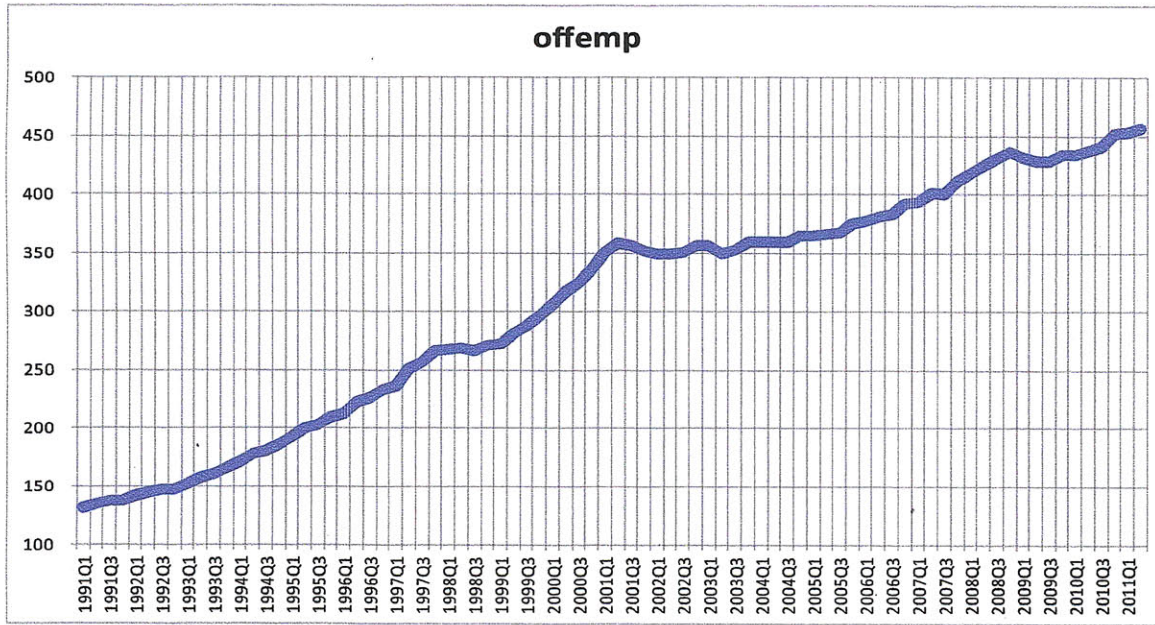


Fig05 Singapore Office Employment
(Source: Author)

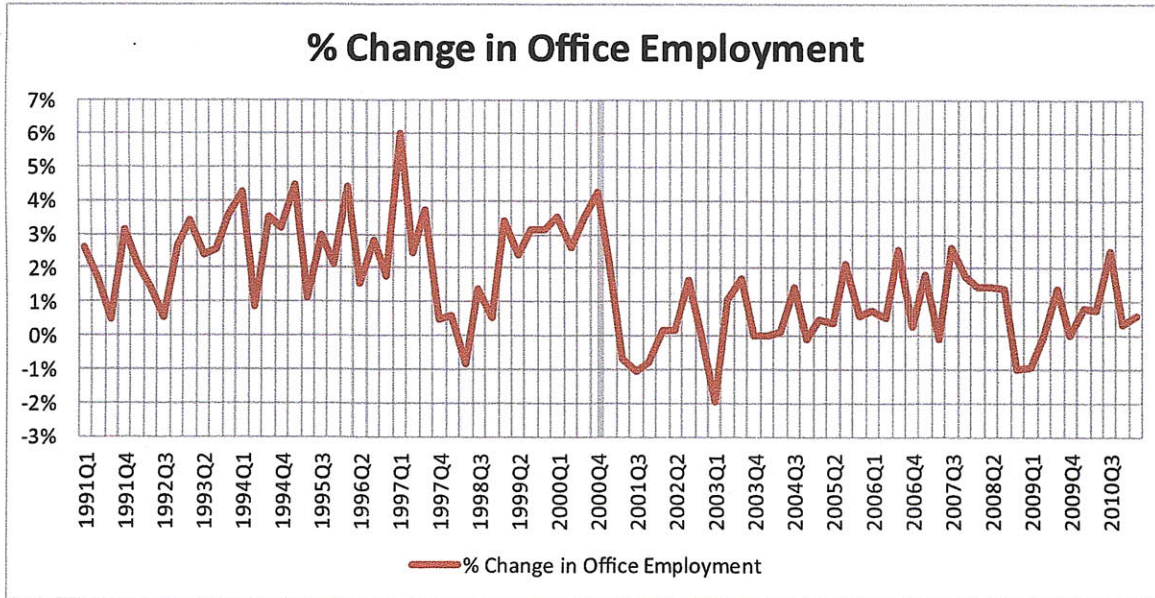


Fig06 % Change in Office Employment
(Source: Author)

1.23 Office Employment

As Singapore government has actively promoted Singapore to become the economic and financial service centre, more and more labor are trained and diverted to the office employment pool to set up Singapore's excellent financial infrastructure. Before 2001Q1, the office employment has been growing with increasing speed, the growth momentum started to slow down after 2001 indicating a the completion of Singapore's basic financial infrastructure and of course a degree of saturation in terms of office skilled labor.

A substantial portion of Singapore's office employment is secured at the very early stage in labor pool through state funded scholarship and tuition grants. This will effectively secure a university graduate to work for the country for a period from three to eight years depending on the nature of the financial aid(local scholarship with fewer years of bond, and oversea sponsorship takes longer bond period). This government initiated funding of education with a bond system has an extremely large coverage in the student population. Even a regular students would enjoy 70% of its tuition off his bill, if he agree to work in the country for three year.

Almost 80 to 90 percent of the university graduates took such offer each year. Besides that, the immigration policy in Singapore are also designed to favor "oversea talents" to settle down in the country and live for longer time. From the diagram, one could observe that regardless of financial booms and bust, the supply of office labor are of relative stable level.

Although the economic slowdown and the job insecurity in the financing service industry in general has slow down the increase, the office employment still look to expand steadily and slowly. Therefore taking the average of the chart, 2% annual increase in office employment are taken as the base forecast assumption for the forecasting model.

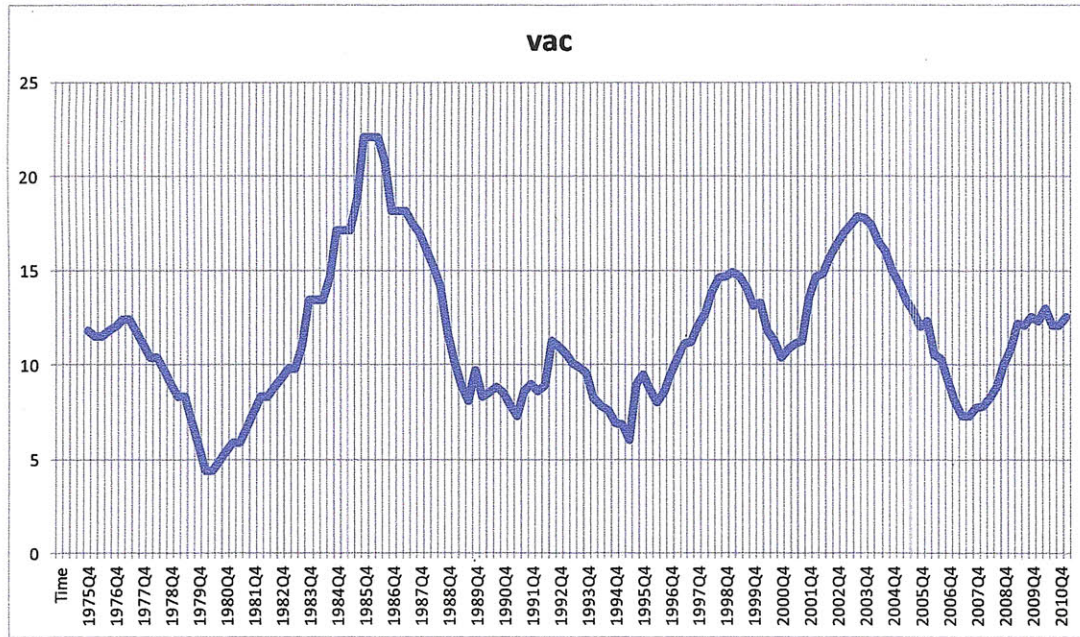


Fig07 Singapore Office Vacancy
(Source: Author)

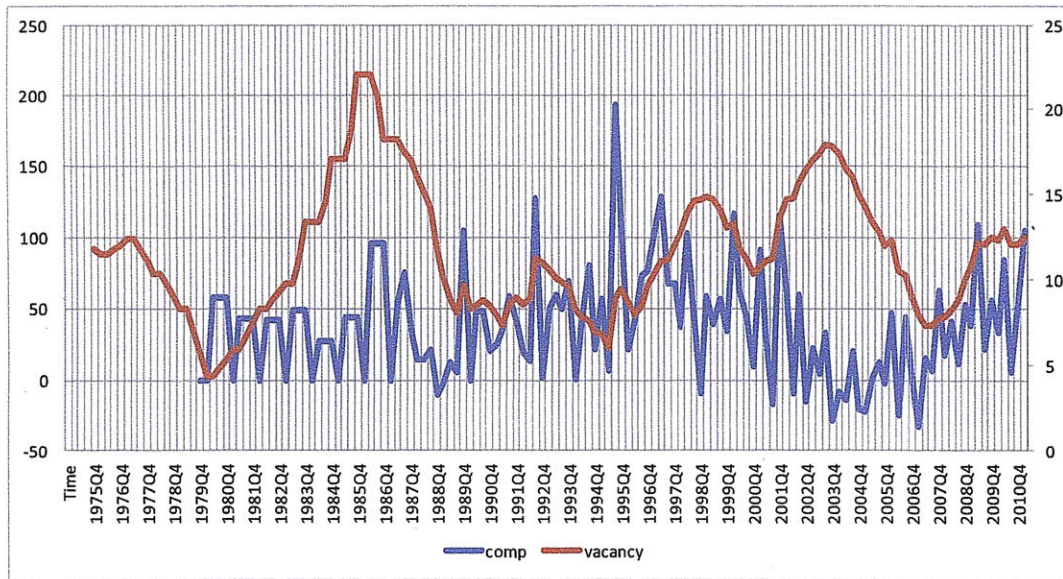


Fig08 Singapore Office Completion vs. Vacancy
(Source: Author)

1.24 Vacancy

Vacancy which has been pointed out by DiPasquale and Wheaton 1996, is a period through which parcels of space within buildings pass either as they wait to be rented for the first time or become available after a tenant moves. In a rental market, the risk of vacancy lies mainly with the landlord. Greater vacancy and fewer relocating tenants raise the expected leasing time, and hence lower the minimum rent that landlords are willing to accept.^[1] In the broader sense, Singapore is the landlord, and MNCs are the potential tenants looking to rent an office in Singapore to project its influence in Southeast Asia.

In recent years particularly MNCs tends to take Singapore as the base and invest in Singapore based firms that has their products going into China. This way not only the MNCs mitigates its risk exposed to policy and political unpredictability in China, they also take advantage of Singapore's matured financial infrastructure. This relationship has made Singapore rather vulnerable when regional or global financial crisis hit and MNCs are not looking to hire or making cuts on their work force.

There are a few major vacancy peaks in the 36 years. 1977, 1986, 1998, 2004. These high vacancy period could almost all be explained by shocks due to internal or external financial crisis. In 1986 when regional financial crisis hit Singapore's economy at the heart and the country GDP had decreased first time in the history, the office market produced a shocking 22% vacancy rate.

With reference to the diagram, Singapore Office vacancy rate is in general inversely correlated with the new completion in the market. This also shows that when the market is down, most offices will tend to slow down the property completion dates to preserve the value of the property and reduce any possible maintenance cost. Therefore the actual vacancy level might be even higher if we include those new completions that has been held off due to high market vacancy.

[1] DiPasquale and Wheaton 1996

Chapter 01 | Time Series Econometric Forecast Model for Singapore Office Market

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1.3 Econometric Model For Singapore Office Market

1.31 The Vacancy Driven Dynamic Model

1.32 The Demand Equation

1.33 The Supply Equation

1.34 The Rent Equation

1.4 Econometric Model For Singapore Office Market



Fig09 Singapore CBD

1.31 The Vacancy Driven Dynamic Model

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The modeling framework used in this thesis is primarily centered around the method proposed in Wheaton and DiPasquale (1996), in which vacancy, a period through which parcels of space within buildings pass either as they wait to be rented for the first time or become available after a tenant moves, plays a critical role in estimating supply and demand through the calculation of occupied stock. In today's commercial real estate market, due to the financial crisis and real estate boom and bust, fluctuations of occupied stock has become more persistent. The real estate market is generally frame into a unique system, where instant demand is measured by period absorption and supply is the total amount of occupied and vacant stock.

The modeling process begins by collecting Singapore's office sector quarterly time series data from 1975 to 2011 second quarter, which includes real rent, accumulated stock, quarterly office space completion, vacancy rate, office employment and real GDP. Three equations are therefore constructed out of these data series: demand(absorption) equation, supply equation and real rent equation.

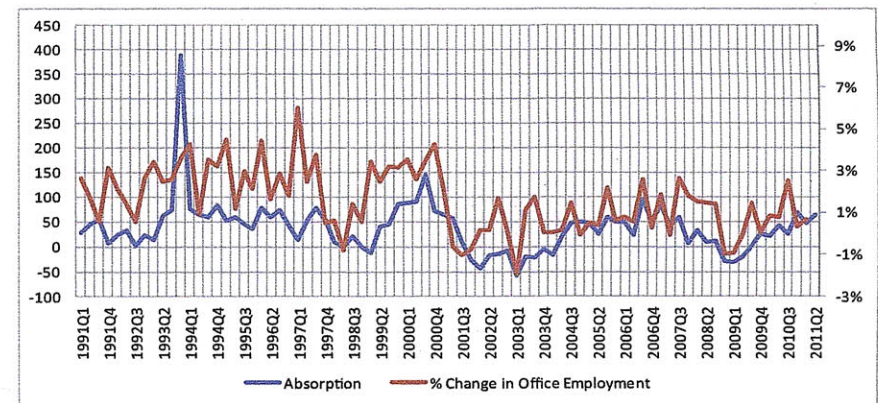


Fig10 Absorption vs. Change in Office Employment
(Source: Author)

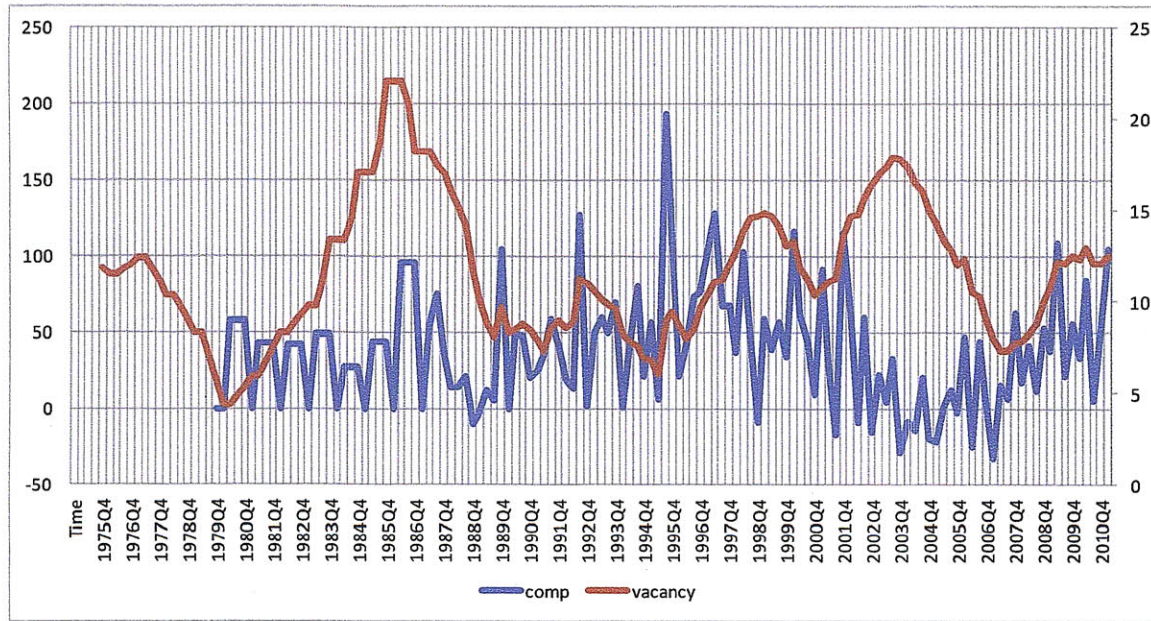


Fig12 Office Completion vs. Vacancy
(Source: Author)

Statistical Results:

	Coefficients	Standard Error	T-Statistics	p-value
Constant	14.40175563	14.04932312	1.02509	0.30751232
COMP(1)	0.0197632	0.09324382	0.21195	0.8325264
COMP(8)	0.22711586	0.09225118	2.46193	0.01532968
RENT(2)	0.37926334	0.12561065	3.01936	0.00313194
VAC(24)	-2.02208776	1.00362089	-2.01479	0.04630075

R Square 0.561977

Fig13 Statistical Results of Supply Equation
(Source: Author)

1.33 The Supply Equation

One major risk in speculative development comes from the long time gap between current market understanding when products are initiated and expected future behavior when product enters the market. Given that asset price of the building and the developer's rate of return depend crucially on estimates of future market conditions, which must be formed years prior to the completion of the development^[1]. (DiPasquale and Wheaton 1996). The key notion lies in the concept of market anticipation: the exogenous, myopic or rational. Myopic expectations, for instance, if the market indicates that there is currently a severe shortage of Class A office space, and a developer start to develop office products to meet such demand at this very moment, by the time the developer completed the building and finished the leasing process, the market might have gone down, and the investors and developers are left heavily burnt. Even a developer with the rational development anticipation cannot avoid the lags in the development process, and such lags generate the up and downs in the market. In reality things could be even more complicated. In Asia, development industry in countries such as Singapore and China are exposed to immediate and heavy policy risk, hence even the most rational developers could hardly develop their products to exactly synchronize with the ever-changing land and credit policy. Estimating the right time lags is therefore the crucial factor in building the supply equation.

The supply model shows that out of all possible economic indicators, completions, real rent and vacancy contribute approximately 56% of the supply formation, in which Completions in the past one quarter and eight quarters indicate a certain degree of market consensus of the need of supply, therefore both factors are positively correlated. As the rent goes higher, naturally the supply will follow up, just like a low vacancy will inspire more developer to produce more supply, in this case vacancy 24 period back influence the supply decision the most. Therefore less the vacancy, higher the future supply.

The supply side of the dynamic is relatively hard to capture, and the decision making process of developer tend to vary lot in reality. They are many way one might explain the phenomenon. For instance, in China where private ownership of land is not possible, and first degree of land development is dominated by SOEs and later on pass on to the private developers for second and third degree development. The cost is therefore passed on to the private sector developers, the huge cost might keep many developers away even if the market might indicate otherwise. The availability of credit is another crucial factor that could significantly affect office supply, this would be further explain in the following chapters.

Quarterly Regression Model of Supply

$$SPY = 14.40 + 0.020 COMP(1) + 0.227COMP(8) + 0.379RENT(2) - 2.022 VAC(2)$$

where:

SPY - Supply of Office Space in Singapore

COMP - Office Space Completion

RENT - Real Rent of Singapore Office Space

VAC - Vacancy of Office Space in Singapore

[1] DiPasquale and Wheaton, Urban Economics and Real Estate Markets

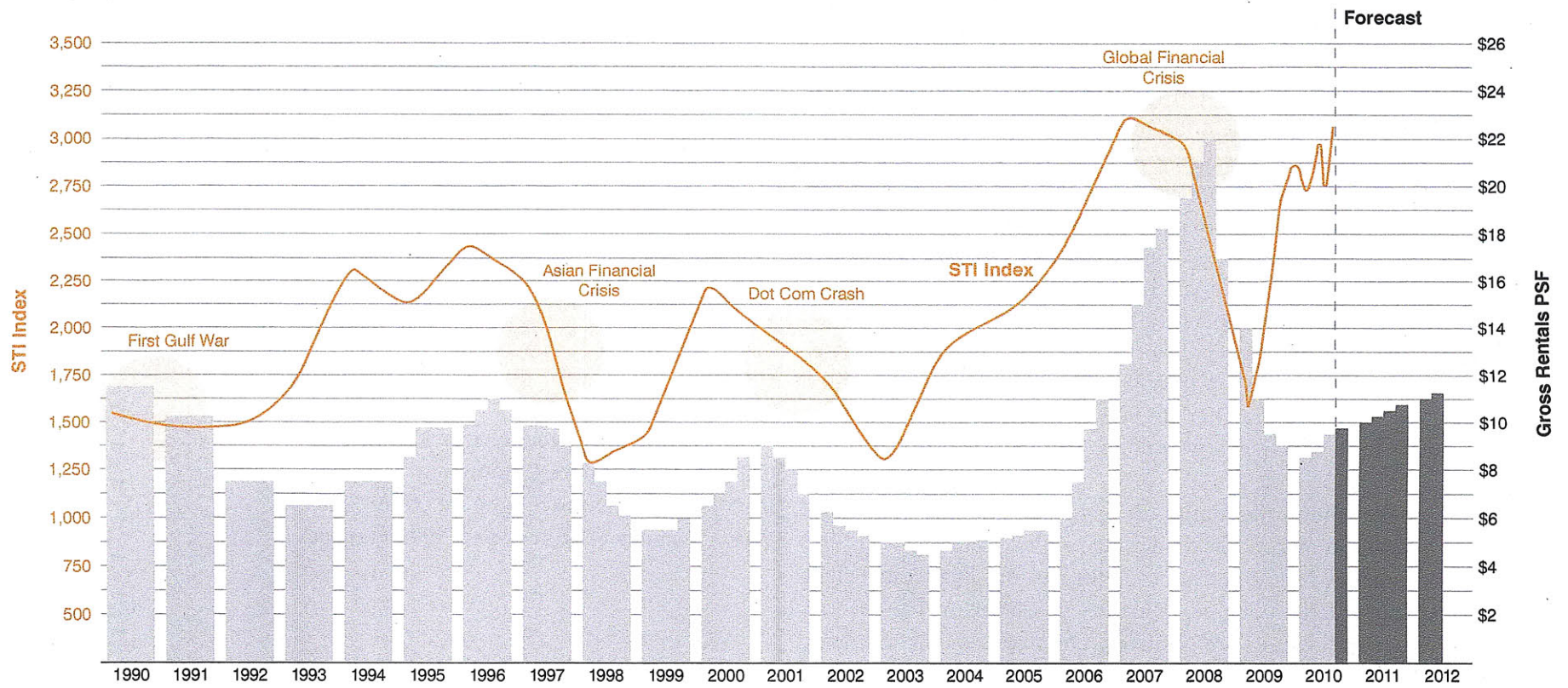
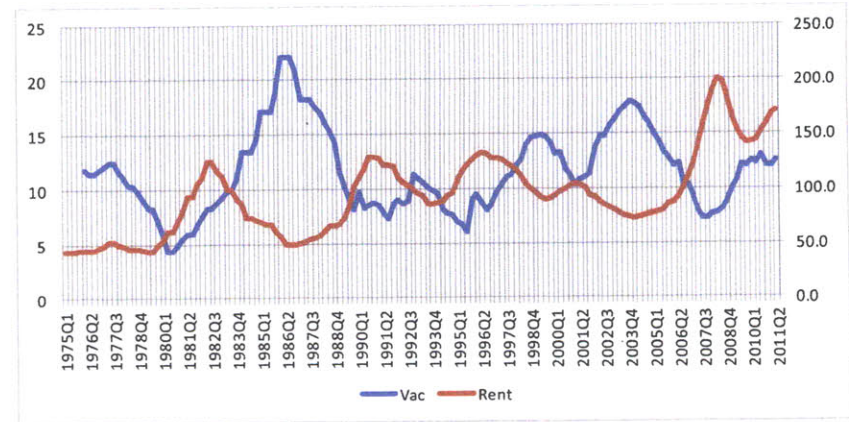


Fig14 Singapore Office Rent Index with STI Index
(Source JLL Research)

Fig15 Singapore Office Real Rent vs. Vacancy
(Source: Author)



1.34 The Rent Equation

With reference to the diagram on the left, in a market where vacancy is high, there will be more space and time available for a potential tenant and less bargaining power for the landlord, this further lower the maximum rent the potential tenant are willing to give and minimum rent the landlords are willing to accept. There is a clear reverse correlation between the rent and vacancy. Using this as a basic framework for the model, rent previously paid by the tenant and vacancy are used to construct the rent equation.

It is encouraging to see that 99.8% of the rent movement can be explained by previous rent movement and vacancy level in the office market. Within the previous rent correlations, if the immediate rent (one quarter back) goes up, the current rent also tend to go up. Nevertheless as cyclical as it gets, if the one year back is high, the current rent tend to go down. There is a obvious negative correlation between vacancy and rent which is clearly captured by the model.

Quarterly Regression Model of Rent

$$\text{RENT} = 12.04 + 1.164\text{RENT}(1) - 0.237 \text{RENT}(4) - 0.361 \text{VAC}$$

where:

RENT - Real Rent of Singapore Office Space
VAC - Vacancy of Office Space in Singapore

Statistical Results:

	Coefficients	Standard Error	T-Statistics	p-value
Constant	12.04483152	3.00647105	4.0063	0.00010785
RENT(1)	1.16412731	0.03217264	36.18377	0
RENT(4)	-0.23732131	0.02847945	-8.33307	0
VAC	-0.36086959	0.14998921	-2.40597	0.01766874

R Square 0.998043

Chapter 01 | Time Series Econometric Forecast Model for Singapore Office Market

1.4 Econometric Forecast

1.41 Economic Outlook: Real GDP and Office Employment

1.42 Base Forecast

1.43 Optimistic Forecast & Pessimistic Forecast

1.41 Economic Outlook: Real GDP and Office Employment

There is strong correlation between office demand Office and real GDP of the country, which makes office product to a significant extent, a vulnerable asset class against economic downturn in the year 2012. Looking at Singapore's GDP performance in 2011, Singapore's economy grew by 0.9% in the second quarter of 2011, a significant slowdown from a 9.3% growth reflected in the first quarter of 2011. The Ministry of Trade & Industry (MTI) revised the full year growth forecast from 5.0% to 7.0% to 5.0% to 6.0%. The slowdown was in sync with cautious corporate sentiments arising from the US and Europe's economic crisis which became pronounced from July 2011. This shows that Singapore's economy has substantial risk exposure to the western economy. Therefore for forecast purposes, the thesis look into three scenarios: a base forecast, a pessimistic forecast and a optimistic forecast.

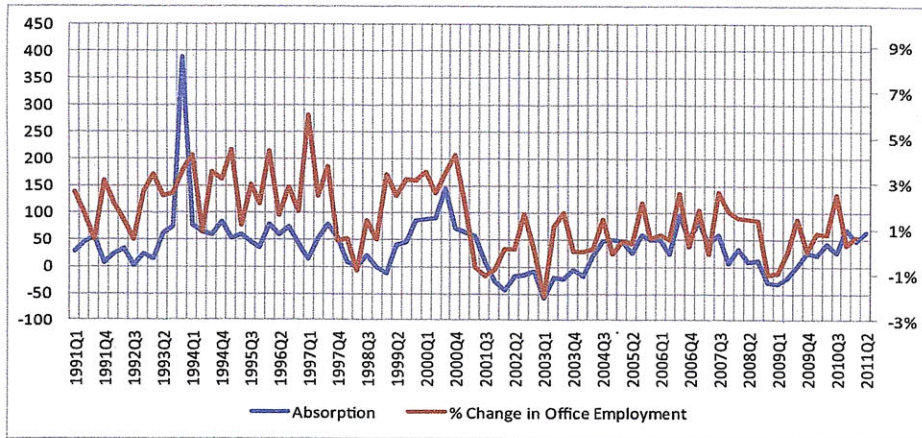


Fig16 Absorption vs. % Change in Office Employment (Source: Author)

	Annual			Quarter		
	Base	optimistic	pressimistic	Base	optimistic	pressimistic
Office Employment Grow	2.00%	3.00%	1.00%	0.50%	0.75%	0.25%
Real GDP Growth	5.00%	7.00%	3.00%	1.25%	1.75%	0.75%

Fig 17 Economic Assumptions (Source: Author)

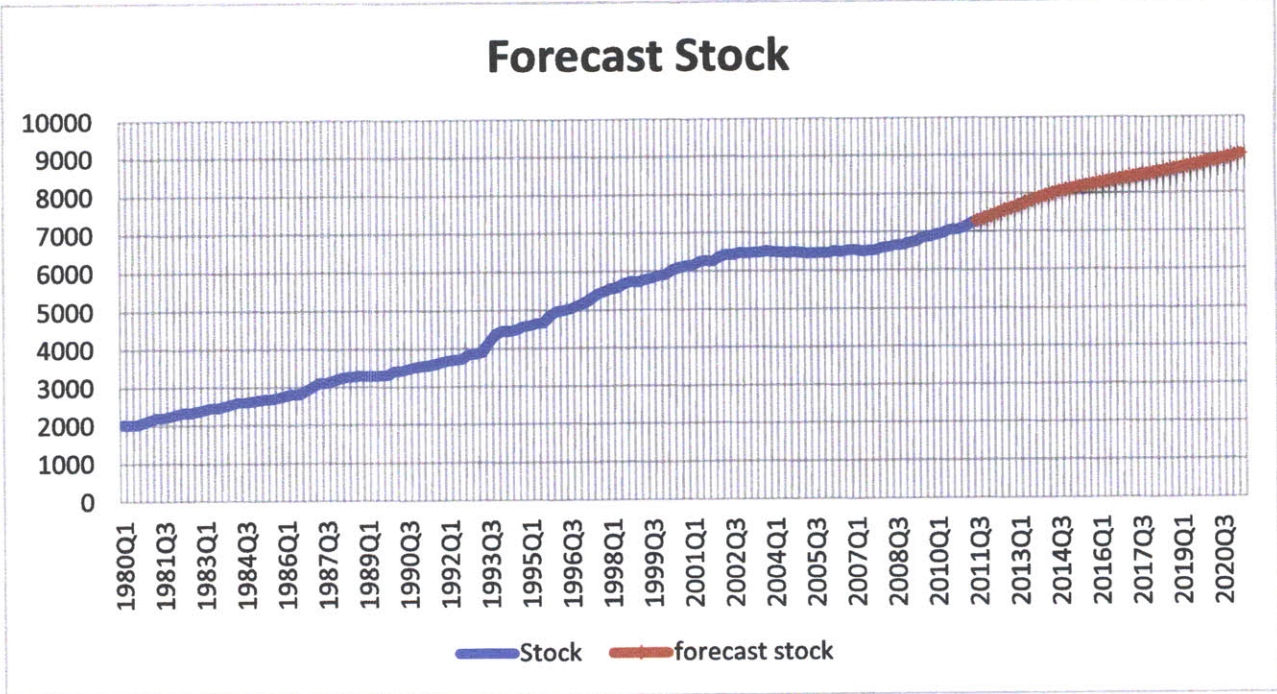


Fig 18 Base Forecast For Stock
(Source: Author)

1.421 Outlook of the Office Stock_the Base Forecast

Given a 2% annual increase in office employment and 5% GDP growth, Singapore's office stock is estimated to continue the growth momentum in 2010 and 2011. Coming out of the supply stagnant period in 2002 and 2007, the supply of Maria Bay area office towers will slowly kick in. The growth will start to slow down in 2014 and the supply will pick up again around 2017.

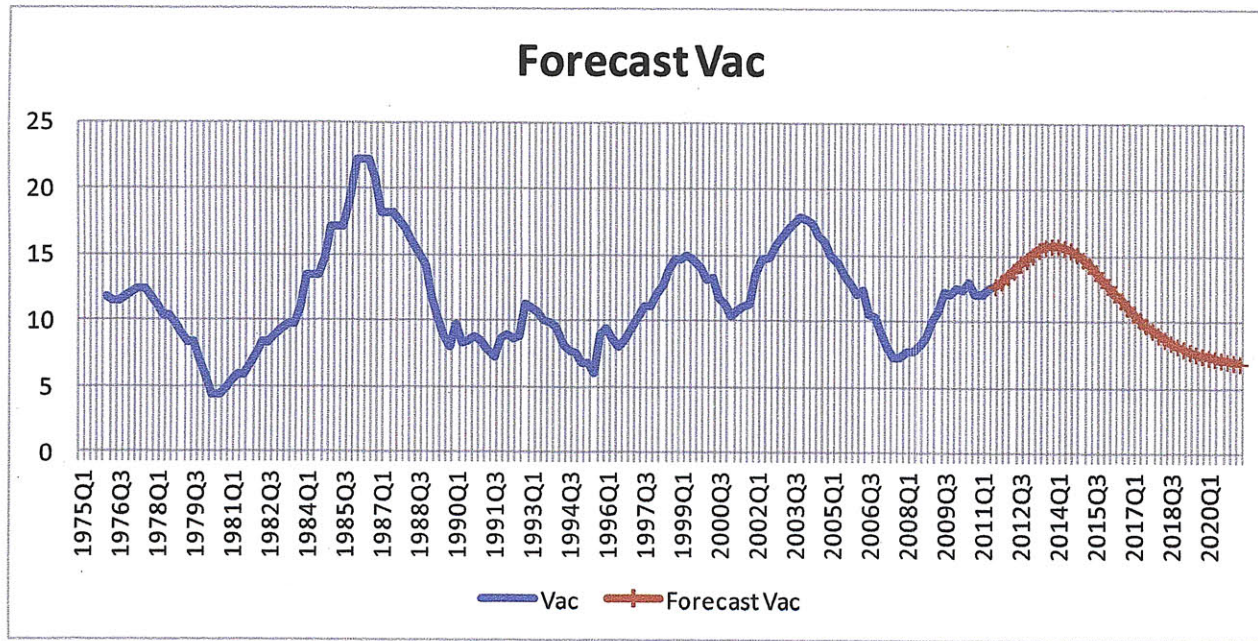


Fig19 Base Forecast For Vacancy
(Source: Author)

1.422 Outlook of the Office Vacancy_the Base Forecast

The model predicts that the vacancy rate will continue to rise in the next two years reaching 15.75% in 2014, the highest level of vacancy after 2003. After 2014, the vacancy rate starts to drop slowly at the early 2015 and the dropping rate increases over time in the next 3 years. If the GDP and Office employment growth rate persists, in 2021 second quarter, the vacancy rate is reaching a record low 7%.

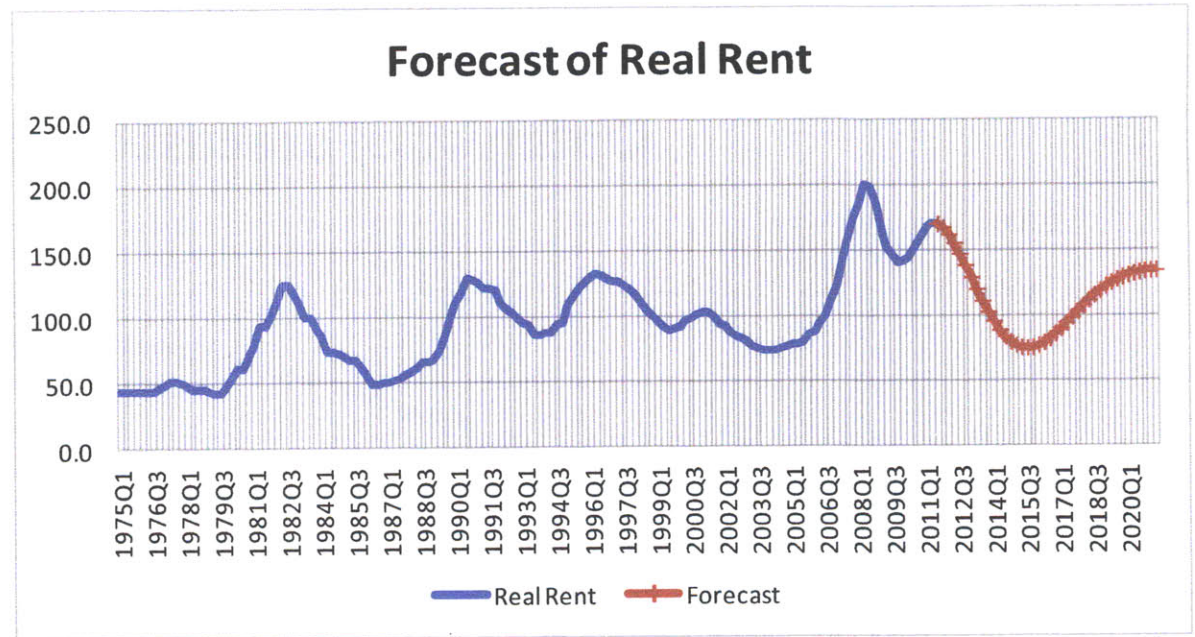


Fig20 Base Forecast For Real Rent
(Source: Author)

1.423 Outlook of the Office Rent_the Base Forecast

In the base forecast, the real rent will continue to fall throughout the course of 2012 due to the large supply and high vacancy rate as stated in previous base forecast. In these forecast, 2014 and 2015 is an important threshold during which period, the economy reaches a turning point. In this case, the real rent of Singapore office market touches down to the lowest level in the past ten years, reaching an index level of 74.86 in 2015 third quarter. After going through this threshold, the real rent will start to rebound and continue to rise up to another high level.

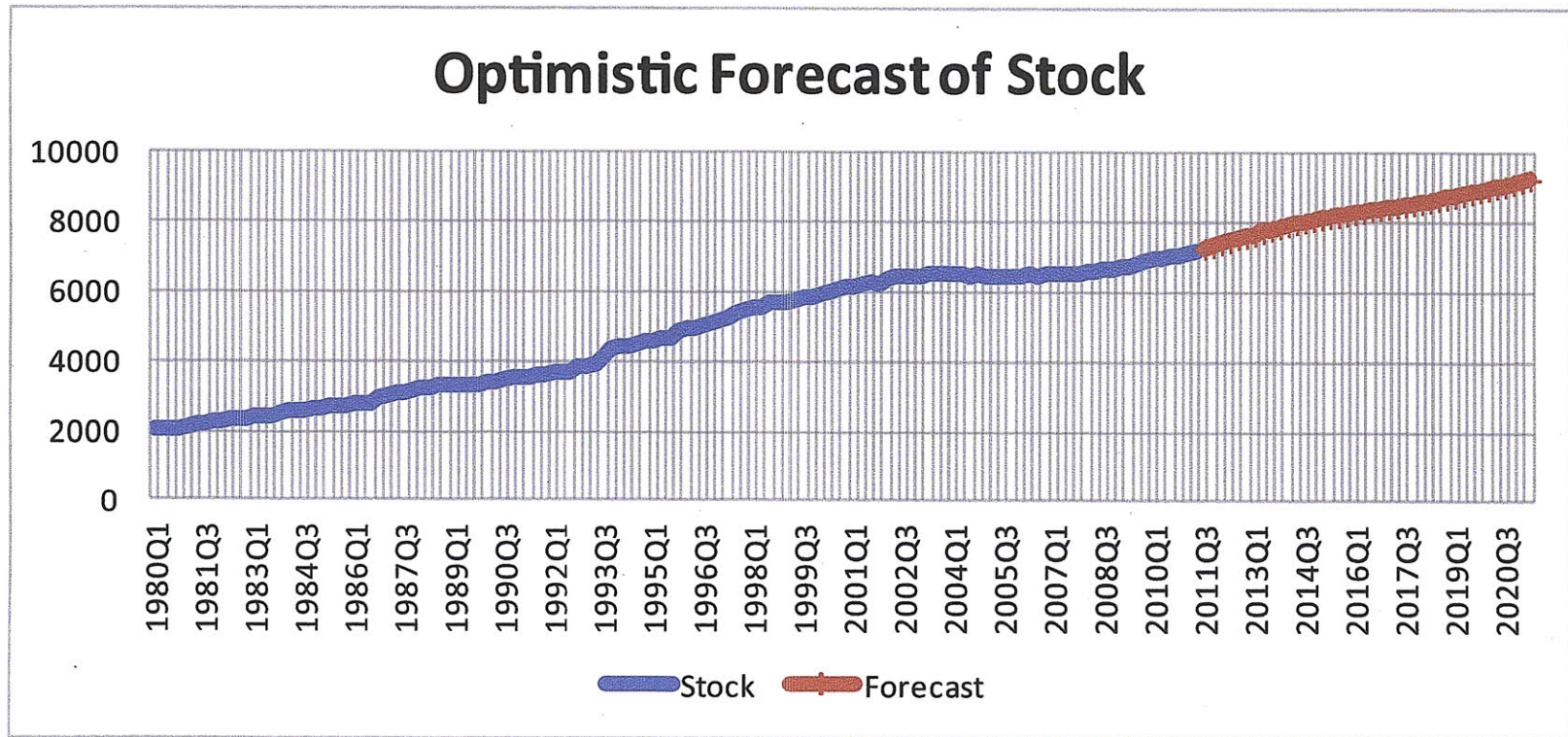


Fig21 Optimistic Forecast of Stock
(Source: Author)

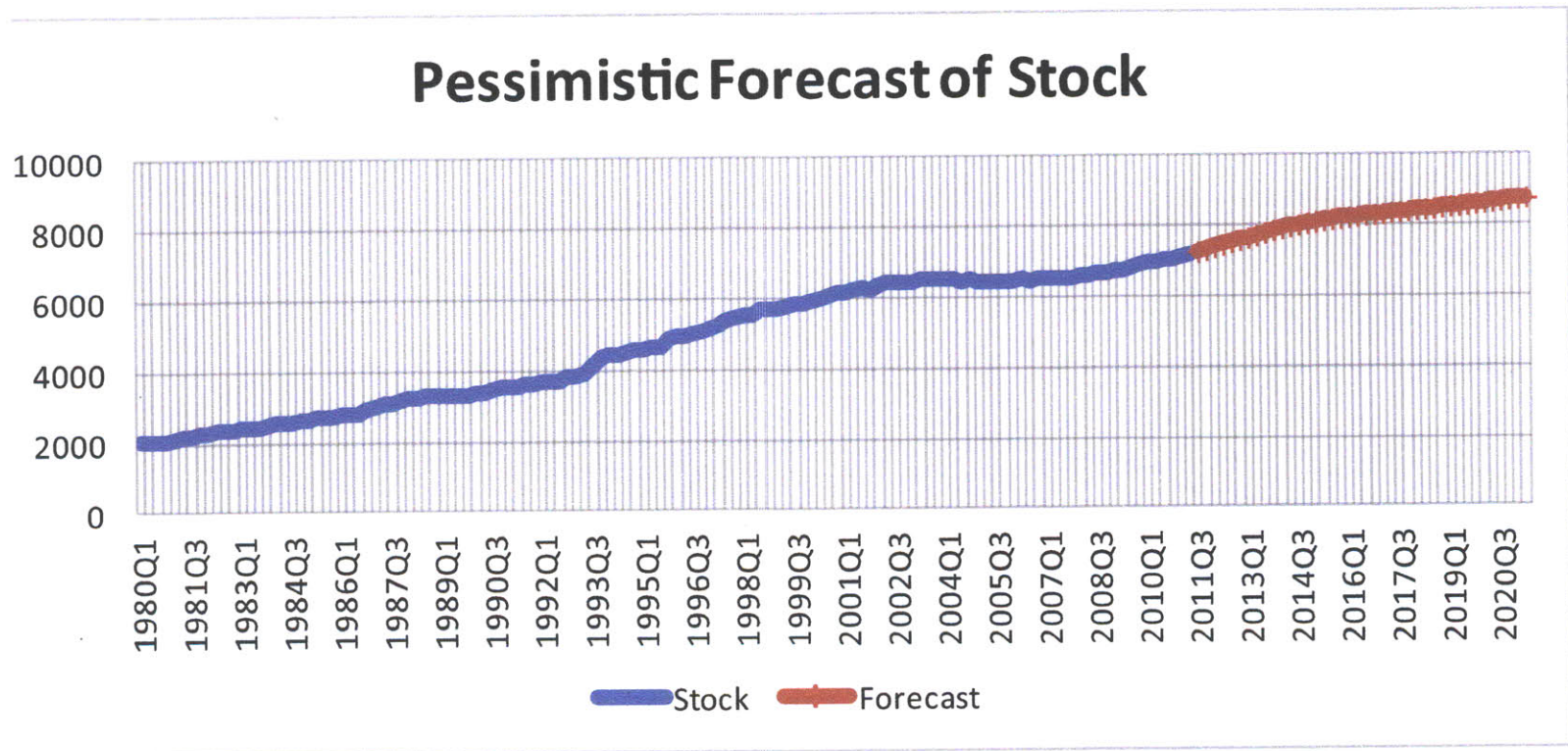


Fig22 Pessimistic Forecast of Stock
 (Source: Author)

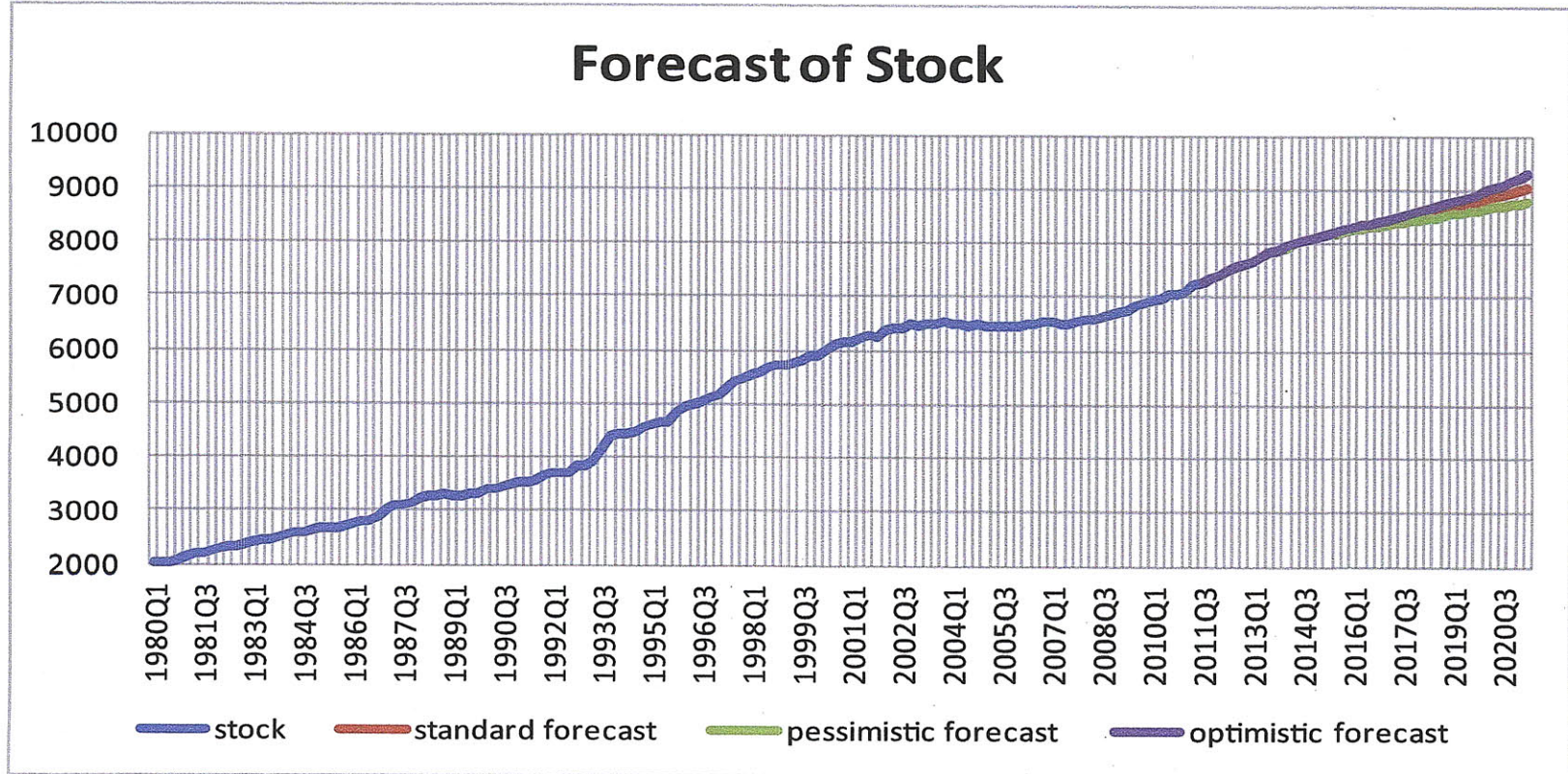


Fig23 Forecast Comparison of Stock
(Source: Author)

1.431 Optimistic and Pessimistic Forecast for Stock

According to CBRE report, in 2011 Singapore office market grew by 6.1% in with 450,000 sf completed in fourth quarter. Overall there was over 3 million sf delivered in 2011, representing a 6% increase in the total stock, and which has now reached 5151.88 sf.. This This is the fastest pace of office development the city has experienced over the past decade and that will be seen in the next five years based on the future office pipeline. Taking this as the baseline in the stock forecast, the base forecast has shown a pretty stable growing trend, with growing momentum slowing down after the five years supply time frame, which pretty much reflects the real situation.

The significant new supply helped to improve the overall quality of the office stock and attracted international companies looking to start up operations in Asia. Looking ahead, there are some 9.8 million sf to be delivered between now and 2016. Furthermore, a number of large units in some existing Grade B buildings were recently vacated. The sheer amount of good quality grade space entering into the market will naturally take some time to be absorbed.

Therefore in the optimistic forecast, we assume the country's GDP would grow at 7% a year continuously over the next few years, the office stock rise up more sharply after 2016, signaling a stronger demand from oversea financing services institutions. As Asia is moving towards the centre of the investment world, and Singapore's average rent standard is much more competitive compared to that of Hong Kong. The demand would drain the supply quickly and the stock will rise continuously into 2021.

In the Pessimistic model, we assume the country's GDP will only grow at 3% and as a result, office employment grow at 1%. This however has very little impact to the stock movement in the immediate 3 years. One explanation is that Singapore's economy is very well exposed to the world economy therefore its own GDP is only one factor determining the stock of the office market. We could also infer from the supply pipeline that after 2016, the stock will more likely take some different trajectory due to the new exposure to the global exposure. The difference does start to appear after 2016, the stock builds up more slower over the years compared to the base forecast and optimistic forecast. Other than that, the situations are

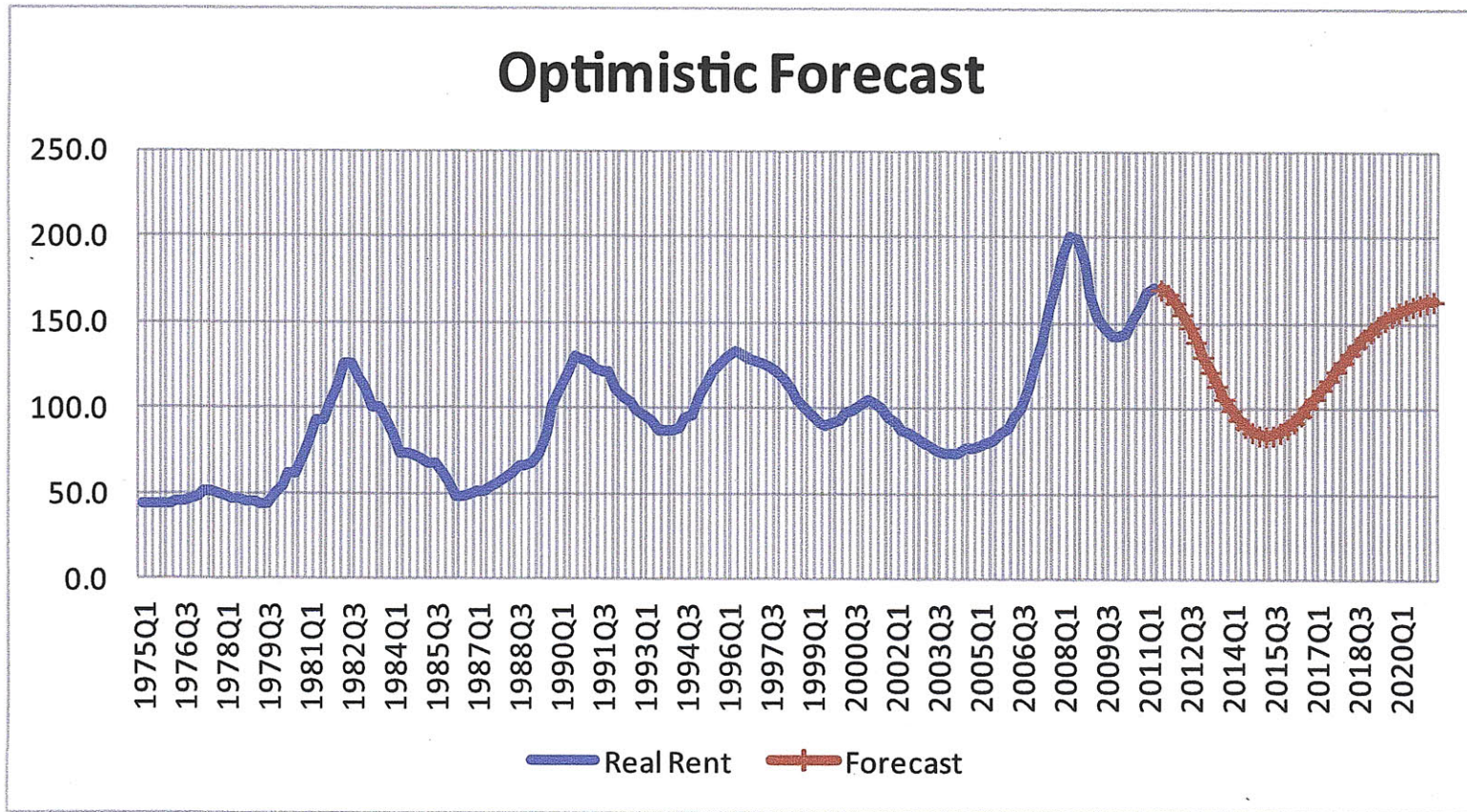


Fig24 Optimistic Forecast of Real Rent (Source: Author)

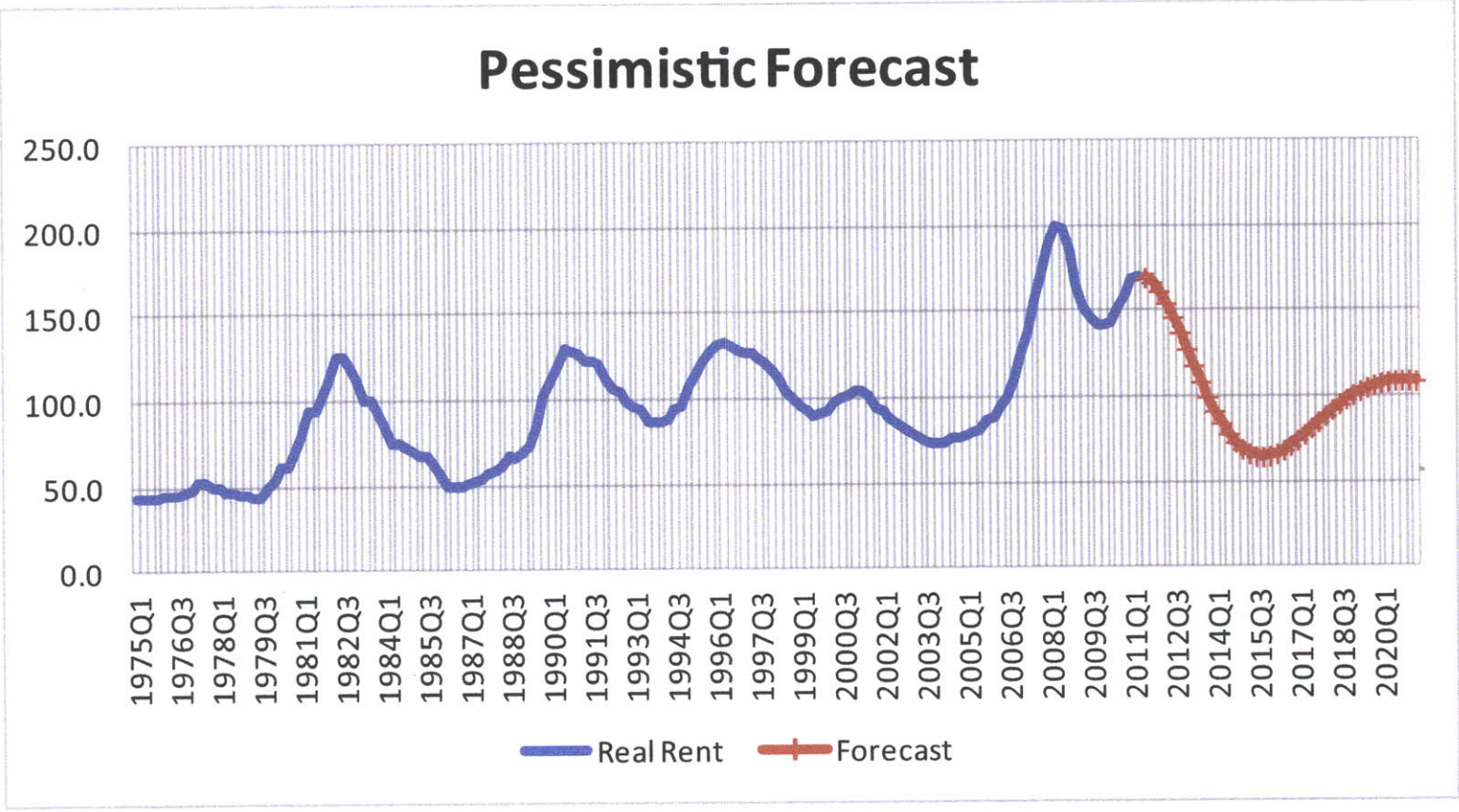


Fig25 Pessimistic Forecast of Real Rent (Source: Author)

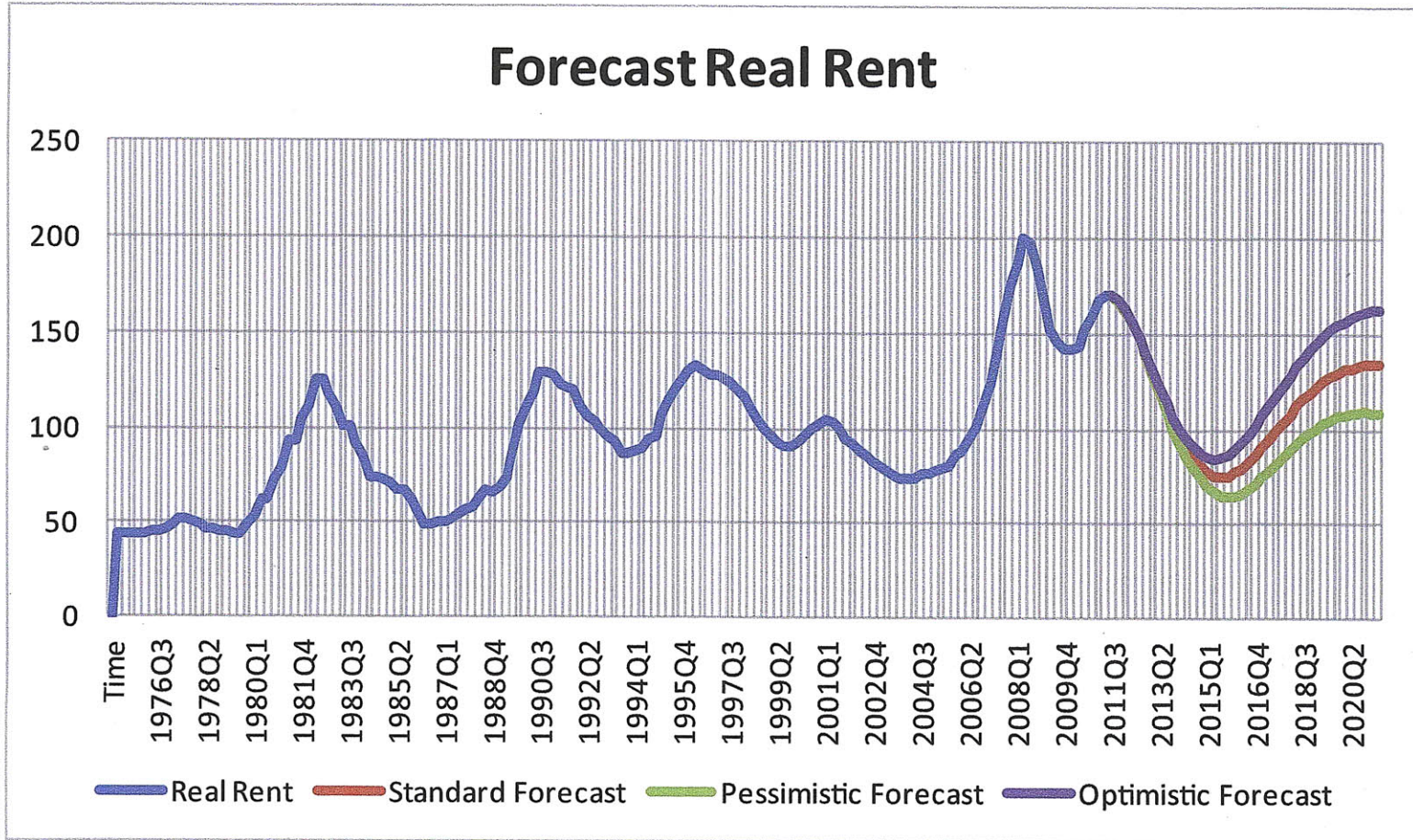


Fig26 Forecast Comparison of Real Rent (Source: Author)

1.432 Optimistic and Pessimistic Forecast for Real Rent

In 2011 fourth quarter, Grade A office rents declined marginally by 0.5% to \$11.00 psf/month. Grade A rents have experienced a relatively short cycle; since the last trough in Q1 2010, rents have recovered by 38%, peaking in Q4 2011 and are headed for a decline in 2012. It is, however, unlikely that the rental correction would be as dramatic as the one experienced in the aftermath of the global financial crisis. In 2012, we anticipate a correction in the order of 10-15%. On a wider scale, island-wide Grade B office rents declined by 1% to \$7.30 psf/month – the first decline since 2009 while Grade B rents in the CBD area remained stable at \$7.96 psf/month. From the base forecast model, the office market will continue to be highly competitive, balancing a downward rental movement with increasing pressure on financial incentives from occupiers. ^[1]

In the optimistic model, the downward rental movement will reach its bottom in mid 2015, the lowest level 84.37 rental index, which is still higher than the 2003 bottom rent. After reaching the bottom, the rent will then go all the way up and reach its peak around 2020. The rent at the peak

is almost equivalent to the peak rent in 2011 in real term, showing that after the demand due to high global and local economic growth absorbing the huge excess in office supply, the market has come back to the rational level.

In the pessimistic model, the downward movement is expected to go deeper and last longer. With reference to the diagram, in this forecast Singapore office rent index decreases till mid 2016, reaching a record low rental since 1985, approximately 50% of the 2011 rental level. The recover comes around the same time. However the peak rent is only around 58% of the rental level in 2011.

[1] CBRE Market Forecast

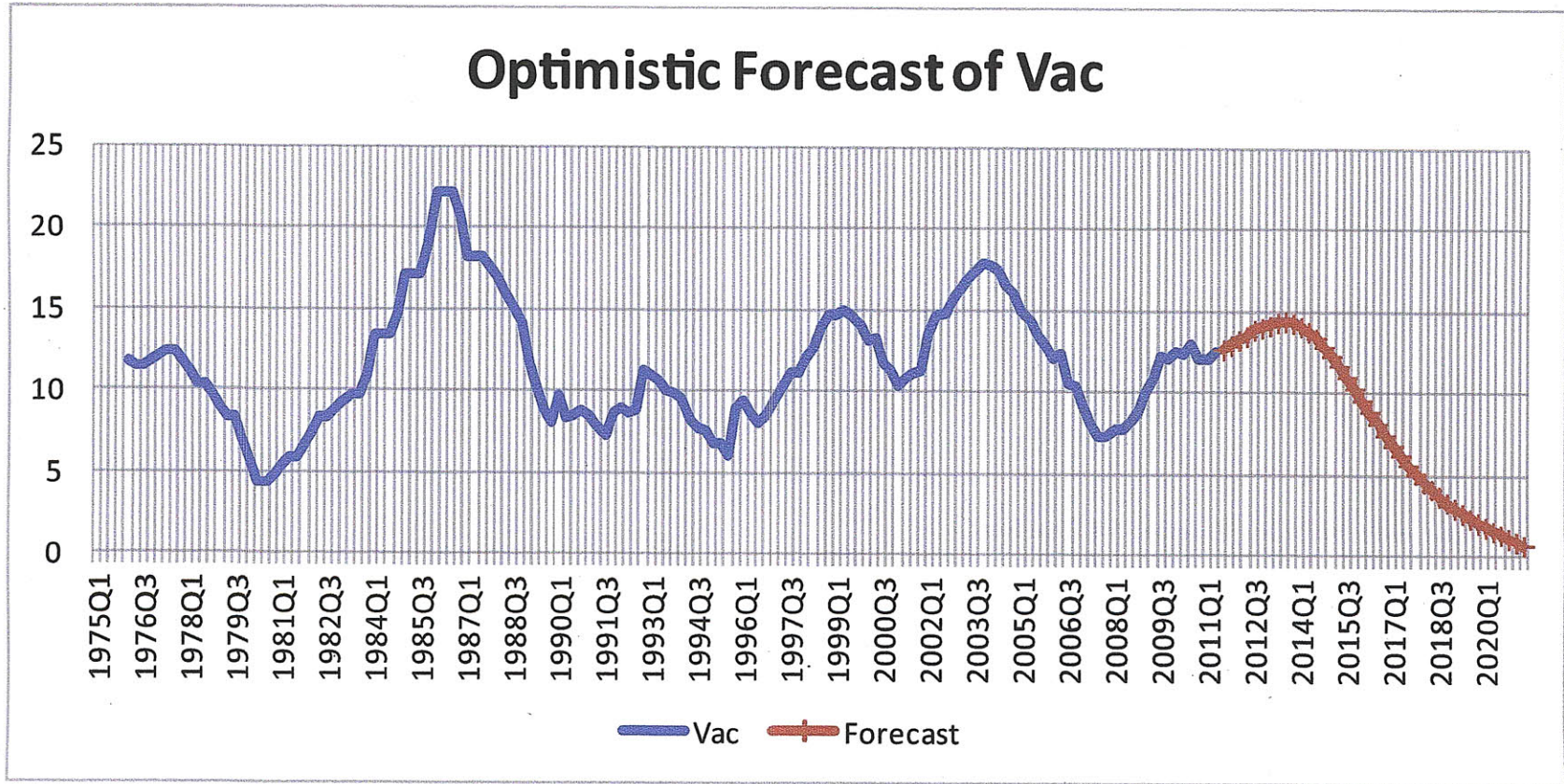


Fig27 Optimistic Forecast of Vacancy
(Source: Author)

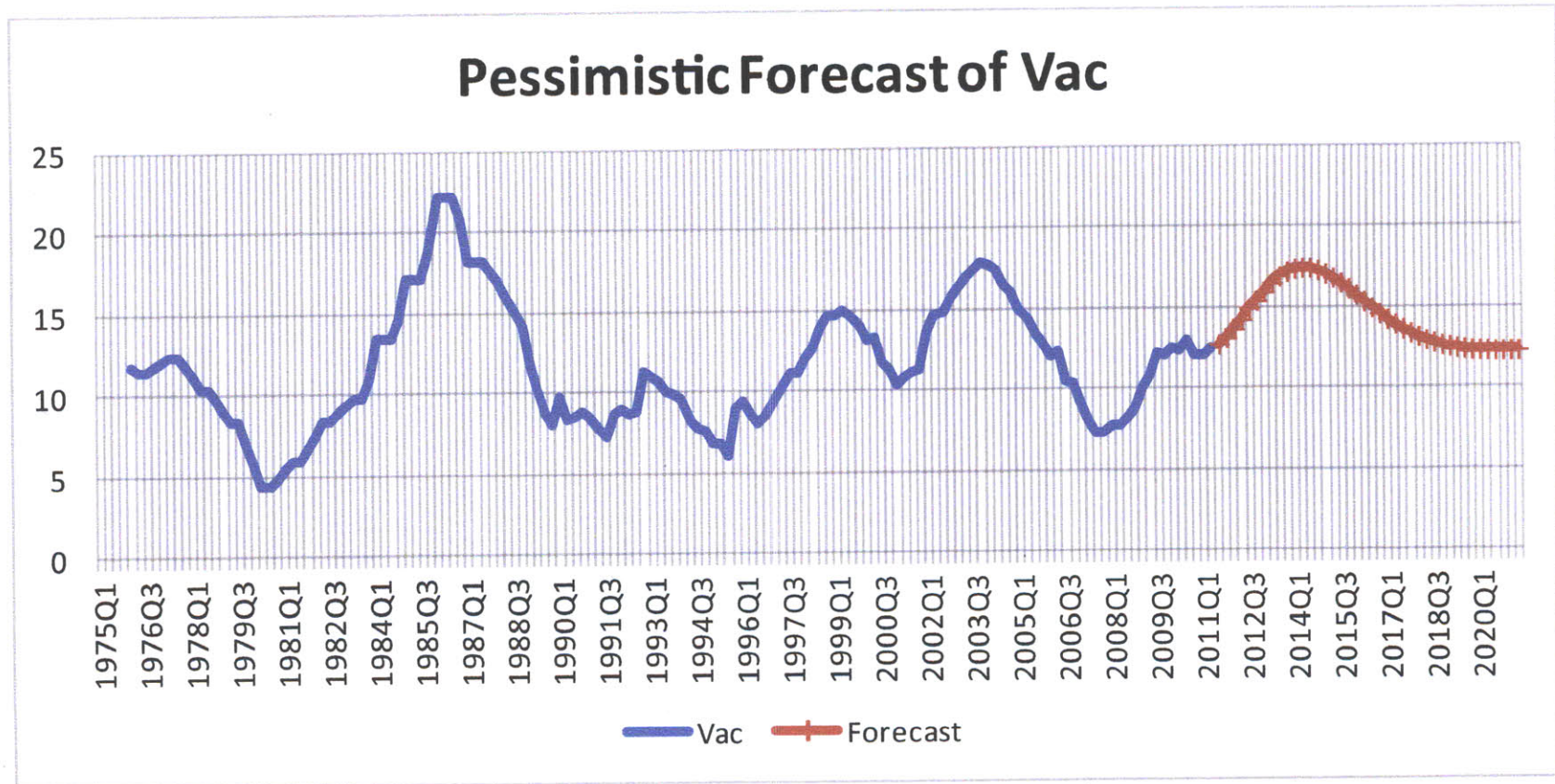


Fig28 Pessimistic Forecast of Vacancy
(Source: Author)

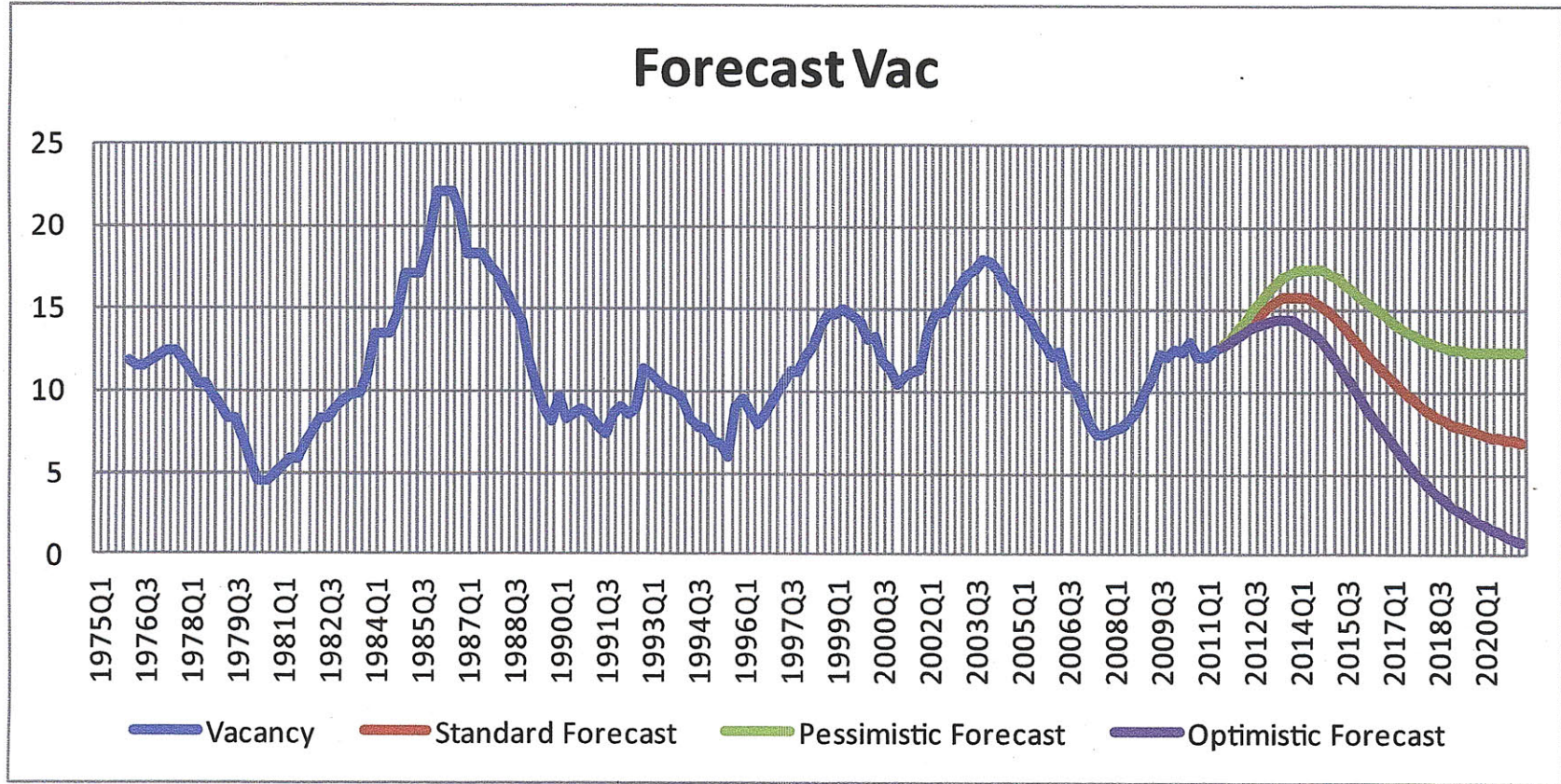


Fig29 Forecast Comparison of Vacancy
(Source: Author)

1.433 Optimistic and Pessimistic Forecast for Vacancy

As a result of weakening demand compared with great amount of supply in the pipeline, office vacancy rate increased by 40 basis points over the quarter to reach 6.70% in Q4. In the core CBD, the vacancy rate increased to 8.80% from 7.70% last quarter. This is off the back of 3.5 million sf of available office space of which 2.3 million sf is located in core CBD. Going forward, we expect that some of the existing secondary stock will be refurbished and it will compete with the new space. With increasing vacancy rates further pressure on rents is inevitable and will create a favorable tenants' market.

The optimistic forecast sees the vacancy to further expand only till the mid 2013, during which the buy side market would make office space landlord upgrade their space and services to compete with the upcoming new high end office products in a more favorable location in the marina bay CDB area. This in the long run has make Singapore's office market significantly more competitive against other prime locations in Asia, such as Hong Kong or Shanghai. Under this scenario when the global economic circle is

back to favorite the financial services industry, the Singapore office market would quickly become the hot spot of the global market. The Optimistic forecast captures this scenario rather vividly. The vacancy picks up slowly till 2013 for about 16% after 2014 its start to go down dramatically and reach a unimaginable low level in 2021 less than 1 %.

In the pessimistic forecast, vacancy rise up quickly and reaches the peak in 2014 almost 40% increase in vacancy rate. It then slowly comes back down and stables in third quarter 2018 remaining in a relative high level, approximately the vacancy rate in the 2011 level 12.5%, which shows the bearish outlook in the market.

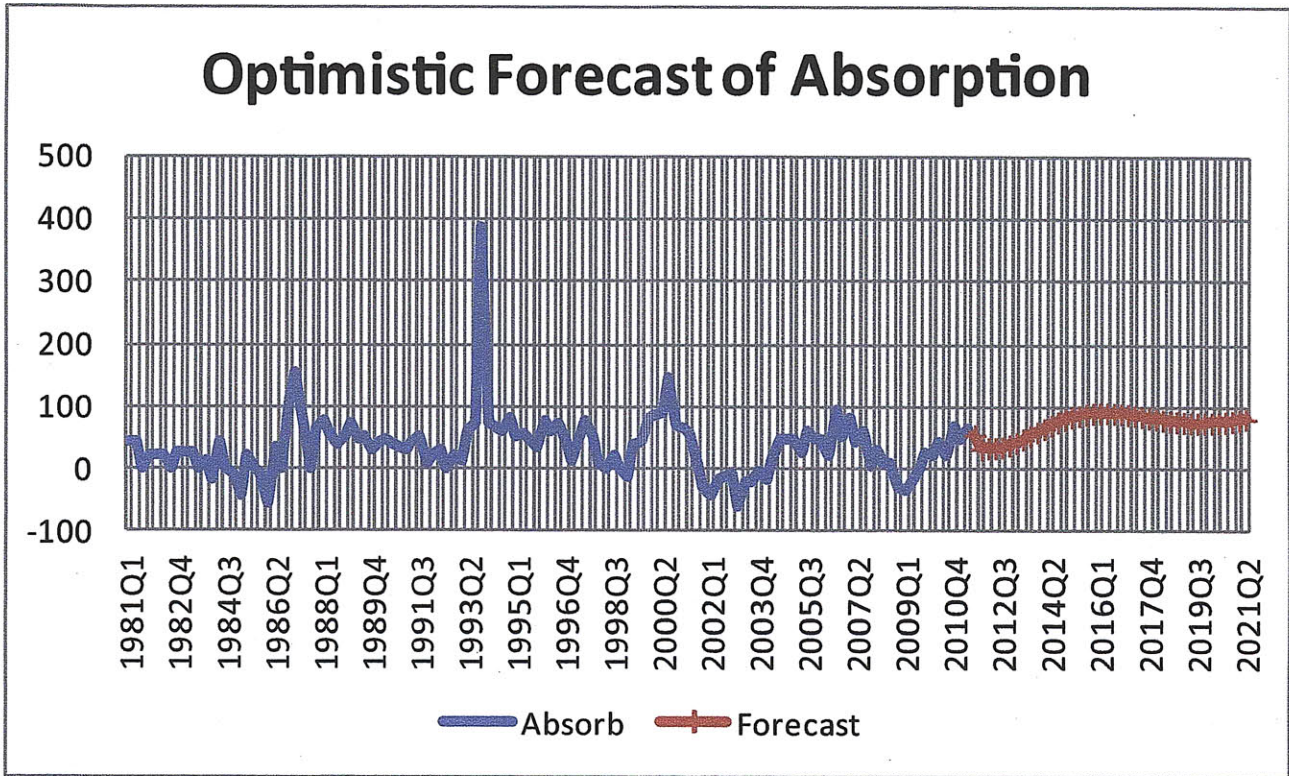


Fig30 Optimistic Forecast of Absorption
(Source: Author)

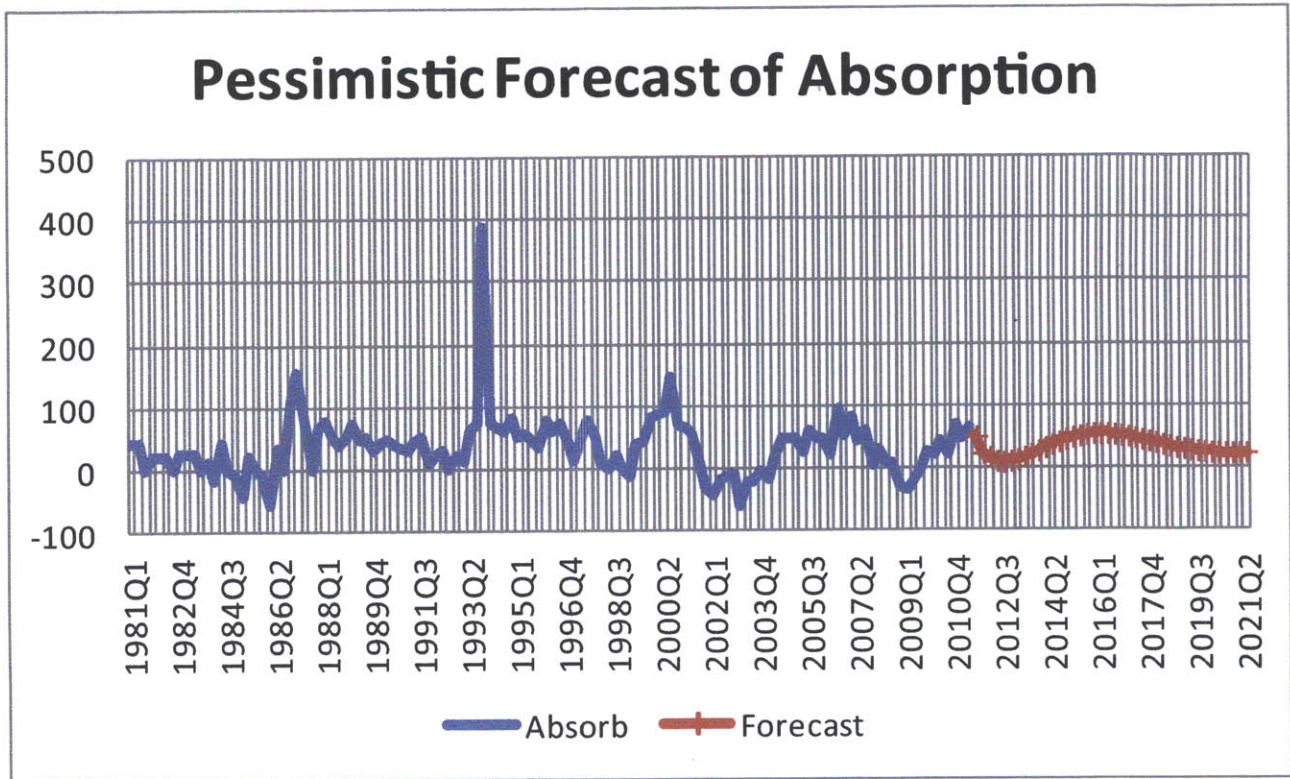


Fig31 Pessimistic Forecast of Absorption
 (Source: Author)

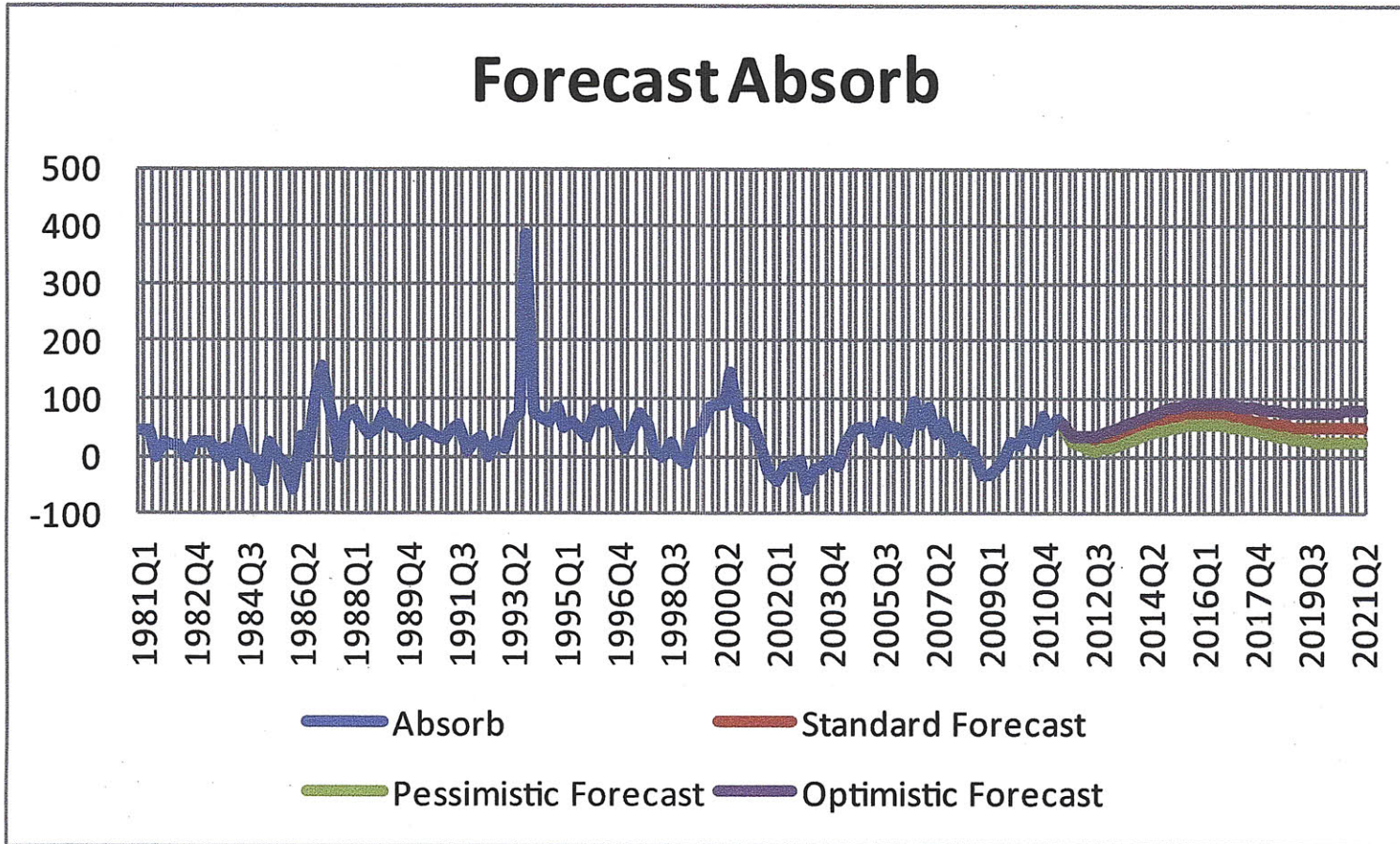


Fig32 Forecast Comparison of Absorption (Source: Author)

1.434 Optimistic and Pessimistic Forecast for Absorption

2011 was the year of contrasting halves and many market changing events. In H1 2011, almost 2.7 million sf were delivered and the market recorded high, above average, net absorption figures. In H2 2011, confidence in the economy had been undermined and it was reflected in weakened office demand. Overall, the annual net absorption came to over 2 million sf. In Q4, however, a net absorption was modest 78,000 sf. Going forward, the anticipated declining demand will be a key concern as corporates remain hesitant to make new investments. That said, CBRE notes that certain global industries are viewing Singapore favorably for expansion given the prospect of tax increases and with political uncertainties in the West.

Demand for office space has slowed in 3Q11 as rising economic uncertainties and slowdowns have caused occupiers to delay relocation and/or expansion plans. Absorption of space has been slower than expected, with new and older buildings displaying little quarterly change in occupancy. Net absorption of space in Raffles Place increased from 63,000 sqm to 89,000 sqm in 3Q11, while the vacancy rate rose from 6.9% to 8.6%. The increase

in net absorption and the vacancy rate can be attributed to the addition of about 117,000 sqm of netlettable area on completion of Asia Square Tower 1. The relocation of tenants from their existing space to Asia Square has left some older buildings with higher vacancy, however it is providing the opportunity for the remaining tenants to expand into the vacated space and for new start-ups to seek good-quality space

This has a good reflection on the model. In the optimistic model, given Singapore's strong economy and irreplaceable position financially and geographically in Asia, the demand will continue to go strong and peak around the year 2016, reaching the same absorption level of 2005, the boom year of the global economy. The absorption level will then slowly come down and stabilize at a high level. In the pessimistic model, compressed by relative low growth in GDP and office employment, the absorption level rise steadily but slowly to 2016 and slowly come down and reach the 2011 low absorption level in 2021.

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1.5 Regression Model Validation

1.51 Back Testing for Stock

1.52 Back Testing for Vacancy

1.53 Back Testing for Rent

1.54 Model Limitations

1.541 Interrelationship between the adjacent office market

1.542 Demonished Space in Supply Calculation

Back Testing for Stock

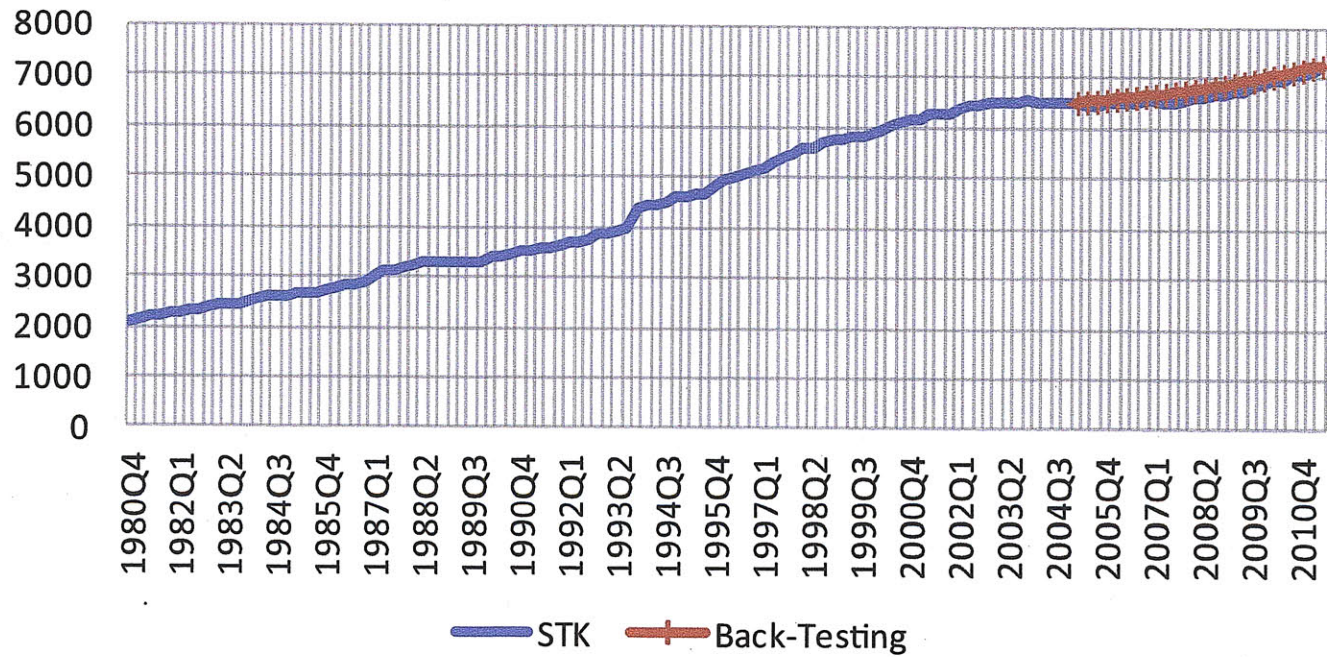


Fig33 Back Testing for Singapore office market Stock
(Source: Author)

Year	Forecast Stock	Actual Stock	Difference	Percentage
2005Q1	6505	6473	32	0%
2005Q2	6521	6451	70	1%
2005Q3	6535	6453	82	1%
2005Q4	6558	6465	93	1%
2006Q1	6578	6463	115	2%
2006Q2	6599	6510	89	1%
2006Q3	6619	6485	134	2%
2006Q4	6640	6529	111	2%
2007Q1	6662	6535	127	2%
2007Q2	6684	6502	182	3%
2007Q3	6709	6517	192	3%
2007Q4	6735	6524	211	3%
2008Q1	6762	6587	175	3%
2008Q2	6791	6604	187	3%
2008Q3	6821	6645	176	3%
2008Q4	6852	6656	196	3%
2009Q1	6885	6709	176	3%
2009Q2	6920	6747	173	3%
2009Q3	6957	6856	101	1%
2009Q4	6995	6877	118	2%
2010Q1	7035	6933	102	1%
2010Q2	7077	6966	111	2%
2010Q3	7120	7050	70	1%
2010Q4	7164	7056	108	2%
2011Q1	7209	7109	100	1%
2011Q2	7256	7214	42	1%

Fig34 Back Testing Data Comparison for Stock
(Source: Author)

1.51 Back-Testing for Stock

In order to access how well the model predicts the market movement, 5 years of data, from 2005 Q1 to 2011 Q2 has been removed from the calculation. The model is then run to predict the market movement during that period with the base forecast economic expectation i.e. 5% growth in real GDP and 2% growth in office employment.

As a result, the model very accurately predicts the market movement in the stock market with 0-3% deviation. This shows that the accuracy and efficiency of the model is good, for office stock the results predicted using the model is reasonable.

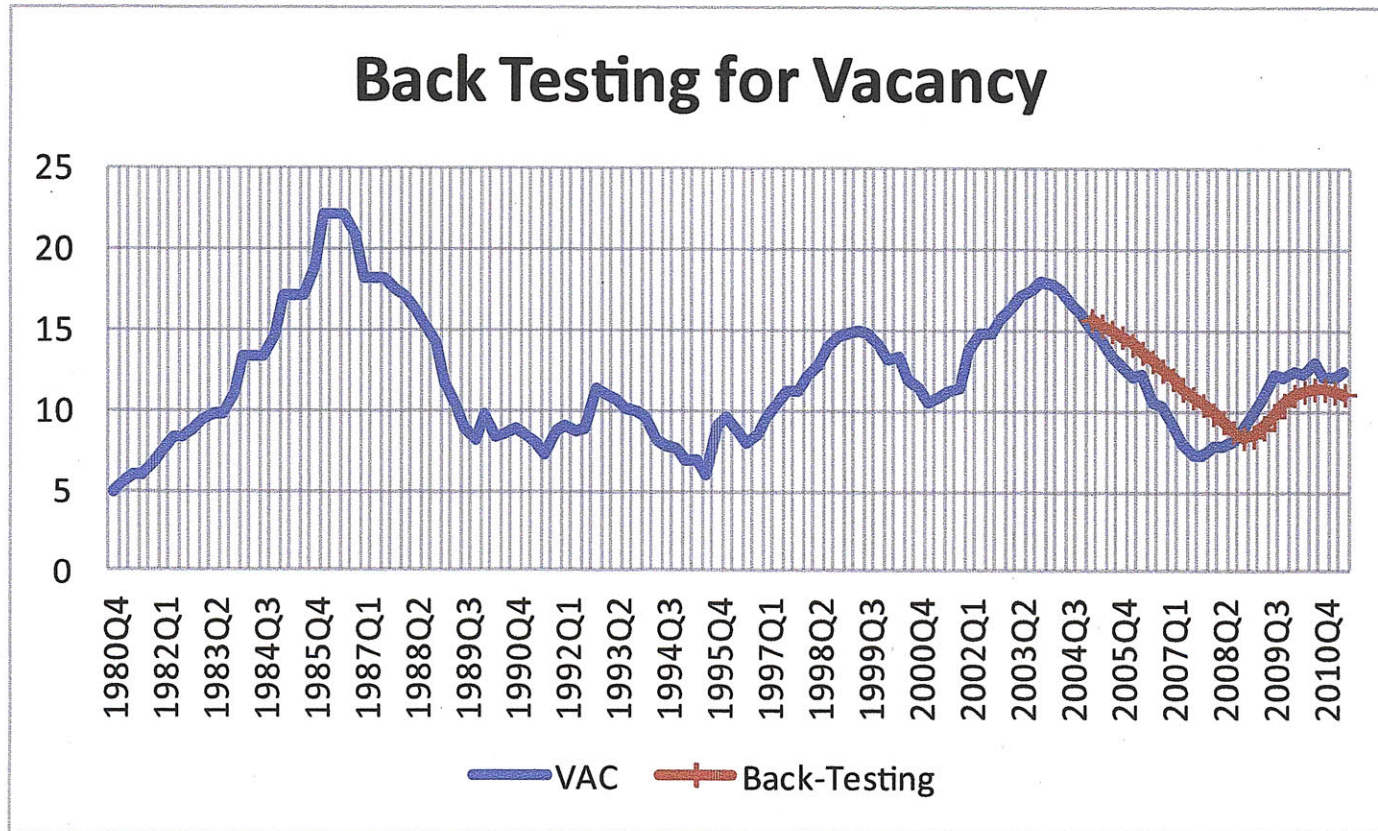


Fig35 Back Testing for Singapore office Market Vacancy
(Source: Author)

Year	Forecast Vac	Actual Vac	Difference	Percentage
2005Q1	15.67941462	15	0.7	5%
2005Q2	15.32319928	14.3	1.0	7%
2005Q3	14.97208595	13.4	1.6	12%
2005Q4	14.62420422	12.8	1.8	14%
2006Q1	14.15973421	12	2.2	18%
2006Q2	13.63630487	12.3	1.3	11%
2006Q3	13.12520239	10.5	2.6	25%
2006Q4	12.55493885	10.3	2.3	22%
2007Q1	12.03670616	9.1	2.9	32%
2007Q2	11.37491381	8	3.4	42%
2007Q3	10.87562355	7.3	3.6	49%
2007Q4	10.41794474	7.3	3.1	43%
2008Q1	9.83152318	7.7	2.1	28%
2008Q2	9.34660796	7.8	1.5	20%
2008Q3	8.75283306	8.2	0.6	7%
2008Q4	8.37716574	8.8	-0.4	-5%
2009Q1	8.45632713	10	-1.5	-15%
2009Q2	8.9412541	10.8	-1.9	-17%
2009Q3	9.70525687	12.2	-2.5	-20%
2009Q4	10.43213108	12.1	-1.7	-14%
2010Q1	11.00991486	12.5	-1.5	-12%
2010Q2	11.25497749	12.3	-1.0	-8%
2010Q3	11.39600224	13	-1.6	-12%
2010Q4	11.37398402	12.1	-0.7	-6%
2011Q1	11.20433236	12.1	-0.9	-7%
2011Q2	11.07636623	12.5	-1.4	-11%

Fig36 Back Testing Data Comparison for Vacancy
(Source: Author)

1.52 Back-Testing for Vacancy

It is important to see that in the data set, most of the indicators starts from around 1975 to 1980, the employment data from Singapore MOM only begins from 1991. This has significantly reduced the accuracy of the regression prediction. Statistically removing 5 years of data most adjacent to the current years would in theory cause the model at least 35% of its accuracy. Furthermore, Singapore's Office Market, primarily the Grade A office Raffles Place, Shenton Way and Marina Centre has huge impact on the overall market, meaning one or two transaction might cause huge vacancy plus or minus movement on paper. Coming to the back testing scenario, it is observed that the predicted vacancy differs from the actual situation by average 12%. However it accurately predicted the general vacancy movement and the stabilization period in 2009. Given the limitation in data collection for the office employment, the framework of the model is believed to be efficient and it gives a reasonable understanding of the vacancy dynamic in Singapore's Office Market.

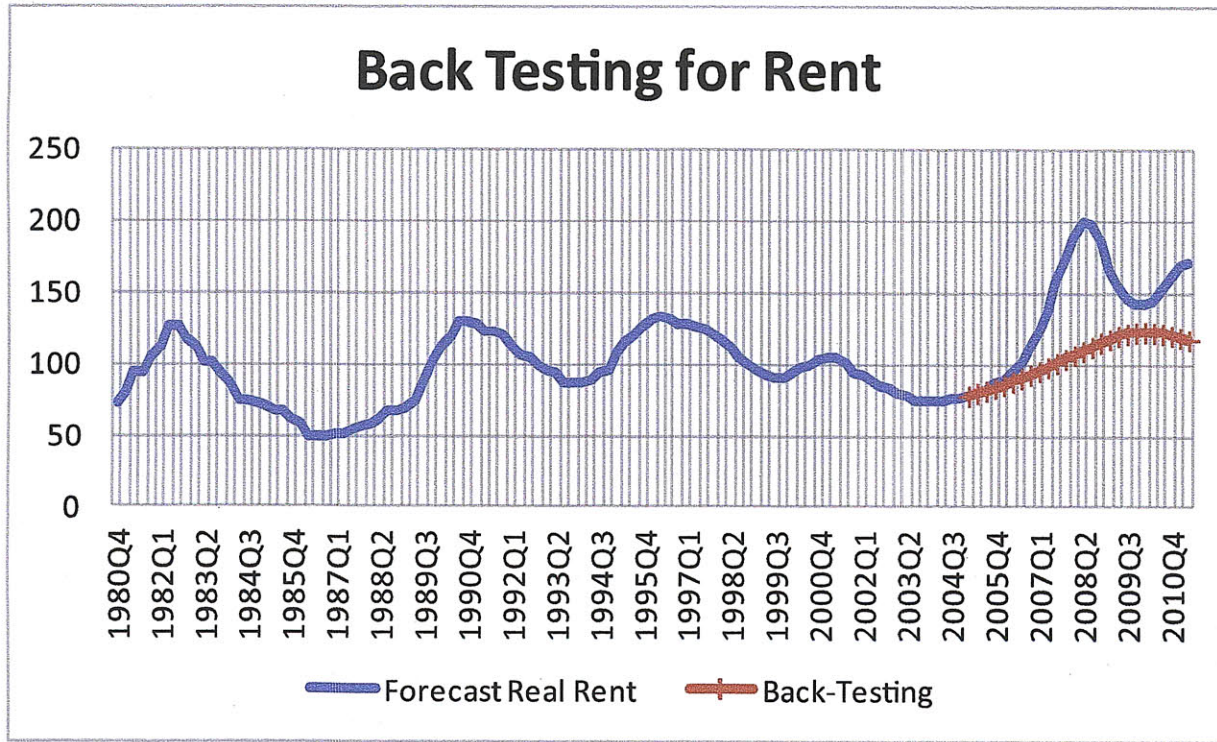


Fig37 Back Testing for Real Rent
(Source: Author)

Year	Forecast Rent	Actual Rent	Difference	Percentage
2005Q1	78	78	0	0%
2005Q2	80	79	1	1%
2005Q3	81	81	1	1%
2005Q4	83	86	-3	-3%
2006Q1	86	88	-3	-3%
2006Q2	88	94	-6	-7%
2006Q3	90	101	-10	-10%
2006Q4	93	112	-19	-17%
2007Q1	95	124	-29	-23%
2007Q2	98	138	-39	-29%
2007Q3	101	158	-57	-36%
2007Q4	104	175	-71	-41%
2008Q1	107	188	-81	-43%
2008Q2	110	200	-90	-45%
2008Q3	112	198	-86	-43%
2008Q4	115	185	-70	-38%
2009Q1	118	166	-48	-29%
2009Q2	120	153	-33	-21%
2009Q3	122	146	-25	-17%
2009Q4	123	142	-19	-13%
2010Q1	123	142	-19	-14%
2010Q2	122	144	-21	-15%
2010Q3	122	152	-31	-20%
2010Q4	120	159	-39	-25%
2011Q1	119	168	-49	-29%
2011Q2	117	171	-53	-31%

Fig38 Back Testing Data Comparison for Real Rent
(Source: Author)

1.53 Back-Testing for Real Rent Index

One weakness of the econometric forecast model is that it is incapable of predicting the external shocks and therefore the results would deviate from the actual situation. If one looks through what has happened in 2007 and 2008 in Singapore's office market, it is rather intriguing what has happened. In early 2007 Demand for office space has continued to strengthen in all sectors, not just in banking, asset management and finance. Energy companies, insurance, software, shipping, professional services and education are all growing. Very few large scale leasing transactions have taken place over the last 5 months, mainly due to the lack of supply. For the last 12 months market watchers have been predicting a chronic shortage of supply and we have now arrived at this stage. For large space users over 25,000 sq ft in the financial district there is already barely any choice and most companies will have no alternative but to wait 2 to 3 years until the market is relieved with a series of new developments such as Phase 1 Marina Bay BFC, Ocean Building, 9 Battery Road and Overseas Union House on Collyer Quay. This could also be observed from the vacancy diagram.

The primary reason why the model did not predict the rise in rent is due to the assumption that supply will logically follow up with demand. Singapore's own physical limitation has caused the building of office not as easy as compared to land abundant countries like China. In fact Hong Kong too suffers from the problem of land scarcity. This has delayed the office supply and creates the chronic shortage which cause the real rent continue to rise. The demand generated from the global economic boom since 2005 had diminished rather quickly too and the rent lands itself approximately where the then model predicts where the re-adjustment period would be. This boom and bust situation is hard to predict in the econometric model, as one core underlying assumption is that the market behave in the most reasonable way possible. And in the imperfect world of ours, the boom and bust will just continue.

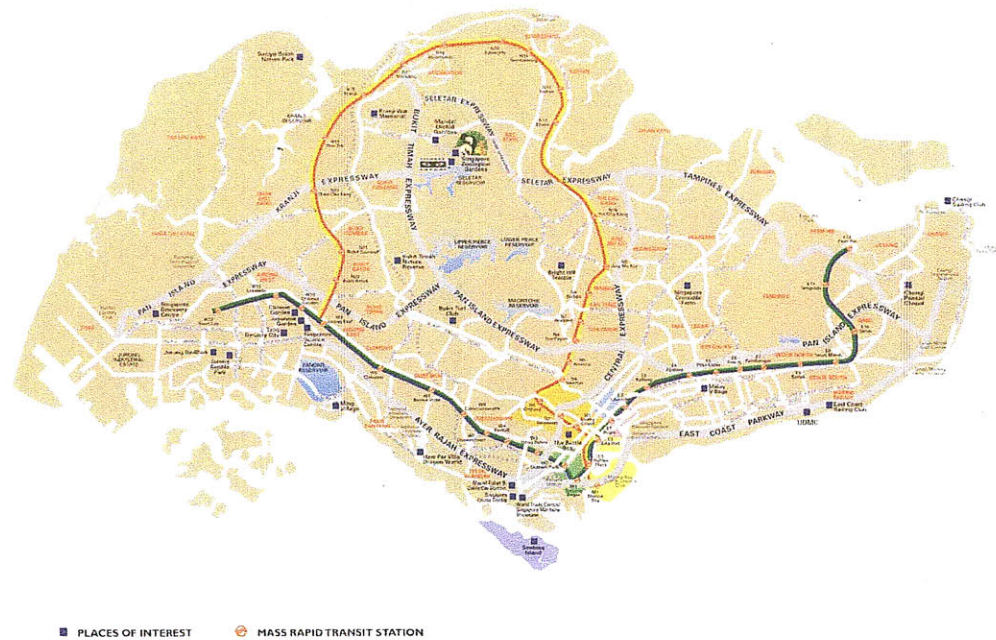


Fig39 Map of Singapore

1.541 Interrelationship between the adjacent office market

Since Singapore forms a huge metropolitan area with surrounding countries such Malaysia and other countries, the economic area might be bigger than the actual projection area of the city. Hence the economic conditions of surrounding sub-centers closely interact with those of City Core, and they influence the economic variables (e.g., rent, new supply, stock, and employment) affecting the Singapore office market. For example, many employees working in Singapore's Tampines area live in bedroom suburbs and satellite cities located outside of the Singapore boarder. On the other hand, employees living in Singapore do not necessarily work in the city.

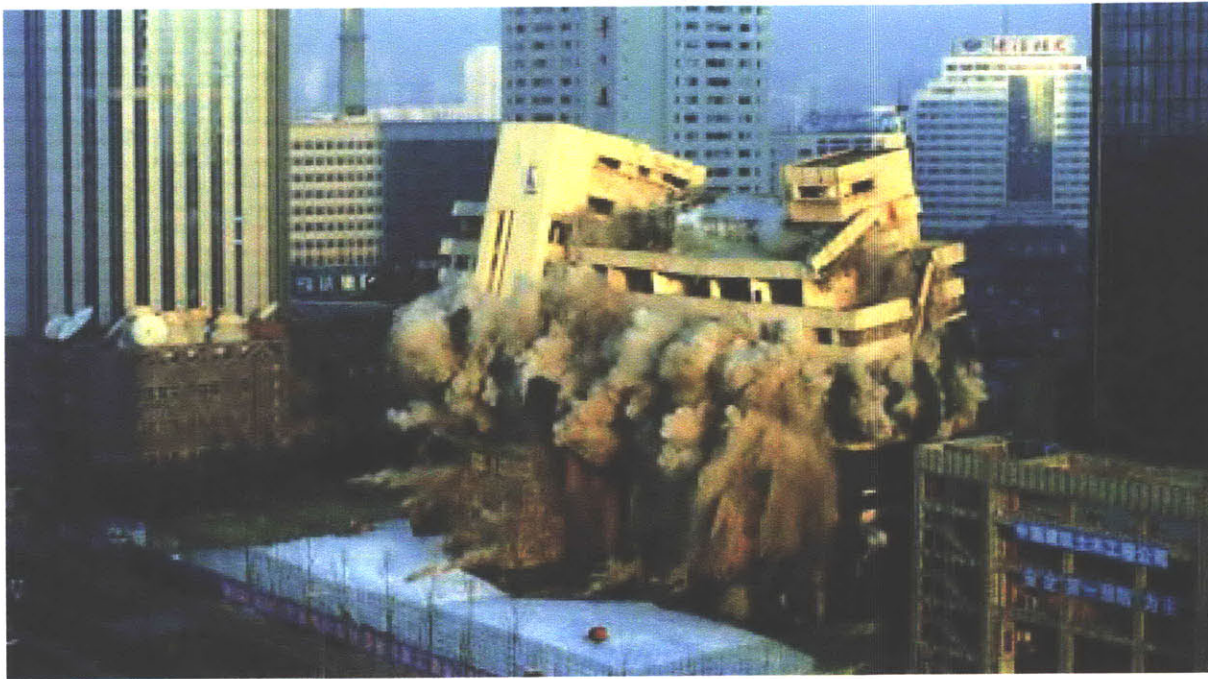


Fig40 Demolishing an office tower

1.542 Ignorance Of Demolished Space In Supply Data

The stock data used in this thesis are calculated by adding up all available office space completed in each period. However this method omits the fact that there are office buildings being demolished along the way. In countries like Singapore where generate redevelopment is done in a fairly fast pace, this method might generate considerable inaccuracy in the calculation. One step forward to make the data more close to reality is to check how many sqft of office space has been demolished during the period from 1980 till now, and how many sqft of office space is built on top of those spaces. This would give a more accurate estimation of the office stock. However one reason why this is not considered as a huge issue is that, Singapore is a relatively young country, and the study period is only from 1980 onwards, for the office building type targeted in this research, the amount of office space omitted due to the ignorance of demolished spaces is believed to be of minimum level.

chapter 01 | Time Series Econometric Forecast Model for Singapore Office Market

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1.6 Comparative Study with Key Asia Cities

1.61 Hong Kong

1.62 Bei Jing

1.63 Shang hai

1.64 The Competitive Advantages of Singapore Office Market



1.61 Hong Kong

In many Asia countries, economic structural change can generate large than proportional growth in the tails of the job distribution, in which tertiary area has significant impact on the office market. From 1980 to 2011 Hong Kong's population grew by 39%, and its employment grew by 48%. The transformation of its economy towards a more financial services focus economy has boosted its real GDP by 410%. As a result, its office space also grew by 230% during our study period.

From the econometric model results generated, global economic concerns led to a noticeable drop in demand for office space towards the end of 3Q11. Net absorption in 3Q11 was 1.17 million sq ft (net), although a significant portion came from the completion of the self-occupied Central government offices complex in Central. For commercial Grade A office space, net absorption was a more modest 324,500 sq ft (net). Vacancy rates continued to fall across the markets, but were starting to move higher in Central towards quarter end. The overall vacancy rate stands at 4.4%.

[1]

Although uncertainties about the short-term business outlook caused some occupiers to put expansion plans on hold, the significant rental gaps that have opened up between individual buildings, and the consolidation and upgrading opportunities provided by large tracts of latent space available continued to drive relocations in Hong Kong.

The Euro-zone crisis has put the solvency of banks back into question. With several banks already announcing plans to pare back their global workforce, demand is likely to remain poor over the near term. However, demand from broader services sector should continue which pushes the absorption back to a higher level. As vacancy comes down, rents to adjust back to the long term average level. [2]

[1] Data sourced from CBRE Econometric Advisors

[2] Market Research from Jones Lang Lasalle.

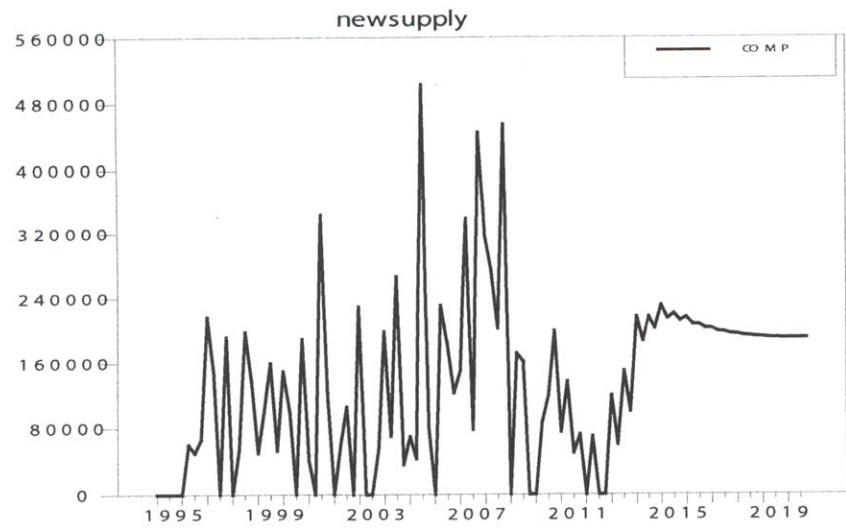
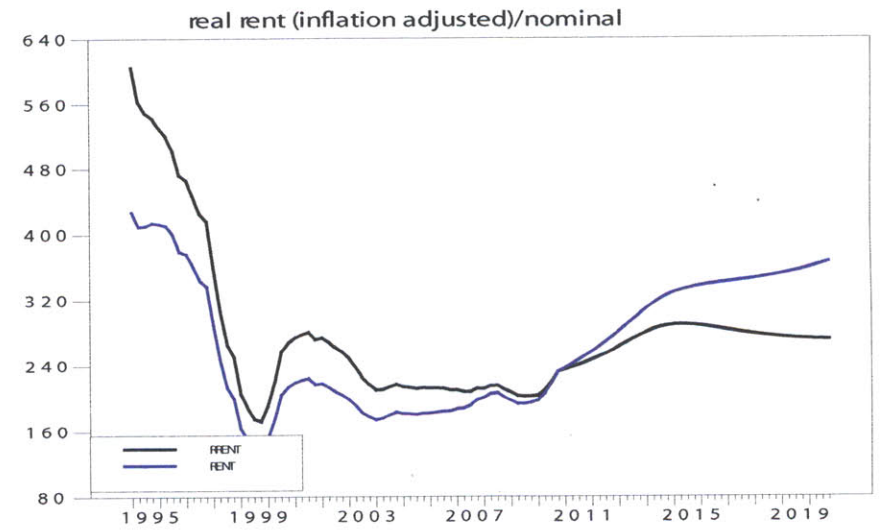
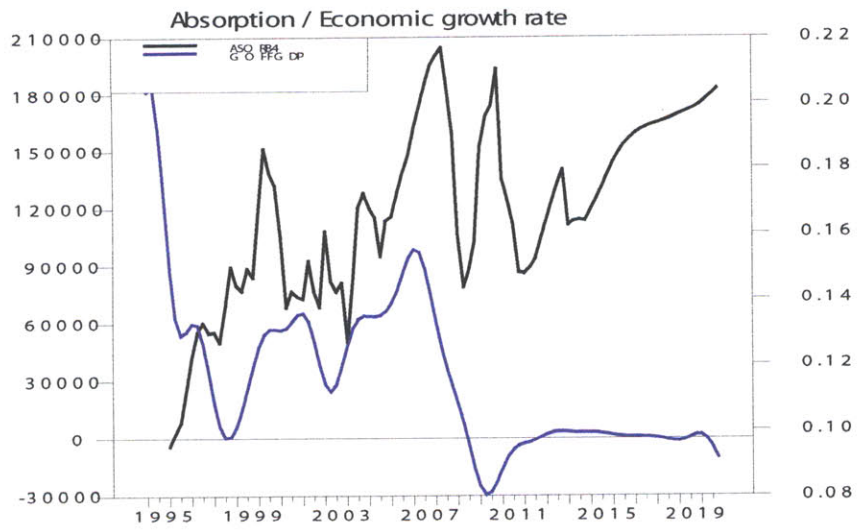
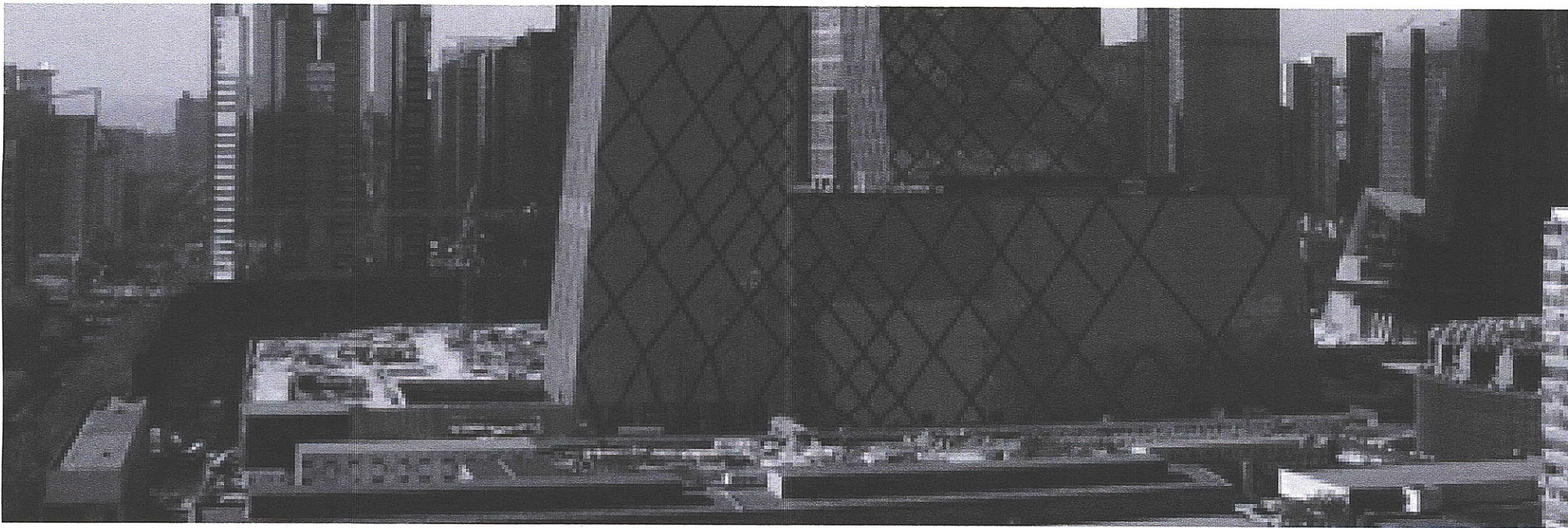


Fig41 Hong Kong Office Market Forecast
 (Source: CBRE Econometric Advisors)



1.62 Bei Jing

Despite the volatile global financial market and lower expectations of economic growth worldwide, demand in the Beijing office market continued to be strong as MNCs experiencing rapid market growth in China continue to demand more office space to handle business expansions, consolidations or new set-ups. Meanwhile, domestic companies, such as SOEs or privately owned companies, continued to show insatiable demand for self-use buildings. Tenants' bargaining power was further weakened due to the shortage of supply. The market again is moving towards a landlord dominant one, with measured supply, vacancy coming down and rent going up.

In terms of leasing demand, financial entities, consulting firms, law offices, and high-tech and manufacturing companies were the leading drivers. With limited vacant space and record high rents in the market, some companies with plans to expand chose to renew or expand within their current

location, while others were forced to relocate/expand externally.^[1]

Despite the forecast slowdown in global economic growth, Beijing is expected to continue to attract new set-ups and experience business growth, driving up office space demand. Companies' increasing price-sensitivity to expensive rental costs and the slowing down of office expansion activities are expected to ease the aggressive growth in rents over the coming quarters; while the improving performance of office rental income is expected to continue driving capital value growth.^[2]

[1] Data sourced from CBRE Econometric Advisors

[2] Market Research from Jones Lang Lasalle.

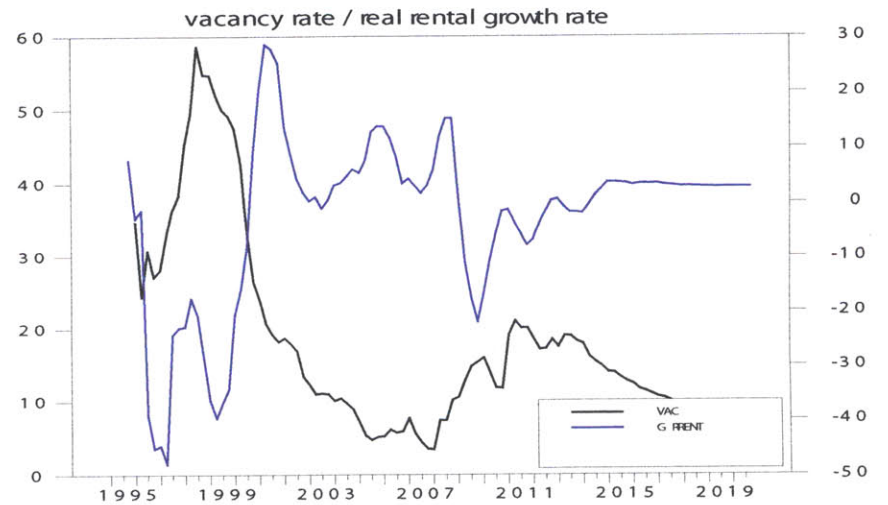
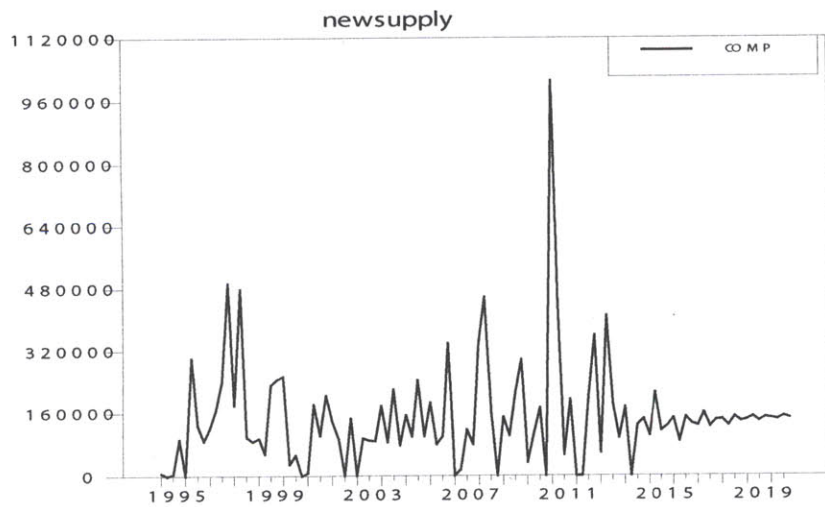
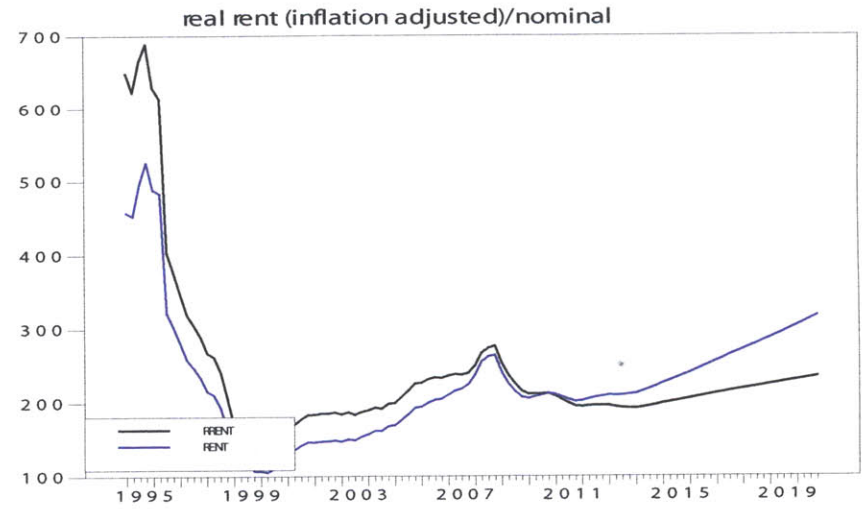
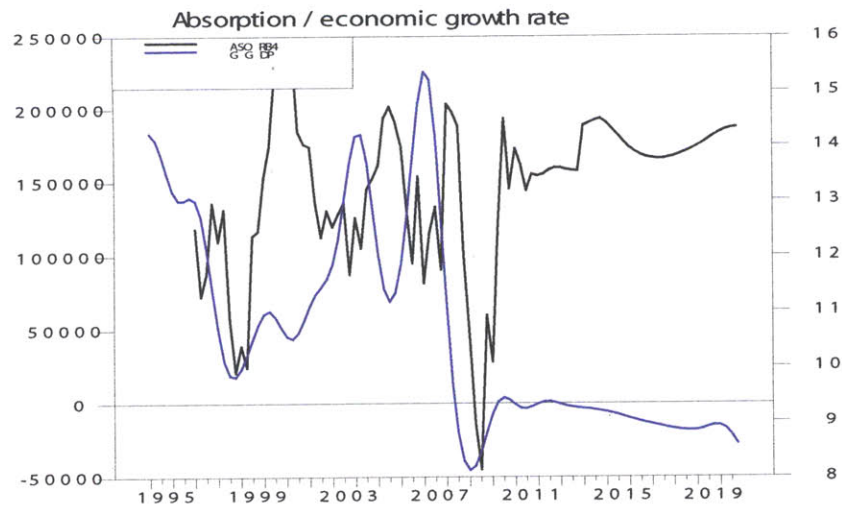


Fig42 Bei Jing Office Market Forecast
(Source: CBRE Econometric Advisors)



1.63 Shang Hai

Leasing demand and net take-up remained strong in Shanghai's office market in 3Q11. In Puxi, expansion demand from MNC tenants drove the market for Grade A space with both new buildings and upcoming projects enjoying an active leasing market.

Four new Grade A CBD buildings were delivered in 2011, three of which were in Pudong. Taiping Finance Tower in Lujiazui added a GFA of approximately 90,000 sqm and has enjoyed strong leasing with 76% committed. In Zhuyuan, Lujiazui Investment Tower (34,020 sqm) and Lujiazui Fund Tower (32,060 sqm) were completed. In Puxi, Yes Commercial Building was completed, adding 65,100 sqm to the Grade A market. Despite the new completions, strong pre-leasing in the new buildings ensured the vacancy rate in Pudong and Puxi only increased slightly to 9.3% and 7.0%, respectively. In the decentralized market, five buildings with a total GFA of 312,270 sqm were completed in 3Q11. ^[1]The record high 2011 new supply, pushes vacancy up to more than 10%, rents

look to decline through 2013.

Rents continued rising across Shanghai as expansion and upgrade demand remained strong and landlords maintained bargaining power. Average Grade A rents reached RMB 8.6 per sqm per day in 2011. Looking forward, we expect MNCs to continue with expansion plans. In Puxi, only a limited number of buildings are expected to reach the market before the completion of Phase II of the Kerry Center in 3Q12, and those that are completed will quickly be filled by demand from MNCs and domestic companies. In Pudong, a large portion of upcoming space will be taken by owner occupiers or developers, therefore landlords should maintain bargaining power. Concerns over Europe's debt crisis, however, could impact demand in Pudong, which remains highly exposed to the financial industry. Shanghai is clearly overbuilt for the next few years. Longer term, there is balance, but potential supply always limits appreciation. ^[2]

[1] Data sourced from CBRE Econometric Advisors

[2] Market Research from Jones Lang Lasalle.

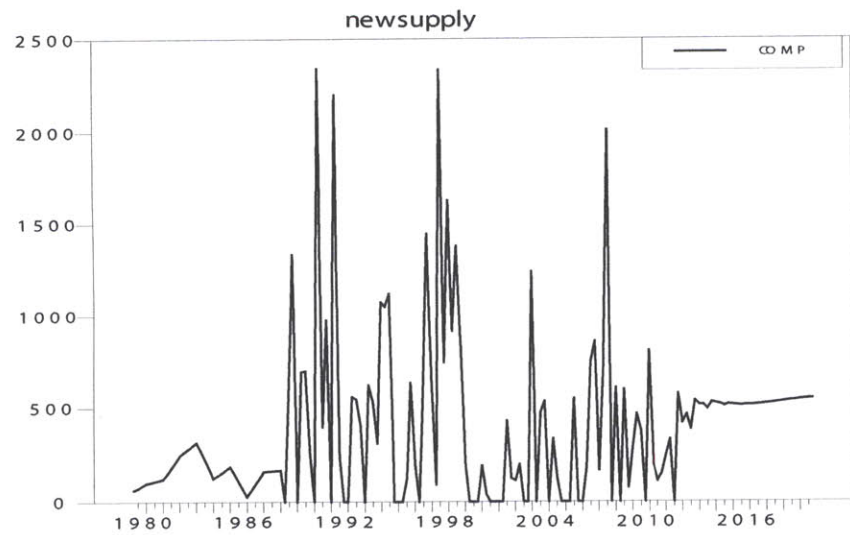
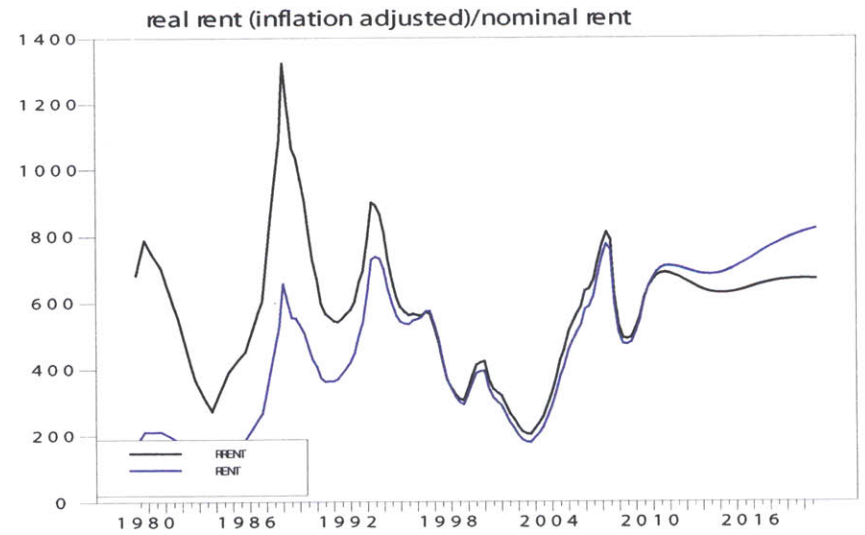
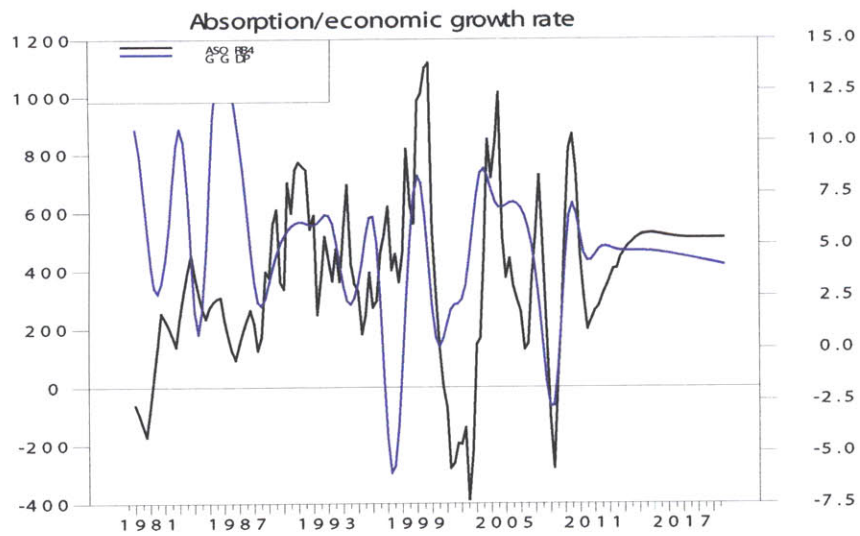


Fig43 Shang Hai Office Market Forecast
 (Source: CBRE Econometric Advisors)

Americas
Asia-Pacific
EMEA

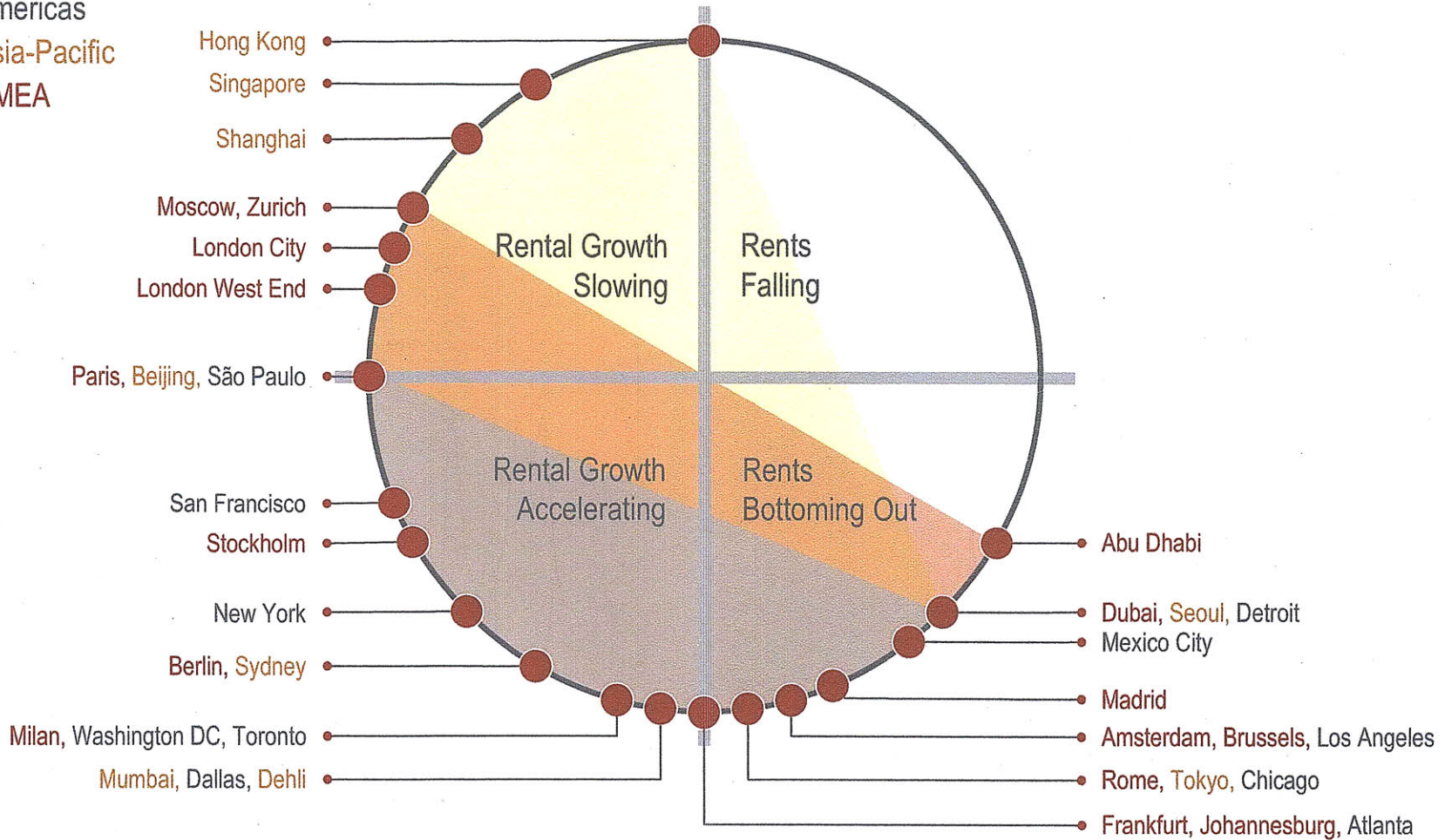


Fig44 Global Property Clock
(Source: JLL Resarch)

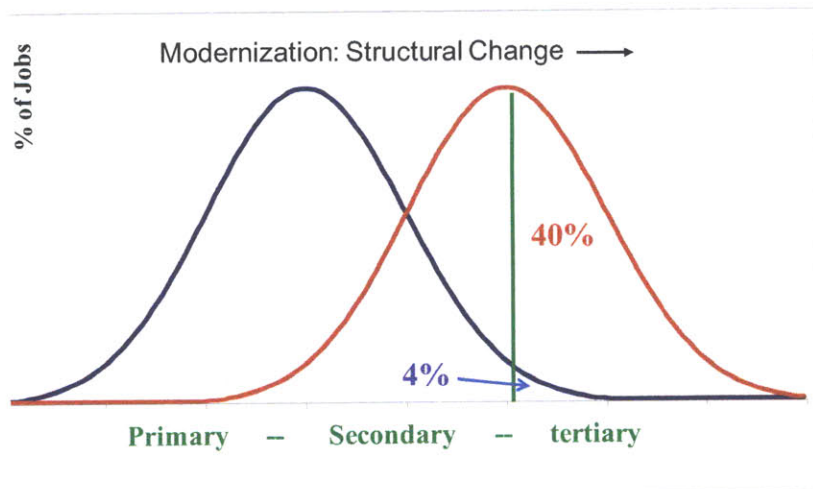


Fig45 Modernization & Structural Change
(Source: Author)

1. 64 Across the Market Comparison

In this chapter, the intention is to compare and contrast Singapore's market with three other Asia cities with similar socioeconomic character. We could observe that there are many similarities, predominantly caused by global financial situations as all four of them are considered to be the most prominent financial center within the region. All four cities had experienced enormous structural transformations. With reference to the diagram, A 40% increase in Average incomes can generate a 400% increase in demand for services, which in turn creates demand for office spaces across these countries. Nevertheless, the difference in each cities are very large. For instance, in Shang Hai the situation of over-built of office space would tend to keep the rental appreciation stagnant, however the author found out after interviewing the developers and private equity investor, that the overall sentiment in the market is extremely positive. The office market are more segmented, with local governmental office demand and more and more Class B tenants gathering momentum to target Class A market, the oversupply tend to have little impact over the long run.

Whereas in Singapore, there oversupply of office space is also a problem, the niche character possessed by the country in terms of financial and geographical position, allows the country to effectively bounce back its rent and vacancy level to normal level within a short time frame. Beijing and Hong Kong's markets are look in balance, and growth is still going strong. In Hong Kong, the country continue to face the problem of land scarcity, and shortage in supply. This in the short run has pushed many firms looking to expand their business in the region to relocate to Singapore, where the financial infrastructure is equally developed , rents much cheaper and more state of the art office building in stock to choose from.

More major take away from this study is that, people tend to think of Asia real estate sector as one market, or similarly taking China for instance as one real estate market, in reality this is a false understanding of the real estate sector. Comparing between the cities, there might be some degree of correlations in several of the indicators, however generally the market behave in very independent ways. This is primarily caused by the difference in the dynamics in development industry i.e. the relationship between Capital, Government, Developers and users. Due to these difference in the development food chain, the capitalization rate in each market are different from one another. The food chain system in each one of these places presents itself as a curious case in which one could almost start to wonder, is there a possibility to optimize the system so we the market can reach a better efficiency and balance.

In JLL Research's property one could also see the relative stages each market has positioned. Hong Kong and Singapore after experiencing slow rental growth and exposing themselves relatively more to the bearish global financial market are looking to see some initial decrease in real rent. Whereas Bei Jing and Shang Hai backed by strong internal and external demand, would continue to see some space in rental growth, most likely in a slow pace.

Chapter 01 | Time Series Econometric Forecast Model for Singapore Office Market

1.7 Conclusion - The Market and the Players

1.7 The Conclusions: The market and The players

This thesis is inspired by Singapore's recent effort in building a new skyline in this Maria Bay, it is the author's intention to extend an inquiry into the factors that influenced Singapore's office market and products. With this intention, the thesis employed the discipline in econometric structural modeling for period around 1975-2011. Using data collected from Singapore's Urban Redevelopment Authority, the regression model dissect the market elements and project an understanding of the underlying market mechanism, and with that forecast for the next 10 years in quarterly interval, the future market behavior.

The modeling process starts with data collection and analysis. To get the most complete time series, more often than not, one has to combine the data collected from different sources to piece together the picture. In this case, the challenge was to merge the annual data collector from CBRE Econometric Advisors with Singapore government's quarterly data series. With employment data collected from Singapore MOM and GDP data from Singstats, three equations are constructed to explain rent,

demand and supply respectively. In the demand equation, demand can be expressed in terms of occupied stock, past rent, past real GDP immediate office employment level and past office employment level. Similarly, in the supply equation, supply can be seen as the synergy between past completion, past rent and past vacancy. Supply is a major factor that affect the dynamics between landlord and tenant. A high vacancy market will put tenants in the driver's seat, and vice versa. Lastly, rent can be expressed in past rents and vacancy rate. This is due to the observation that myopic expectations sometimes influence the way investors make decisions, and there is a tendency to make decision based on the current market even though in theory it takes longer for properties to pass through the development pipeline.

The model forecasts with the three equation system shows that there is a slight oversupply for next three to four years which would on one side make the office market on the landlord side more competitive, but on the other hand, it forces the older office building to reinvent itself

to compete with incoming more state-of-the-art office building. In the short run, a tenants- dominant market is unavoidable. However given Singapore's unique location, relative low office average rent compared to other financial centers like Hong Kong and its own position in financial competitive landscape, the oversupply is likely to be balanced soon by demand generated in the financial services industry. It is also interesting to look at the vacancy forecast, it only take 5% economic growth and 2% employment growth to keep the vacancy in a relatively healthy level. For Singapore's current economy, it would not seem to be a huge problem. And from the forecast trajectory one can also see that if the economy is in a better shape, the vacancy level would reach ideal level in 2014.

Despite careful considerations, there are some inherent limitation to this method. From back-testing scenarios, the model fails to capture the rental shoot-up in 07 and 08. This is partially due to the fact that the model assume efficient market and rational investors and developers. In reality however, many factors could contribute to a late delivery of supply, for instance government approval process and other policy factors. The actual market is indeed far more complicated than what has been constructed in the model. Such inaccuracy in the model can hardly be eliminated. There are however other factors affecting the model predictions which could be improved. For instance, the data in stock is calculated by adding completions in each period and demolished office building space are not taken into consideration. Besides, there are data inaccuracy in evenly spread annual data in four quarter when translating annual data to quarterly date. Such problems could be eliminated by using better data sets.

Comparing to most "fortune telling" in the market, the regression study is believed to be more of an educated guess, which allows people to take a deeper look at the reason why there is market inefficiency, and shortage or oversupply. And this give people a better sense when it comes down to making a decision for the next 3 to 5 years in office transaction.

Besides focusing on Singapore's Office Market, the thesis also projected a

curious look into Asia's other major financial centers: Hong Kong, Bei Jing and Shang Hai. Although under the similar global financial recession and bearish financial industry sentiment, the markets behave rather differently. Which inspired the next portion of the thesis to look into the elements that cause not only different market behavior but also different reale state/ architectural products.



Chapter 02 | The Urban Monsters

- 2.1 Real Estate Food Chain System
- 2.2 The Evil of OTC Sytem?
- 2.3 Three Hyphtosis
 - 2.31 Ghost in The Shell
 - 2.32 The Monters Ball
 - 2.33 The Power Redistribution
- 2.4 Real Estate_Unreal Estate_Sureal Estate
- 2.5 The Urban Monters
 - 2.51 the Government
 - 2.52 the Banks
 - 2.53 the Participation
 - 2.54 Hypothetical Private Equity Investment Model

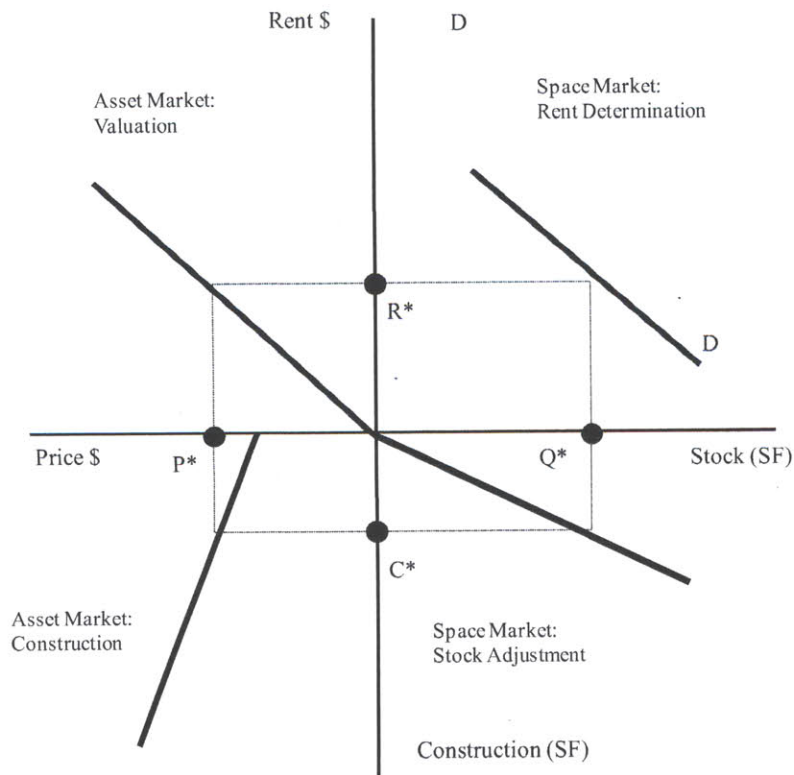
“...it's my hypothesis that the individual is not a pre-given entity which is seized on by the exercise of power. The individual, with his identity and characteristics, is the product of a relation of power exercised over bodies, multiplicities, movements, desires, forces.”

— Michel Foucault

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Here I believe one's point of reference should not be to the great model of language (langue) and signs, but to that of war and battle. The history which bears and determines us has the form of a war rather than that of a language: relations of power, not relations of meaning.

- Michel Foucault



2.1 The Real Estate Food Chain System

The world of development industry is fundamentally shaped by the provision of the financial industry and the economic social phenomena: market and produces a system which organize itself around a dual market system: space market and asset market.

^[1]In which, space market is the use of real property and asset market works as an integral of the larger capital market, which represents the ownership of the real estate asset. The dynamics could be explained by the Four Quadrant model in which the correlation between the supply and demand side both market gives an explanation of the boom and bust of the real estate market.

Ideally if we hold the assumption that real world situation follows such widely recognized Four Quadrant system, the world of real estate market would be relatively predictable given two cities with similar locality and socio-economic attributes.

[1]David Geltner"Commercial Real Estate Analysis and Investment"

From our forecast in the previous chapter, the observations indicate otherwise. The trends of the real estate markets are extremely unpredictable even for the office market which are less influence by random crowd decision factors. We also notice that each city would develop an unique inertia which it would likely to obey periodically.

This thesis develops a particular bias of the industry centered on the understanding of Genius loci and Zeitgeist, proposed by thinker and architect Peter Eisenman. Through which, the thesis sees the essence and probably the biggest crisis of our age to be the process in which financial sector grows and becomes a dominant force which tilt the balance created by the fair dollar vote system in capitalistic development framework.



2.2 The Evil of OTC Sytem?

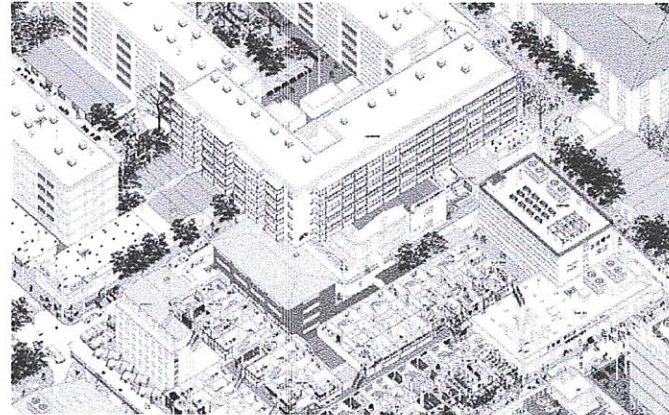
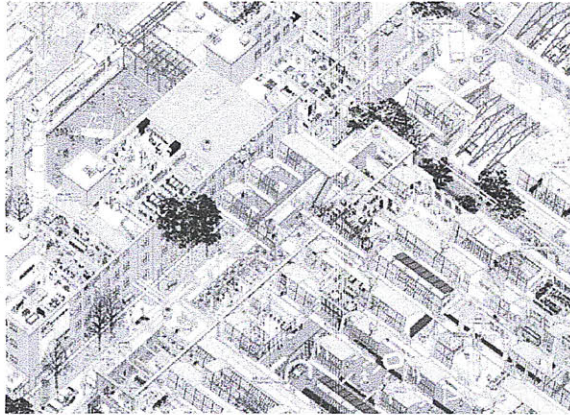
How do I respond to a congressman who asks if the financial sector in the United States is so important that it generates 40% of all the profits in the country, 40%, after all of the bonuses and pay? Is it really a true reflection of the financial sector that it rose from 212% of value added according to GNP numbers to 612% in the last decade all of a sudden? Is that a reflection of all your financial innovation, or is it just a reflection of how much you pay? What about the effect of incentives on all our best young talent, particularly of a numerical kind, in the United States?1

[Wall Street Journal, December 14, 2009]

By extracts excessively "high rents" in terms of social benefit and best talents in the labor pool, from the provision of the financial framework/services. The OTC market system creates the rules of games which regulates the human activities in financial time: production, consumption and value system according to its own value allocation. Particularly for the real estate industry in third world developing countries where the influence of the government is not based on legislation, the system becomes a process of war where each party involved in the development process would struggle to maximize its benefit or struggle to survive.



Fig46 Cheng Guan



One would intuitively ask the question: Why it is not a fair system and where the financial sector gets its power from? The OTC system is an informal market where sellers of assets match with informed dealers and negotiate terms bilaterally. This is particular in contrast to organized markets, where all quotes and transactions are posted. As a results of the scarcity of informed dealers and opacity of the OTC market, informed dealers are able to extract an informational rent from the selling party, in our case, the investors would impose large informational rents to the party lower down in the food chain. The receiving parties: the end users would have to bear the burden or fight its own way up the food chain system.

This thesis proposal is centered on the notion of "living as urban participation". Dwelling as an activity in this current milieu where role play in the system of power are essential to success was problematized; In the era when social "cloud participation" has given rise to Facebook, Twitter and Wikipedia, what does work, live and play mean in this current environment where indulgence and consumption for its very own sake is very much part of the cultural lifestyle. In as much as it is about providing plausible answers, this thesis challenges the existing power system in the Real Estate industry, instead of taking dweller's spatial appropriation as guerrilla activities, the thesis proposes ways that channels such "cloud

participation" into system of value production. Architectural proposition therefore works in way which turns these inherent power struggle scenarios into formal expression.

By deconstructing the Real Estate industry in Asia, its four major player: Capital, Government, Developer and Dwellers, are dissected in context where each had the opportunity to dominate the market and give birth to its own genres of Urban Monsters. For instance, in Mainland China the severe shortage of investment products has lead to an overflow of hot money(capital) into the real estate market, which has lead to the surreal urban monstrosity: the Ghost Town, Vertical Tomb, Signature Overflow and the Total Abandon of Authorship.

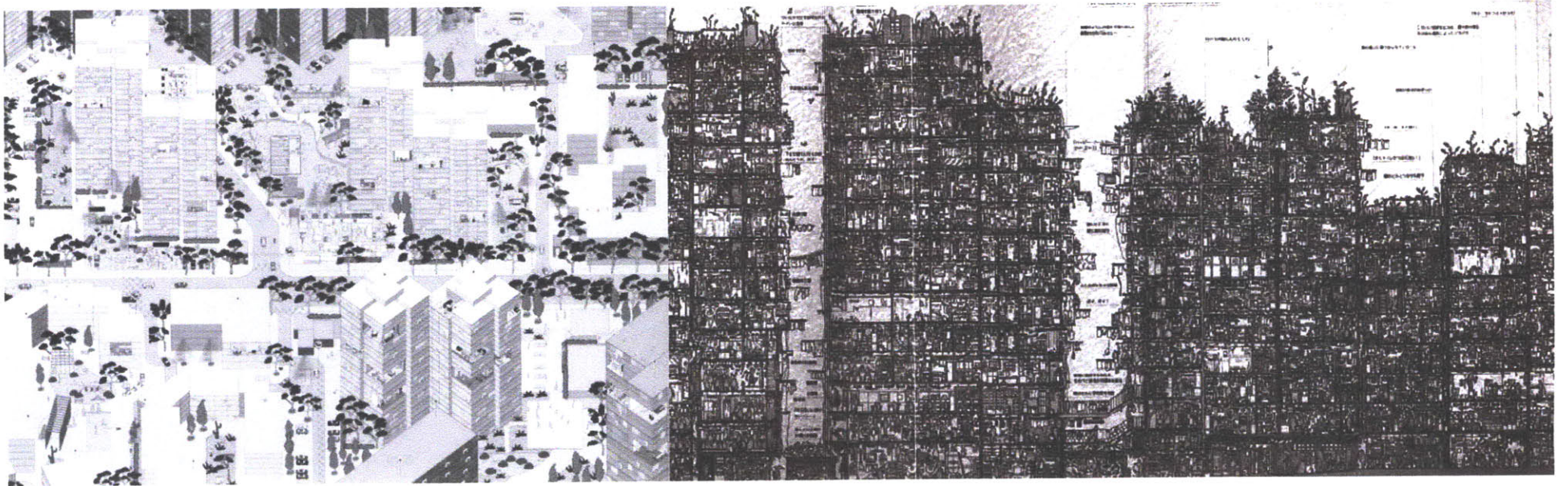
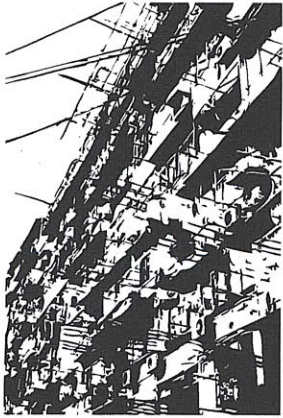
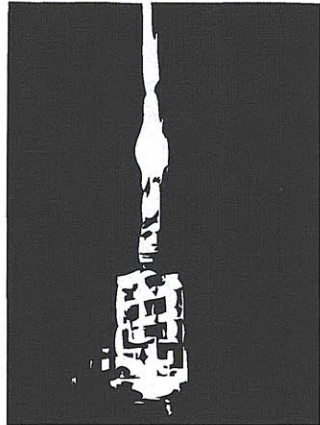


Fig47 Un_Real Estate



Hypothesis **01**
Ghosts in the Shell



Hypothesis **02**
Zoo of Urban Monsters



Hypothesis **03**
the power redistribution



Fig48 China Modernism

2.3 The Three Hypothesis _Ghosts in the Shell

The first hypothesis starts with an understanding looking into the food chain of development industry by highlighting its four major players, namely: Capital, Government, Developer and Dwellers. By systematically mapping out the working mechanism of these players based on the contextual forces in Asia. The first hypothesis brings the roles of the players against their respective historic background. In Shanghai and Singapore, two extremely different context, the role played by the play differs significantly.

By understanding the behavior of these ghosts and hunting them down in the greater context of Asia cities, the thesis intends to gain an understanding of the overall picture of Asia's development industry and its unique ways of developing projects and sculpting cities.

2.3 The Three Hypothesis _The Monsters Ball

The Ghost Town

The Stubborn Nail Dweller

The Signature Zoo

The Abandon of Authorship

The Cleanest City and the Silent Hill

The second hypothesis deals with the reality in two extreme contexts in Asia: Shang Hai and Bei Jing where the distorted relationship of the “four players” as a result of the localised social and political conditions, has lead to the birth of several Urban Monsters. The survey will focus on the documentation of the characters and behaviors of these monsters. The consequences in terms of urban fabric and social distribution would be surveyed in greater details. The dramatic nature of these urban monsters have proved to be a series of unique architectural typologies to be documented and they in themselves are a good refection of the social-political character of the city where they were given birth to.



Fig49 Nail Dweller



Fig49 the Powerful powerless

2.3 The Three Hypothesis _ The Power Redistribution

For a typical food chain scenario where the top players controls the options given to the immediate level underneath it, the power distribution pattern has been extremely rigid particularly the industry of real estate, where the gap in terms of power distribution is extremely large and is still widening these days. This hypothesis looks into the possibility of rethink the process of the production of residential development by optimizing the organizational construct within the players. By giving them a different set of rules,(for instance, what if the dwellers, being the lowest breed in the food chain, are given significant part in the creation of the residential product), the resultant internal working mechanism and formal expression would indeed be extremely different. By initiating such power redistribution, we are opening the gate to the immense possibilities of “cloud participatory model”, in which each individual dweller are able to contribute to the creation of the city and contribute to the general well being of the community.

2.4 Real Estate_Unreal Estate_Surreal Estate

Under the framework of the Three Hypothesis, four key concepts are going to be discussed in details: Real Estate, Un-Real Estate, Sur-Real Estate and Hyper-Real Estate.

For the Real Estates, two perspectives will be examined in details: the dwellers perspective, interviews with both Chinese living in Bei Jing will be conducted, apart from regular site visits, photo documentation, observation and data mining; and from the developers perspective, the research focuses on the innovative housing initiatives carried out by Real Estate Companies, concluded after meeting different project managers, as well as surveying every statement and housing project of the top Chinese developers.

For Un-Real Estate, the research will be conducted on a daily basis of life experience and interaction in Bei Jing courtyard houses. Through on-site survey and published research documentation, the thesis will be focused on the intense social networks existing in this informal housing environment.

For Sur-Real Estate, the research will focus on documenting various almost surreal situations, where the emergence of urban monsters has generated immense social economic problems. The key notion is to expose the fact

that the twisted relationship among the Ghosts behind is the cause of these monstrosities.

The product of this series of research effort. To critically access the role played by each major force on the stage of Asia's development battle field, we take on a birds eye view to survey these urban monsters: The "Real Estate" generated by the "Government" oriented world, the "Sur-Real Estate" generated by the capital dominant world, the "Un-Real Estate" generated by the dweller driven interventions. Urban monstrosity has not only unnecessarily tormented the life of billions of people, but also created a psychological barrier that has strength the gap between social classes.



Fig50 Un_Real Estate

2.4 Real Estate_Unreal Estate_Sureal Estate

Real Estate

The Encyclopedia defines Real Estate as a basic division of property, roughly corresponding to the division between immovables and movables in Civil Law. At common law most interests in land and fixtures (such as permanent buildings) are classified as real-property interests. Leasehold interests in land, however, together with interests in tangible movables (e.g., goods, animals, or merchandise) and interests in intangibles (e.g., stocks, bonds, or bank accounts) are classified as personal-property interests, if they are classified as property at all.

Un-Real Estate

Therefore, in this research, the (removable) movables and informally added elements to existing buildings are designated as Un-Real Estates, as opposed to the Real Property and emphasizing at the same time the officially unrecognized character

Sur-Real Estate

This is a proposition referring to the condition where large amount of capital and hot money could potentially mutate the way real estate market behavior and generate urban monsters.



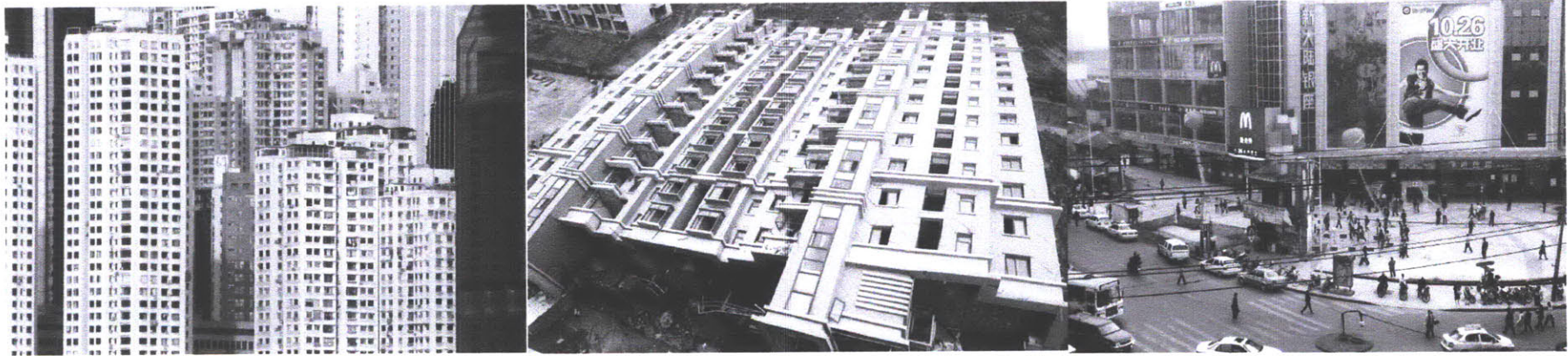


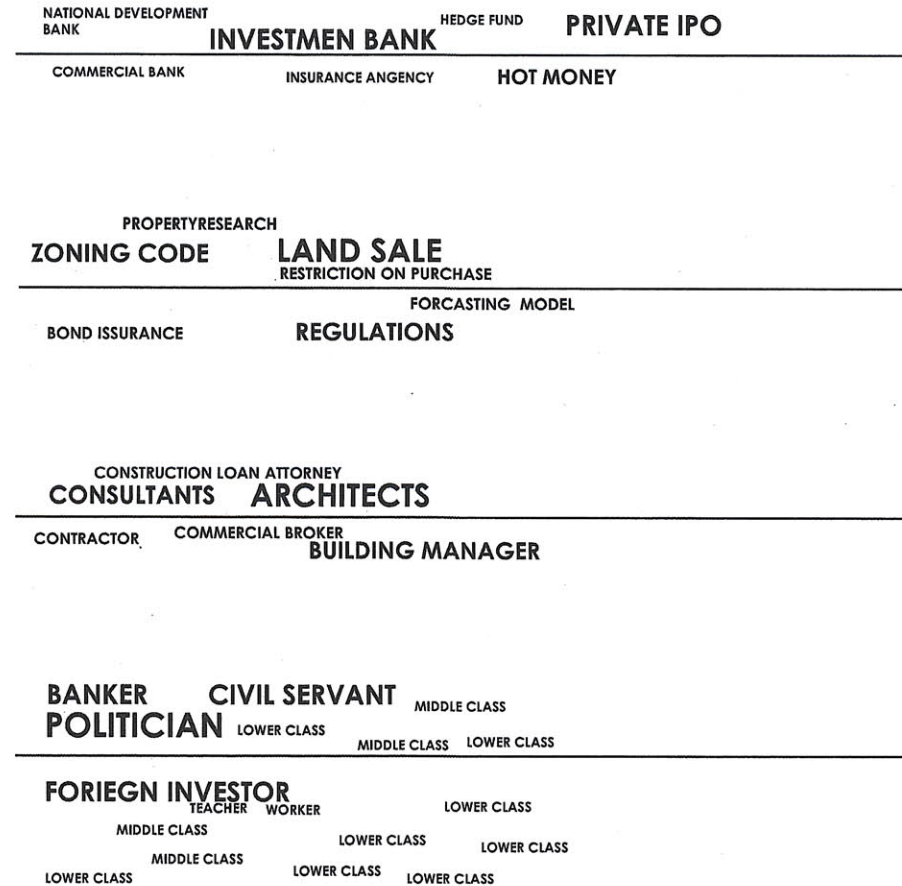
Fig50 Urban Monsters

2.4 Urban Monsters_The Government

Previously in chapter one, we have examined how market behavior could be triggered to change by forces exerted from each player, the creation of architectural form and in a larger context, the urban form is curiously affected in very similar ways. In china where the creation of urban form is less regulated by conscious governmental regulations, the phenomena is more obvious. In Hong Kong of its 80s, due to the high residential pricing, most dwellers cannot afford the rent of a single room, they have to themselves divide the units up into smaller pigeoncages-like sub units. This not only creates immense social problems like that of today in China: younger girls marry to older guys, but also generates a particular character of the city landscape. Coming back to China, a country with enormous hot money coming in and out of real estate, the building generated out of the capital with a single-minded attitude towards flipping land and money making, fell down in one piece in Shanghai. To go against many governmental development intentions, individual dwellers put themselves in front of bulldozers and policemen. Their efforts are ususally left in vain.

2.4 Urban Monsters_the Banks

Looking into China's financial system, in which the governmental conflict of intention between central and local plays an important role. Despite central government's intention to cool down the real estate bubble, the local government depends on the sales of land for 30% of its governmental budget. The conflicts of intention between central/local government has resulted in market inconsistency. The banks in China solely regulated by CBRC of Chinese government has played important role in setting up a transaction model in which each transaction i.e from user to developer or from developer to contractor has to go through the banks in order to push the proprietary payment backwards in order to minimize its own IRR. This however, allows the bank to take control over the informational rents, and in the long run gradually develop itself into a monster that sets the price and terms for all development related transactions.



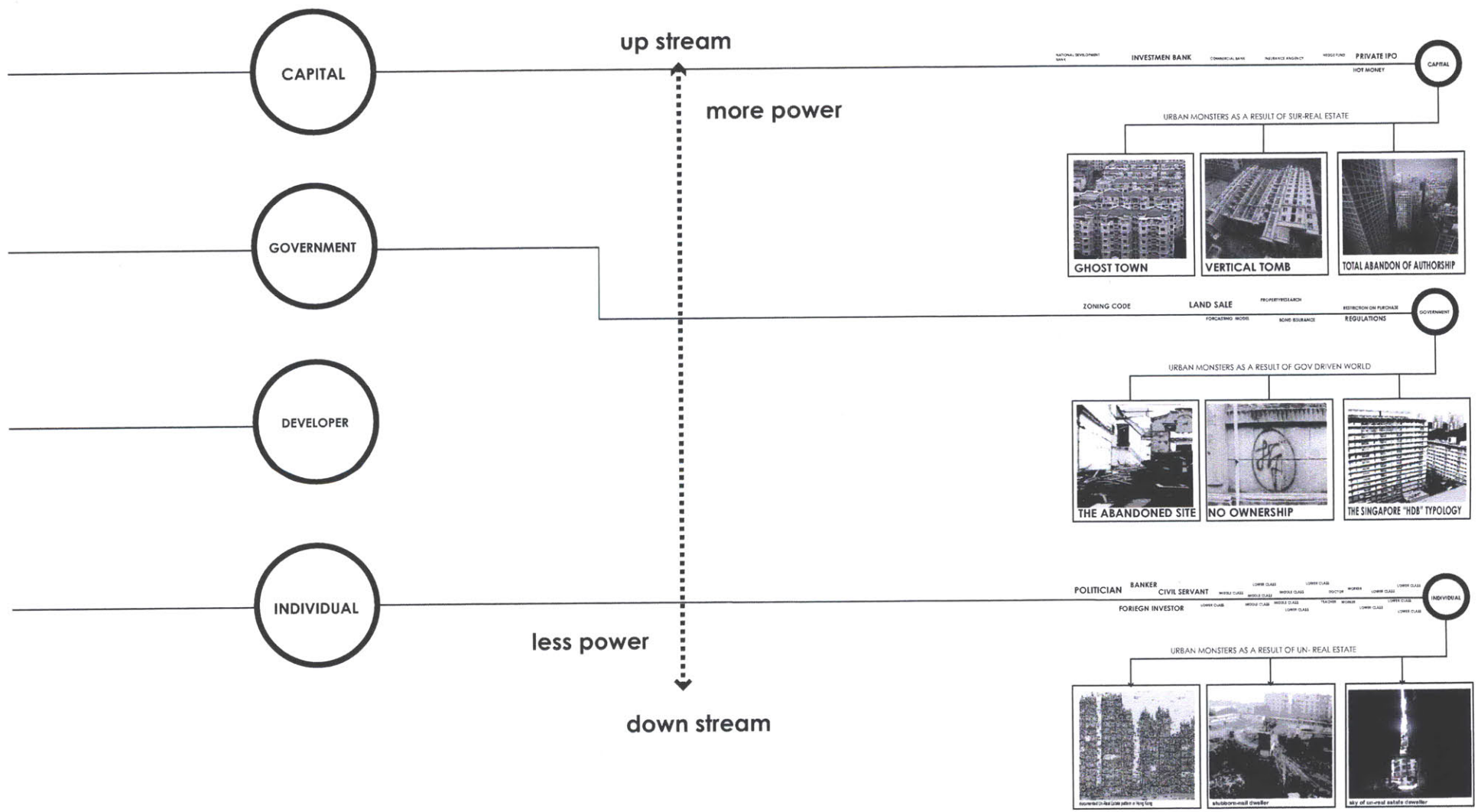


Fig51 power structure & urban monsters

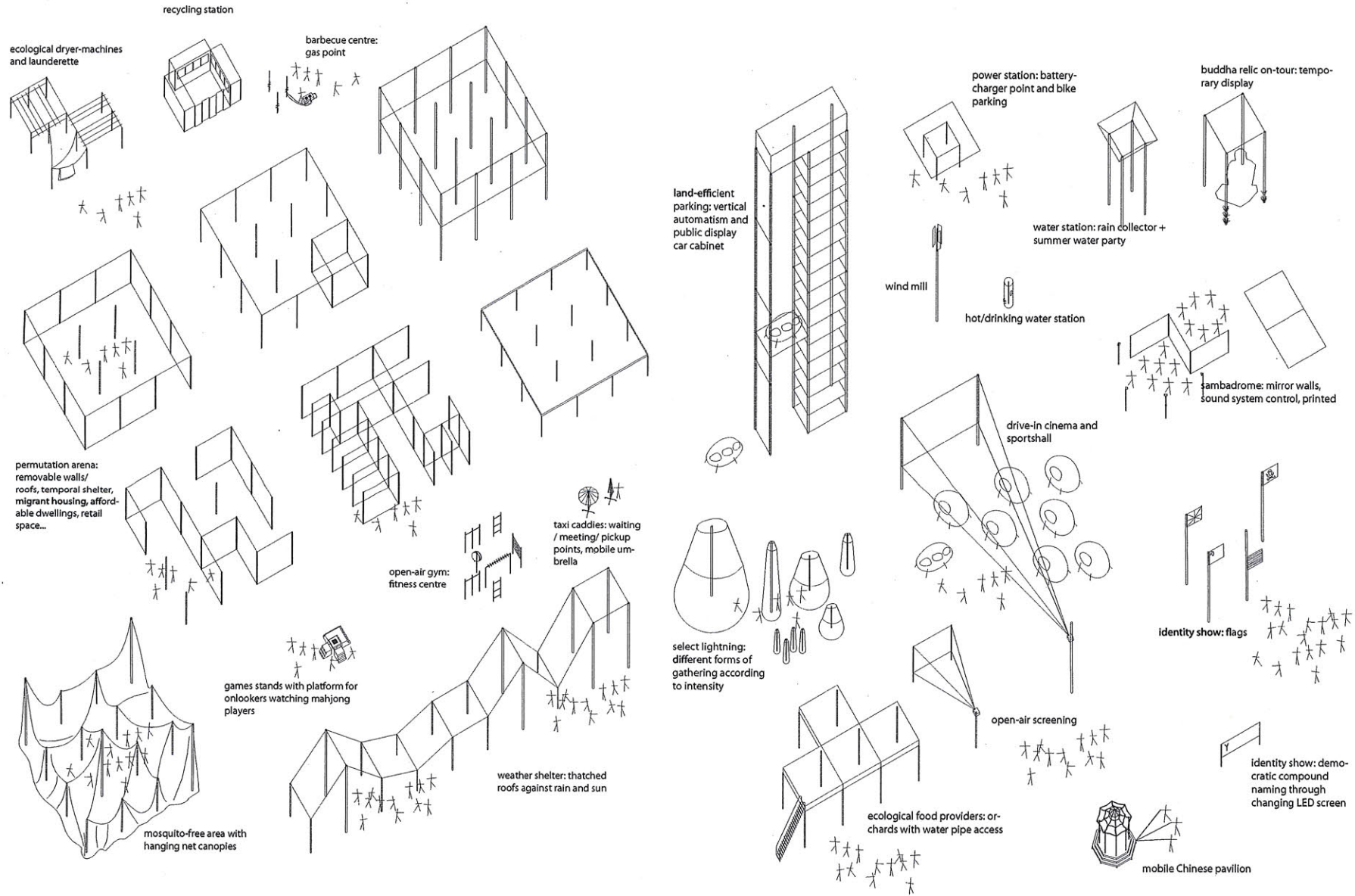


Figure 52
 participatory language diagram
 (Source Daniel Fernandez Thesis)



Figure 53
Spatial participatory

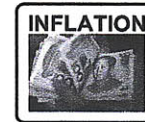
2.4 Urban Monsters_The Participation

There are in general two ways to participate in the development process: Direct Participation, i.e to develop un-real estate systems or Dollar-Vote to voice their preference. The diagram on the left proposed by Daniel-Fernandez in his thesis *Hyper Real Estate 2010*, shows a dictionary of language in direct participation. This idea provides an architecturally amusing alternative, however, the lack of financial service infrastructure simply does not allow any form of bottom up structure to start with.

2.4 Urban Monsters_Hypothetical Private Equity Investment Model

Even if we assume banks are all angels, relying on debt financing itself can be potentially dangerous. The recent credit tightening measures from Chinese government has already seen smaller non-SOE developers going to their graves. Local dwellers dying to purchase their first house or second house as vital investment to keep up with inflation (sometimes as bad as 35% per month), normally find themselves not qualified for a loan. The deadly risk in China's stock market just does not allow a regular person to invest. Without a convincing local investment channel, the Chinese has little choice but to invest in real estate market. So where is the way out?

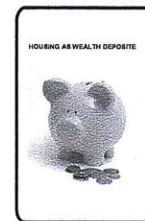
In this thesis, a hypothetical private equity investment model is constructed, this allows us to fundamentally change the way how each player participate in the creation and trading of units of a mixed-use development. Ideally, the developer and its money partners as preferred shareholders could start a Joint Venture structure, which effectively allows the developer avoid paying the banks and directly go into construction phase. And the users similarly have direct access to the "prime units of the product" and has a say over the preference of products during the development process.



CPI > 35% A MONTH

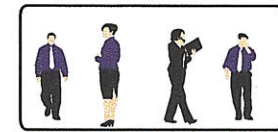


90% OF SMALL INVESTORS LOSE \$\$\$

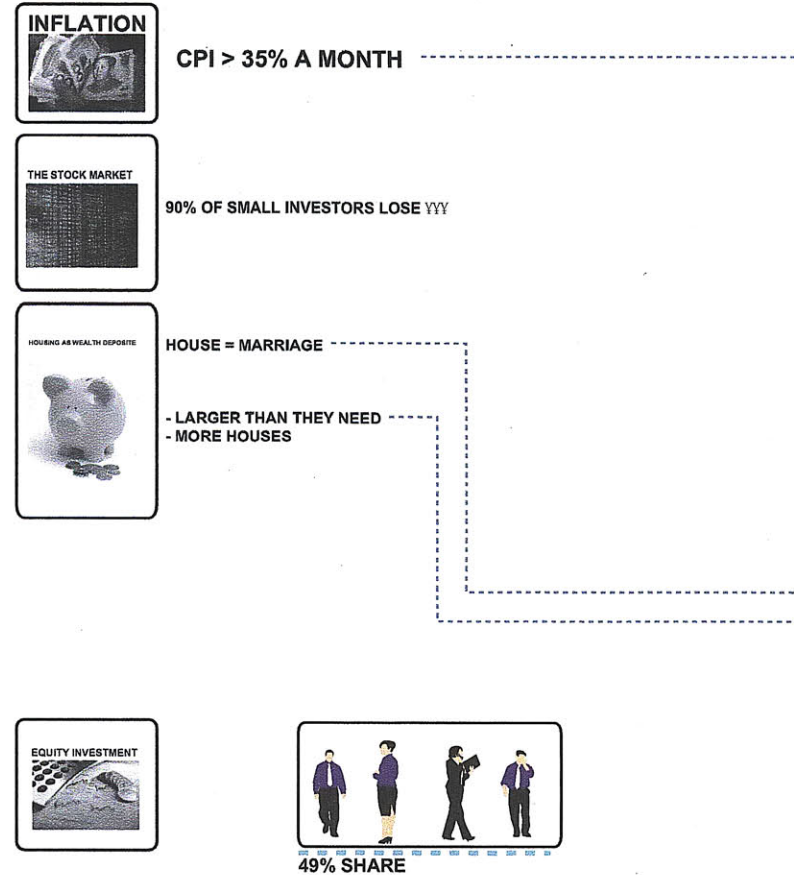


HOUSE = MARRIAGE

- LARGER THAN THEY NEED
- MORE HOUSES



49% SHARE



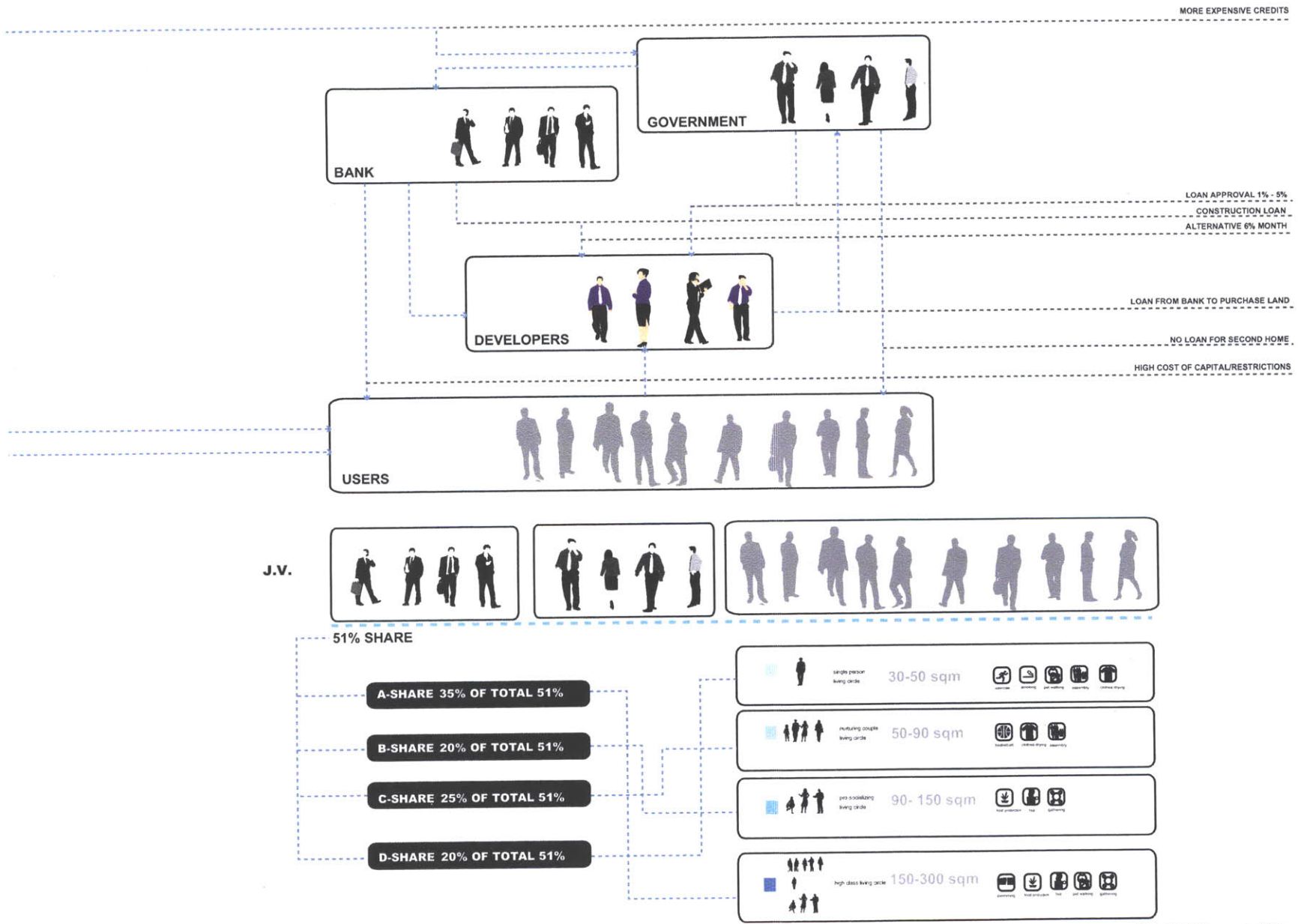


Fig54 Financial Strategy Diagram



Chapter 03 | A Scenario Design Experiment in Bei Jing's Financial District

3.1 The Site_ Heart of Swarm

3.2 The Strategy

3.21 A Stint of The Dark Side

3.22 Risk Management

3.23 Public Space as Value-Add

3.24 The Units

3.3 Density

3.4 Light & Air

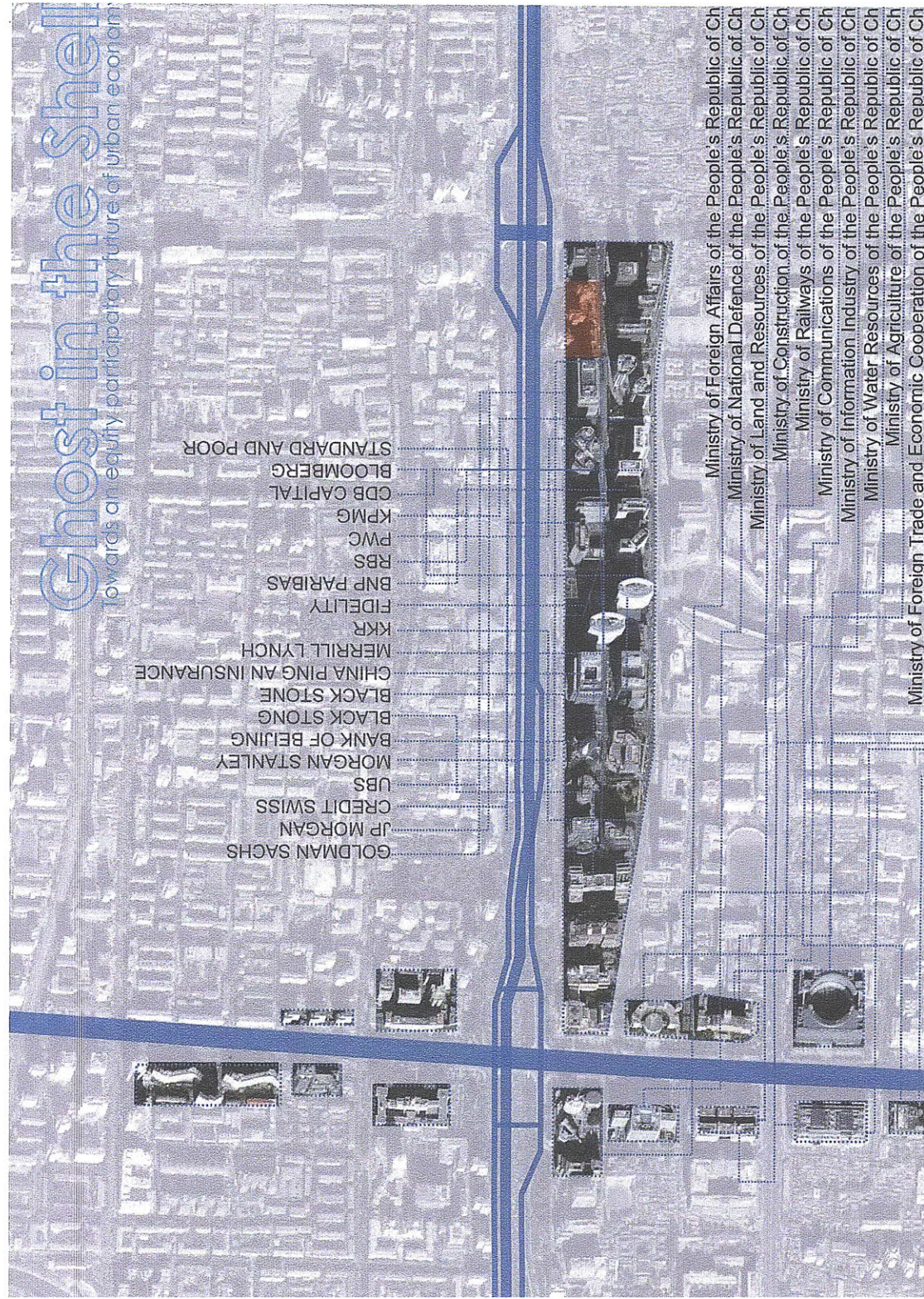
3.5 Circulations

3.6 Structure System

3.7 Conclusion

3.1 The Site_Heart of Swarm

This site is as famous as the city Bei Jing itself. The Chang An Road, where Chairman Mao announced the founding of China and through which, each China president marched their army through to demonstrate their absolute control over the country, is today the prime spot for the country's most powerful political or financial institutions to fight with one another to place their headquarters to. The site is comfortably placed at the heart of the financial district. The developer who develops the Winland Center which houses major foreign investment banks such as Goldman Sachs, JP Morgan etc, Seagoing International Ltd, has decided to develop the adjacent parcel into a mix-use development with hotel, office, service apartment and luxury residential units.



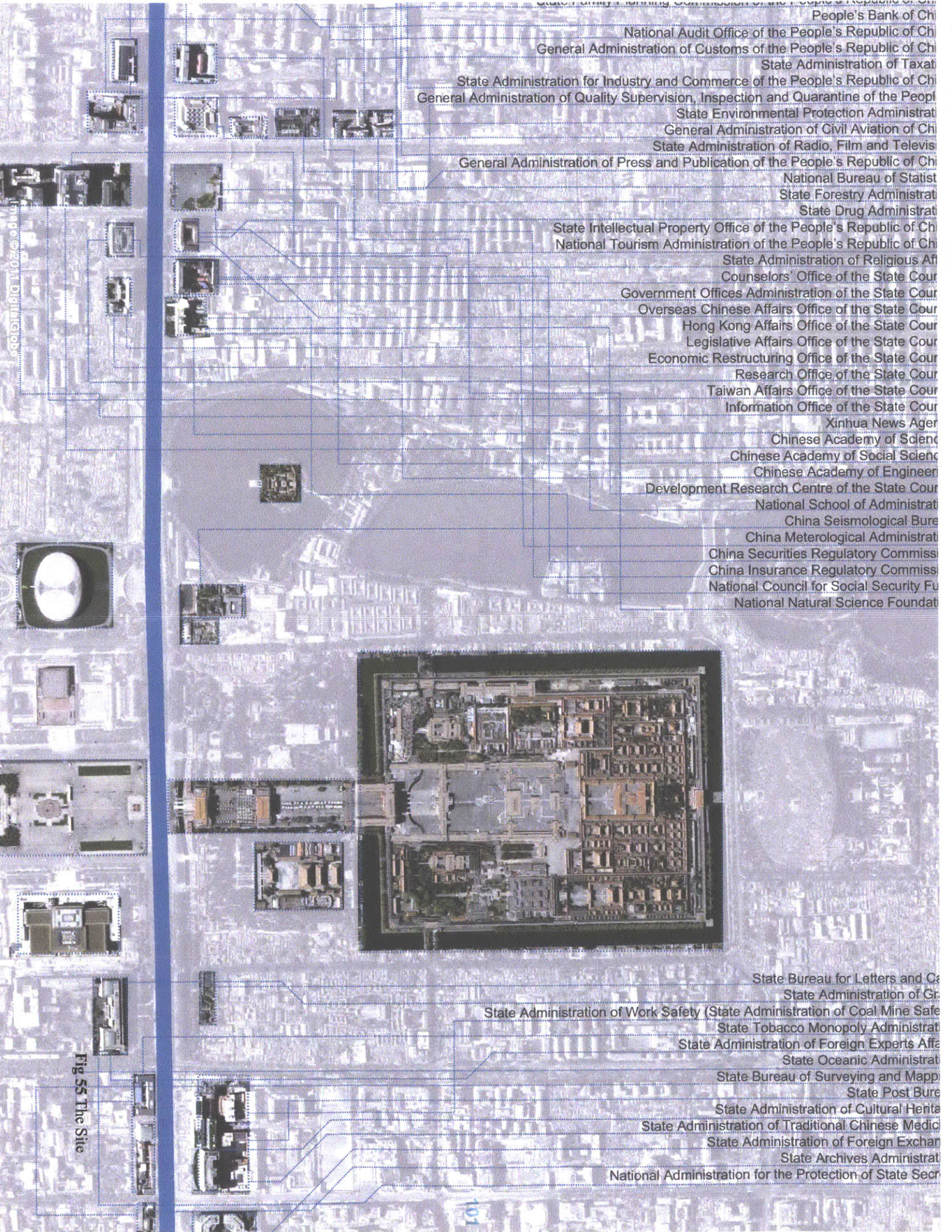


Image © 2011, DigitalGlobe

- State Planning Commission of the People's Republic of China
- People's Bank of China
- National Audit Office of the People's Republic of China
- General Administration of Customs of the People's Republic of China
- State Administration of Taxation
- State Administration for Industry and Commerce of the People's Republic of China
- General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
- State Environmental Protection Administration
- General Administration of Civil Aviation of China
- State Administration of Radio, Film and Television
- General Administration of Press and Publication of the People's Republic of China
- National Bureau of Statistics
- State Forestry Administration
- State Drug Administration
- State Intellectual Property Office of the People's Republic of China
- National Tourism Administration of the People's Republic of China
- State Administration of Religious Affairs
- Counselors' Office of the State Court
- Government Offices Administration of the State Court
- Overseas Chinese Affairs Office of the State Court
- Hong Kong Affairs Office of the State Court
- Legislative Affairs Office of the State Court
- Economic Restructuring Office of the State Court
- Research Office of the State Court
- Taiwan Affairs Office of the State Court
- Information Office of the State Court
- Xinhua News Agency
- Chinese Academy of Sciences
- Chinese Academy of Social Sciences
- Chinese Academy of Engineering
- Development Research Centre of the State Court
- National School of Administration
- China Seismological Bureau
- China Meteorological Administration
- China Securities Regulatory Commission
- China Insurance Regulatory Commission
- National Council for Social Security Fund
- National Natural Science Foundation

- State Bureau for Letters and Calls
- State Administration of Grain
- State Administration of Work Safety (State Administration of Coal Mine Safety)
- State Tobacco Monopoly Administration
- State Administration of Foreign Experts Affairs
- State Oceanic Administration
- State Bureau of Surveying and Mapping
- State Post Bureau
- State Administration of Cultural Heritage
- State Administration of Traditional Chinese Medicine
- State Administration of Foreign Exchange
- State Archives Administration
- National Administration for the Protection of State Secrets

Fig 55 The Site

3.2 The Strategies_ Interview with Private Equity Leaders

The design process begin by visiting private equity firms in Hong Kong, Beijing and Shanghai to understand their position in China's real estate market. 20 over firms are interviewed for this purpose: Goldman Sachs SSG, JP Morgan Asset Management, BlackStone, KKR, Bain Capital, China Development Bank Capital, GIC Shang Hai Office, SHK, Tishman Speyer, CBRE Investors and etc

The following consensus are gathered:

01. The Chinese Real Estate market is highly risky from outside investor due to the policy risk
- 102 02. The Developers can only get the land developed to the 2nd stage, where 1st stage land development is monopolized by SOE developers
03. Diversify the portfolio in order to minimize policy risk
04. No borrowing from oversea banks, only local banks can run local business
05. A lot more PE firms chasing little deals
06. The ground team has to be extremely local in order to raise money and source the deal
07. Exiting strategy limited, mainly through IPO, real estate product tend to hold on for longer period.
08. There are potentials in targeting direct secondary market due to fewer players.
09. Hard to do leverage buy-out, minority growth equity as primary position.
10. VIE structure has made ownership of investment ambiguous

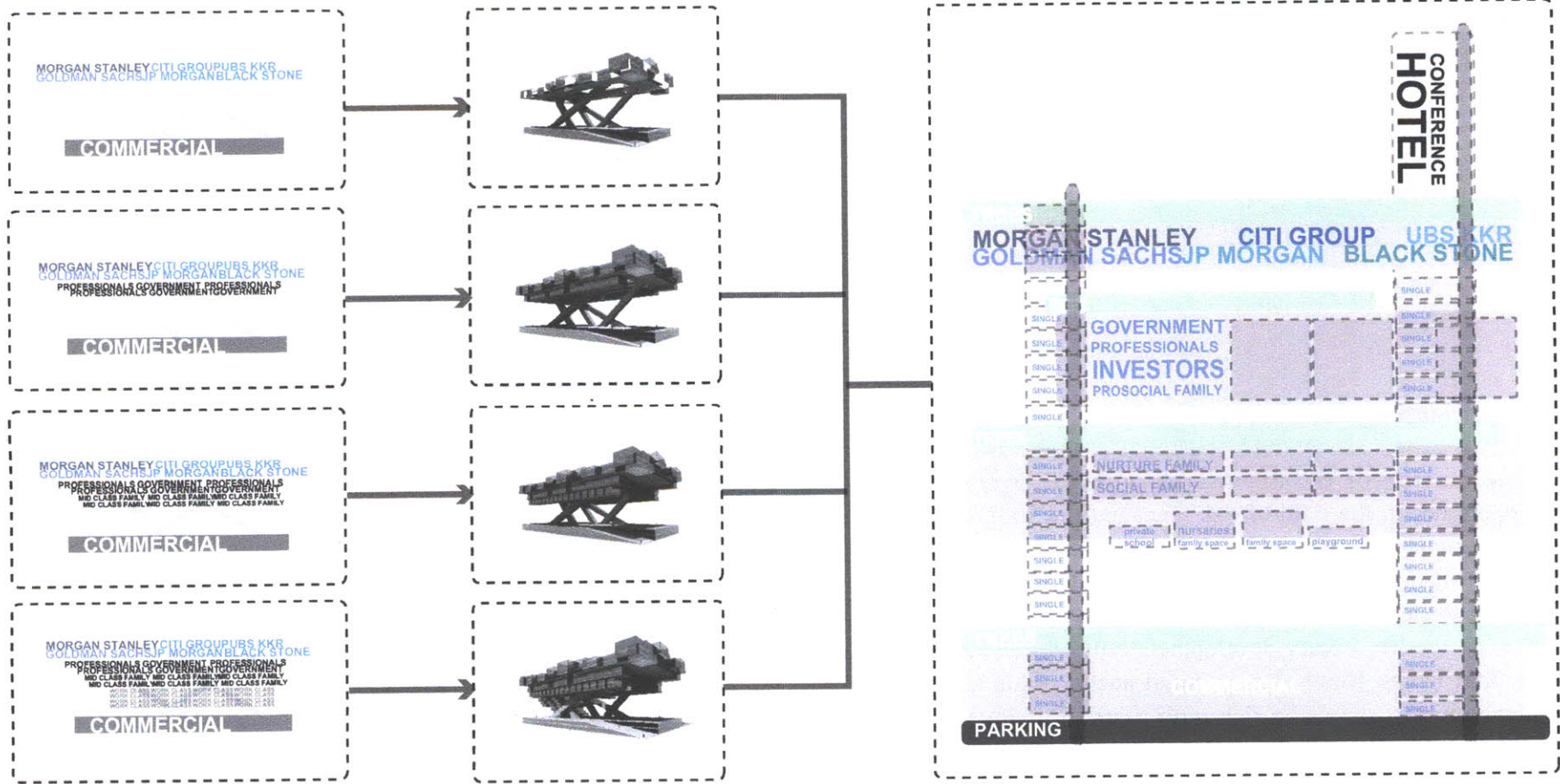


Fig 56 Programmatic Diagram

3.2 The Strategies_ Risk Management

A large portion of the discussion with PE firms and developers lies in the field of risk management. In terms of the programmatic construct, a mix-use building program is proposed which consists of office on the west corner as one major anchor tenant, a boutique hotel on the upper level of a tower as another, luxury development types following the Seven Star Pangu Hotel as residential anchor. This allows the developer to share the risk with a group of investors including world renowned institutional investors and investors with governmental connections, whom are believed to have significant impact on the potential share buyers. Therefore the development starts with a top down structure with major investors on top and other investor with their share reference stacking towards the lower level.

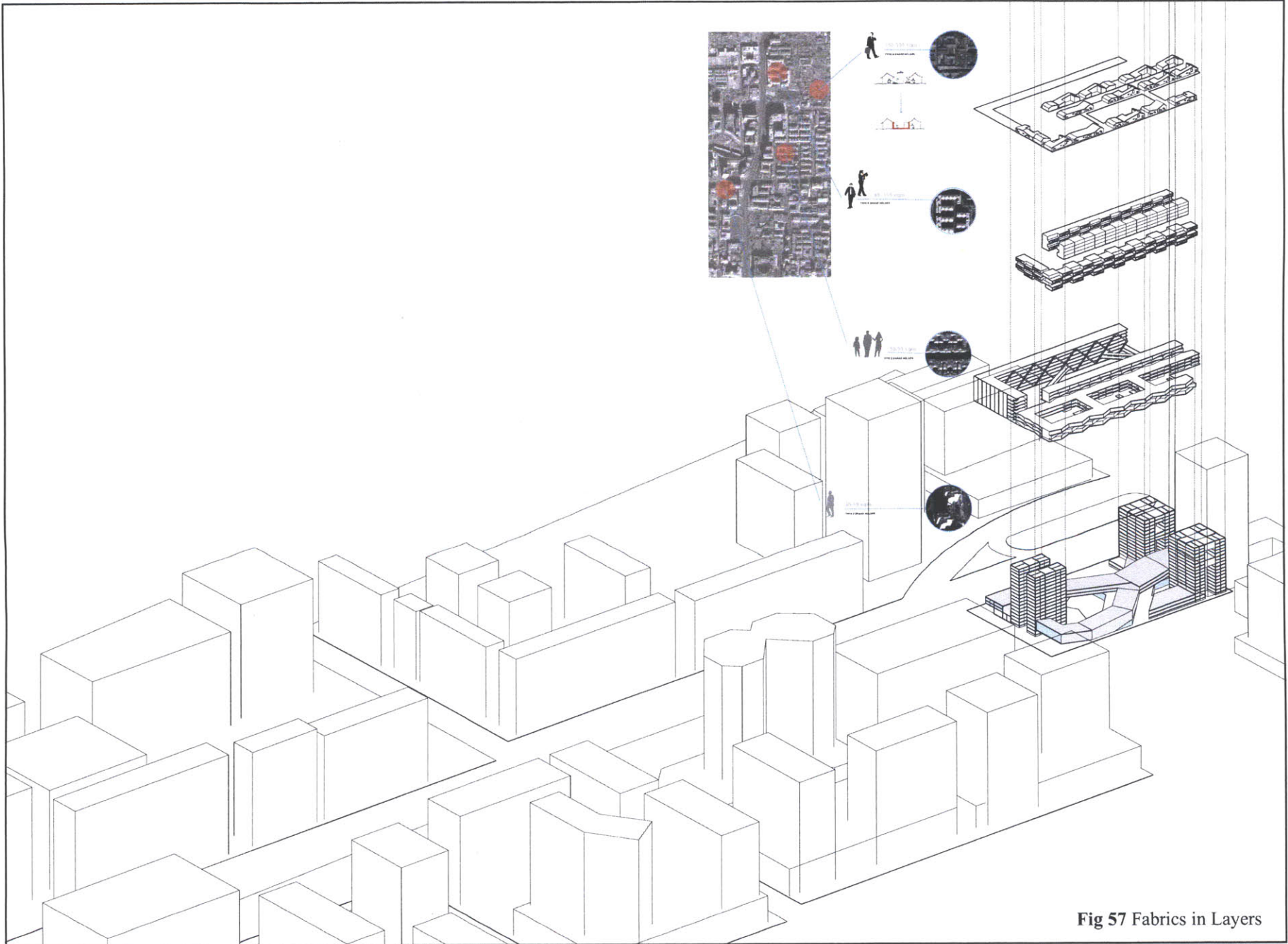
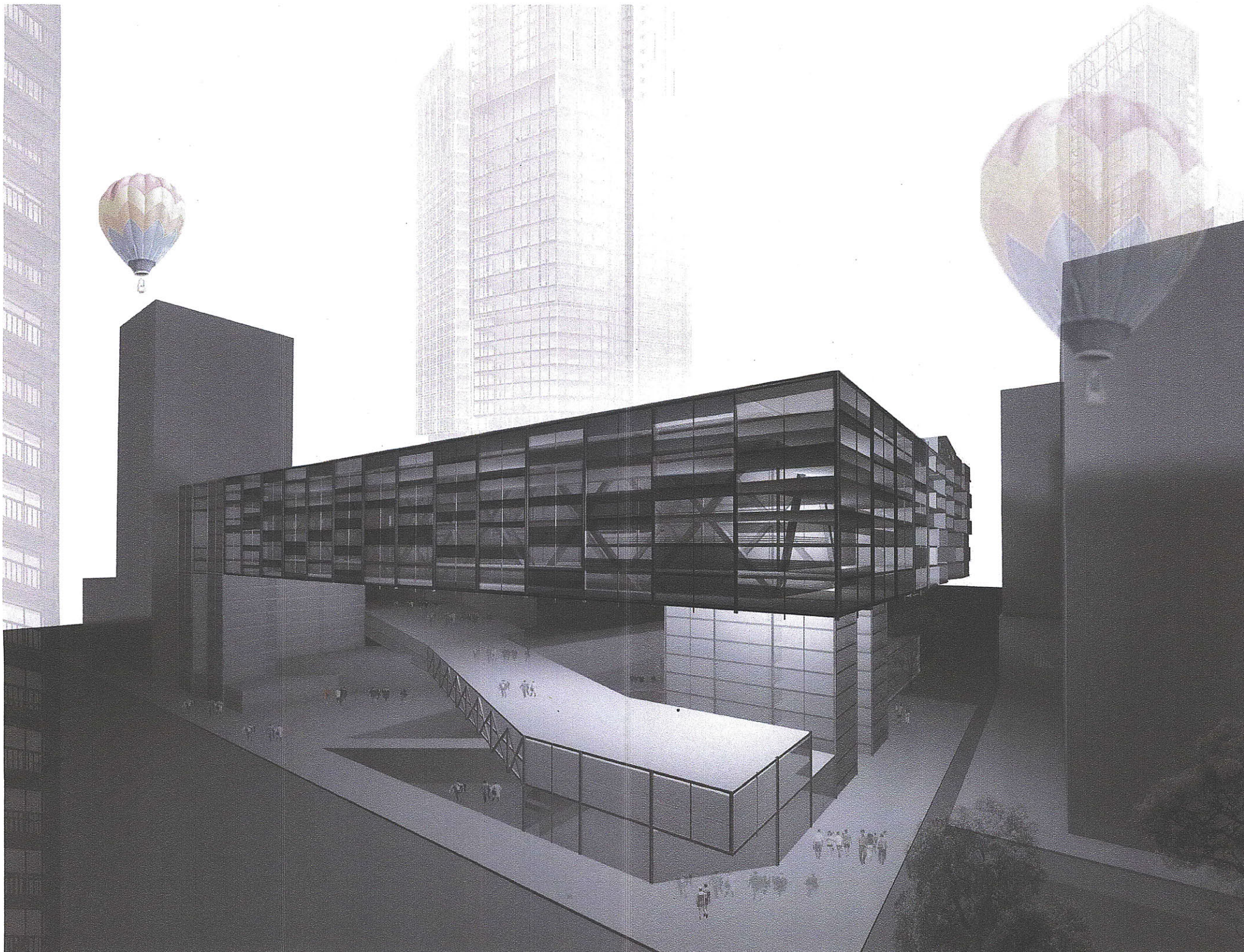


Fig 57 Fabrics in Layers

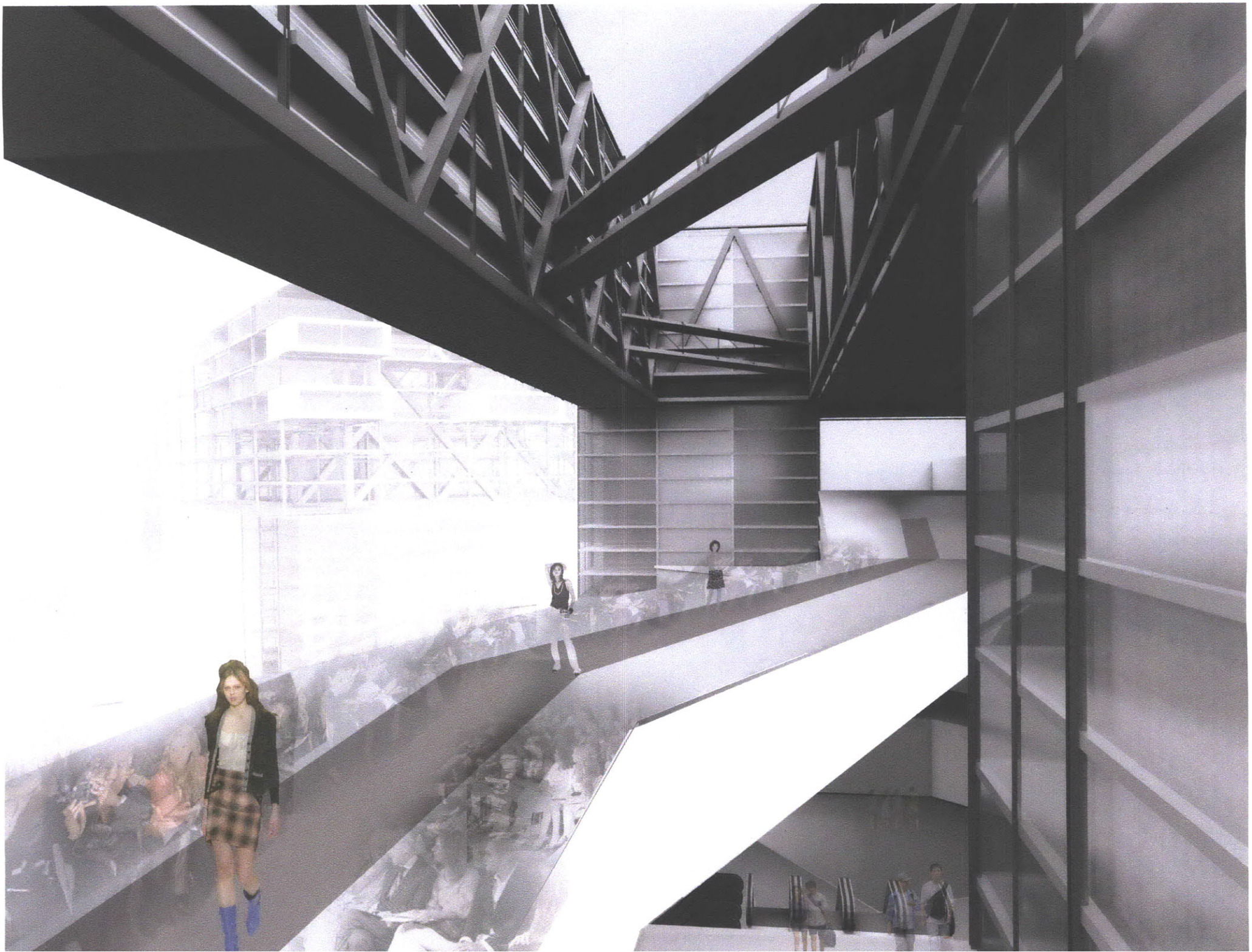


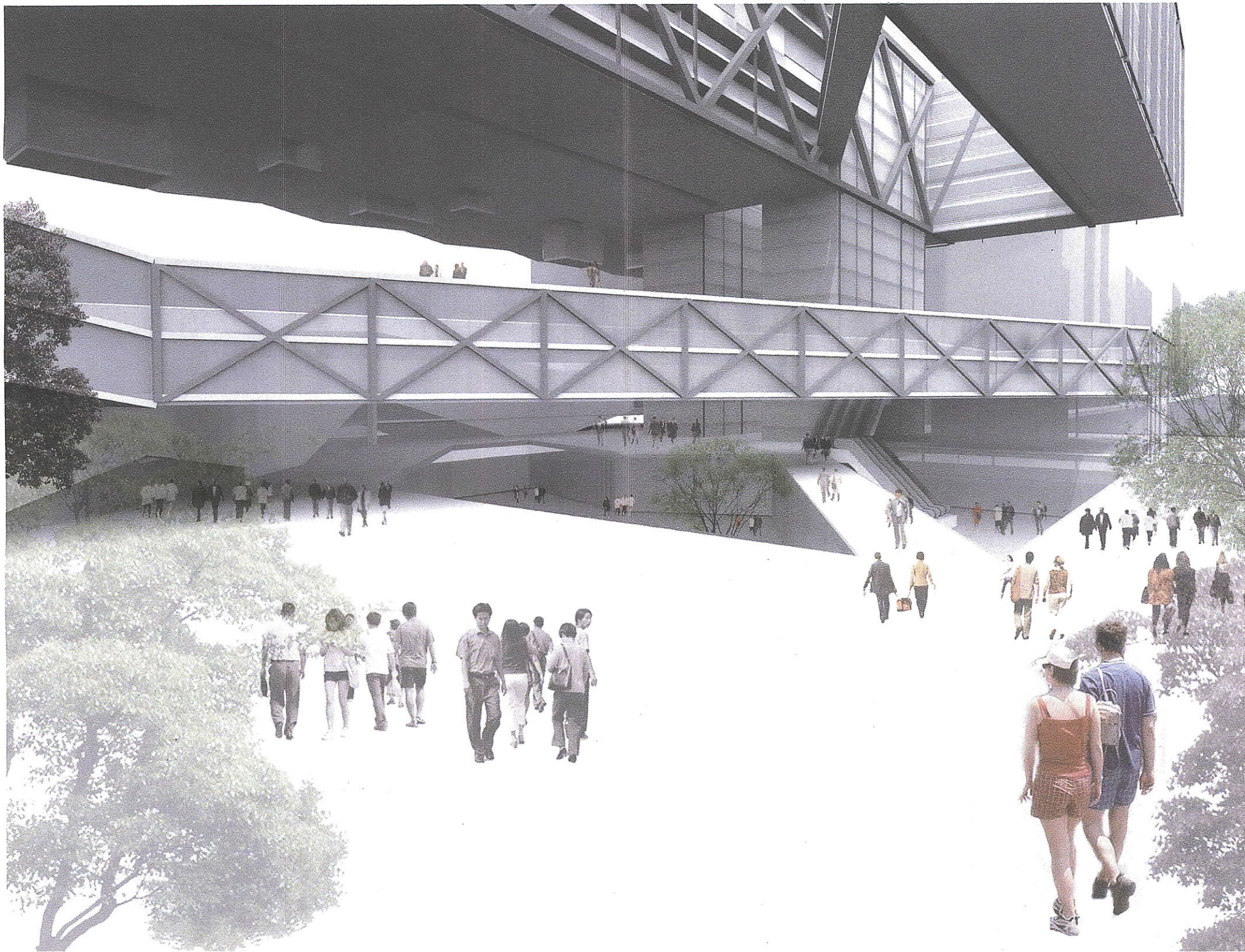
3.2 The Strategies_ Risk Management

A large portion of the discussion with PE firms and developers lies in the field of risk management. In terms of the programmatic construct, a mix-use building program is proposed which consists of office on the west corner as one major anchor tenant, a boutique hotel on the upper level of a tower as another, luxury development types following the Seven Star Pangu Hotel as residential anchor. This allows the developer to share the risk with a group of investors including world renowned institutional investors and investors with governmental connections, whom are believed to have significant impact on the potential share buyers.

3.2 The Strategies_ The Use of Public Space

A public space is created as a major value creation platform. Following the success of Rockefeller center in which the extremely well run ground plane and the private streets creates the image for the office tower, the maintenance and programming of the public space is largely left to the shops to, on one side cater to their business needs, on the other creates a nice public space which adds significant value to the upper level space. This also saves cost for the public space maintenance. The design intends to employ similar strategy in terms of programming and value creation. Utilizing the business connection and even oriented upper level tenants, events such as Victoria Secret fashion show would significantly boost the name of the property and make it highly desirable.





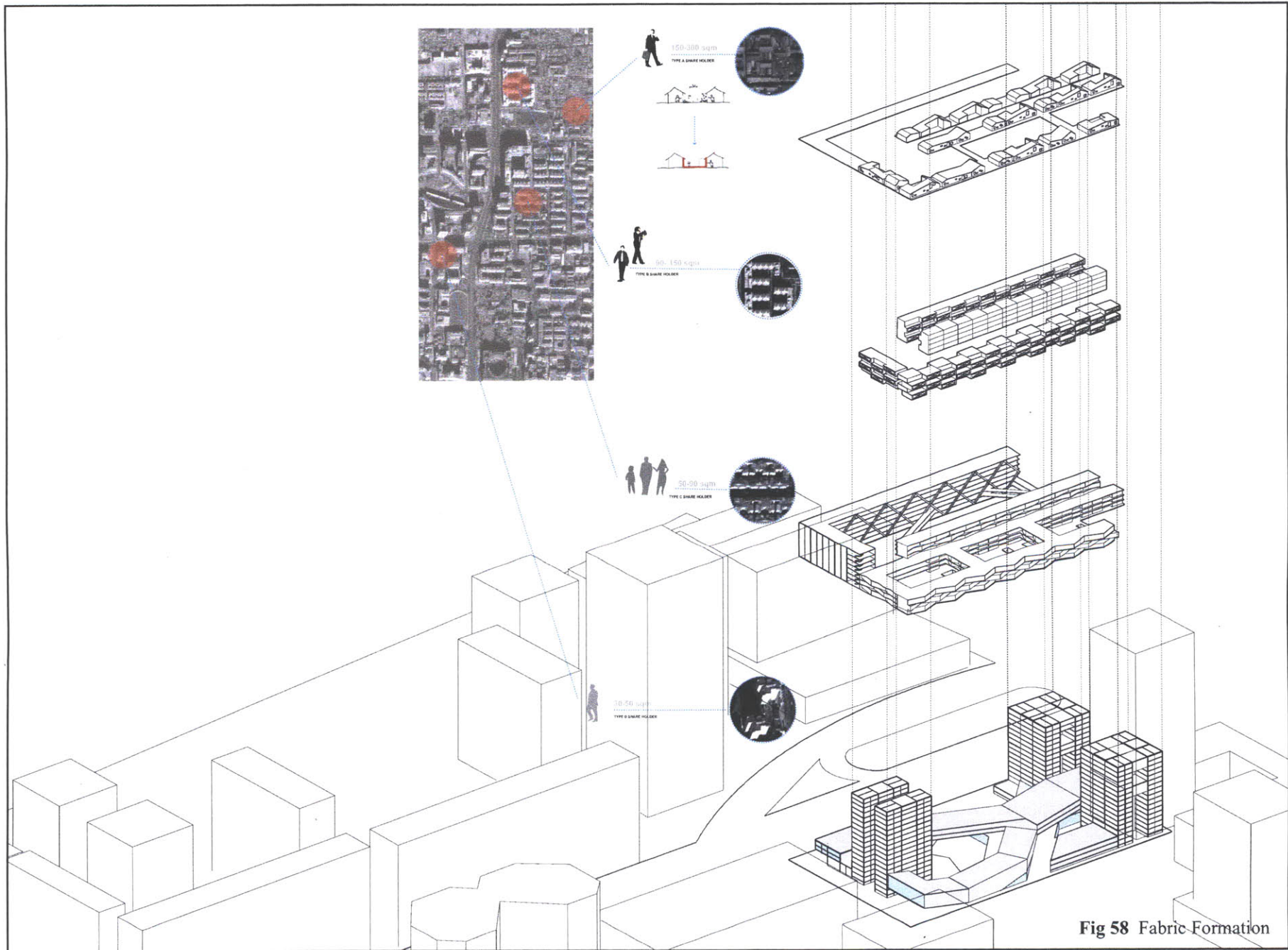


Fig 58 Fabric-Formation

3.2 The Strategies_ The Units

The fabrics near the site are examined and differentiated according to their program and size. In general, the dwellers and fabrics they represent are grouped into four fabric groups: the key shareholder group, the professional group, the family group and the bachelor group. Besides the key shareholder group, the rest of the group dwellers are of similar income level, and working in the financial industry. The grouping strategy intends to generate community of similar living style and social interests.

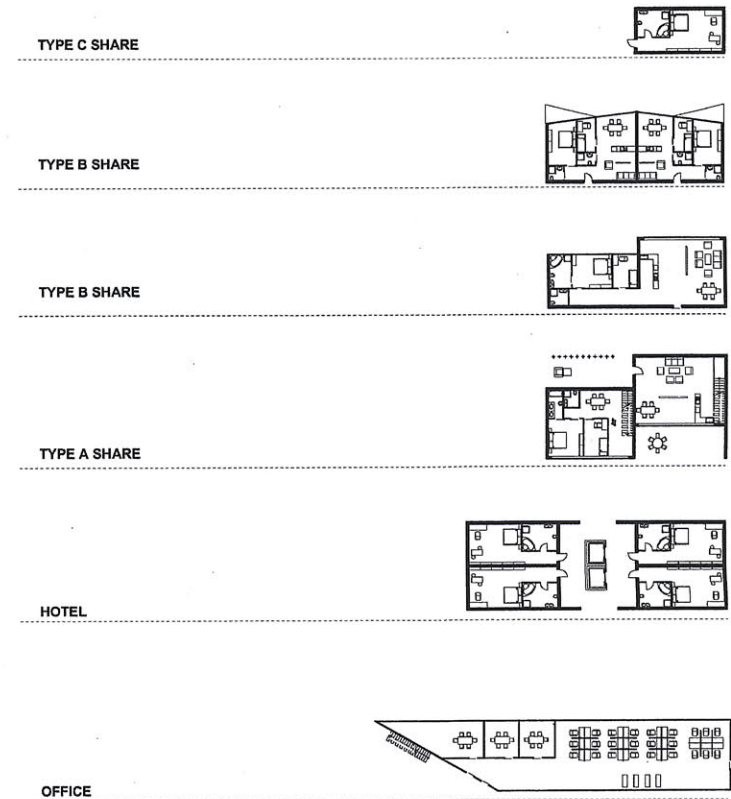


Fig 59 Plans for Each Dwellers Group

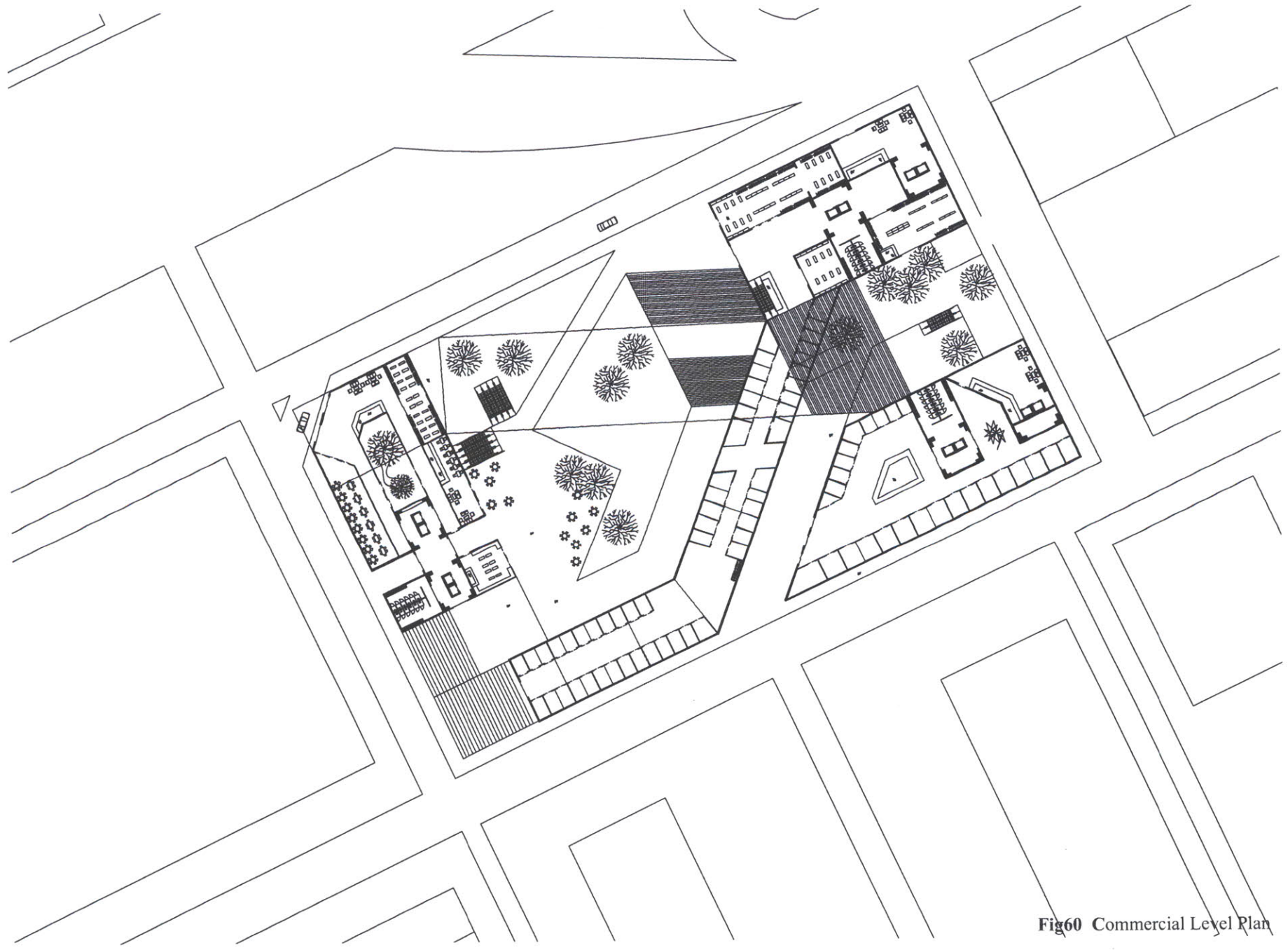


Fig60 Commercial Level Plan

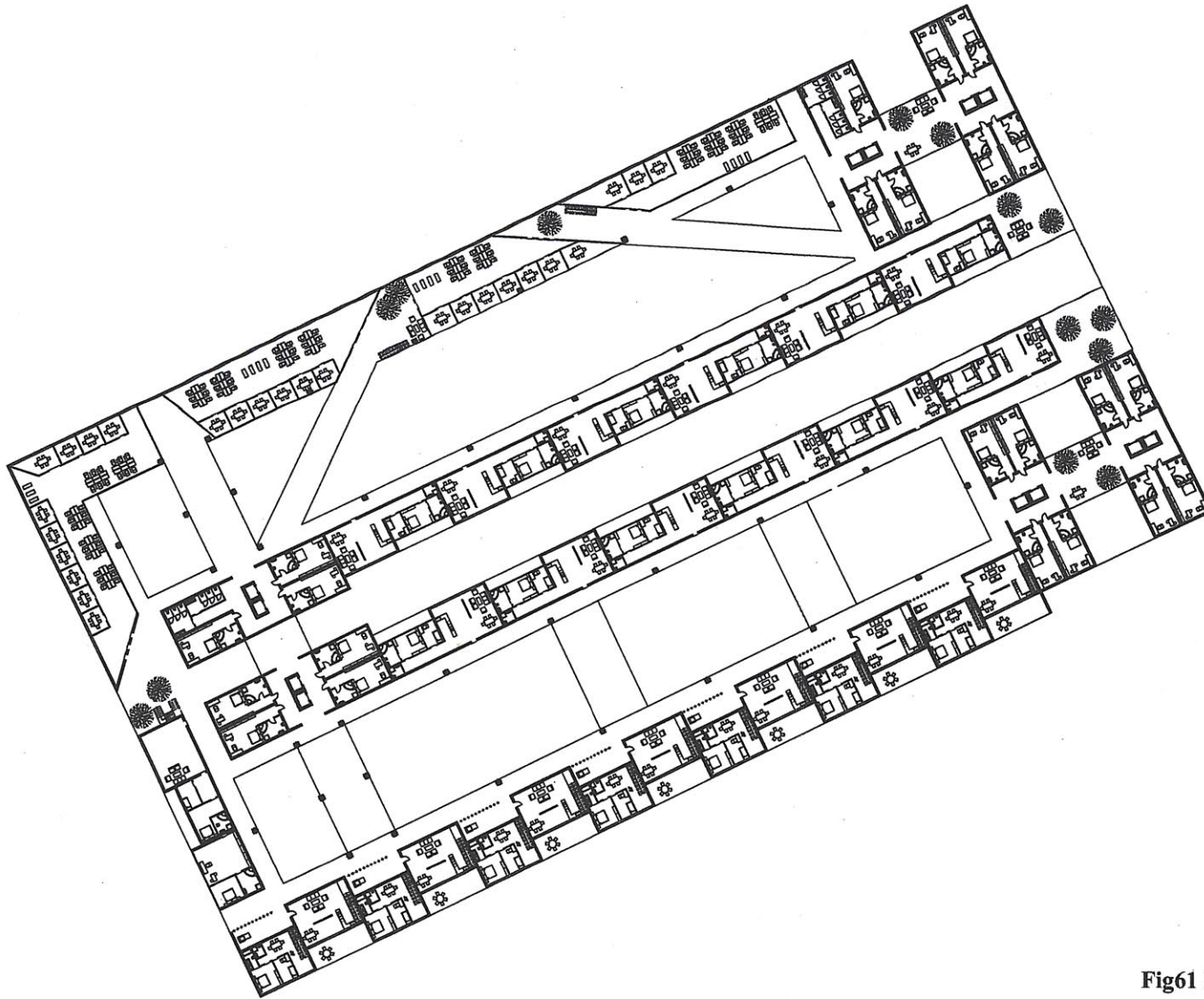


Fig61 Professional Community Dwelling Units

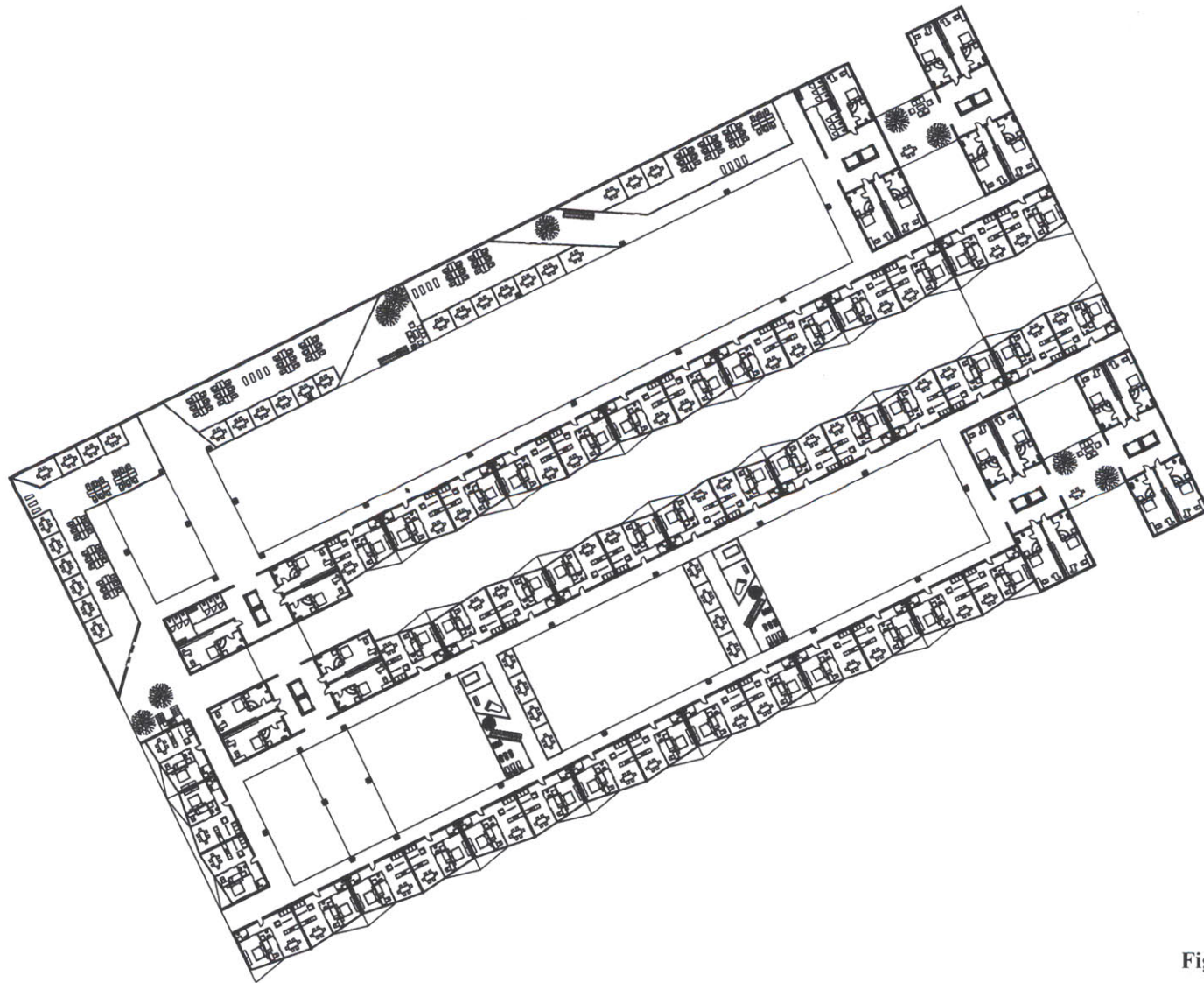
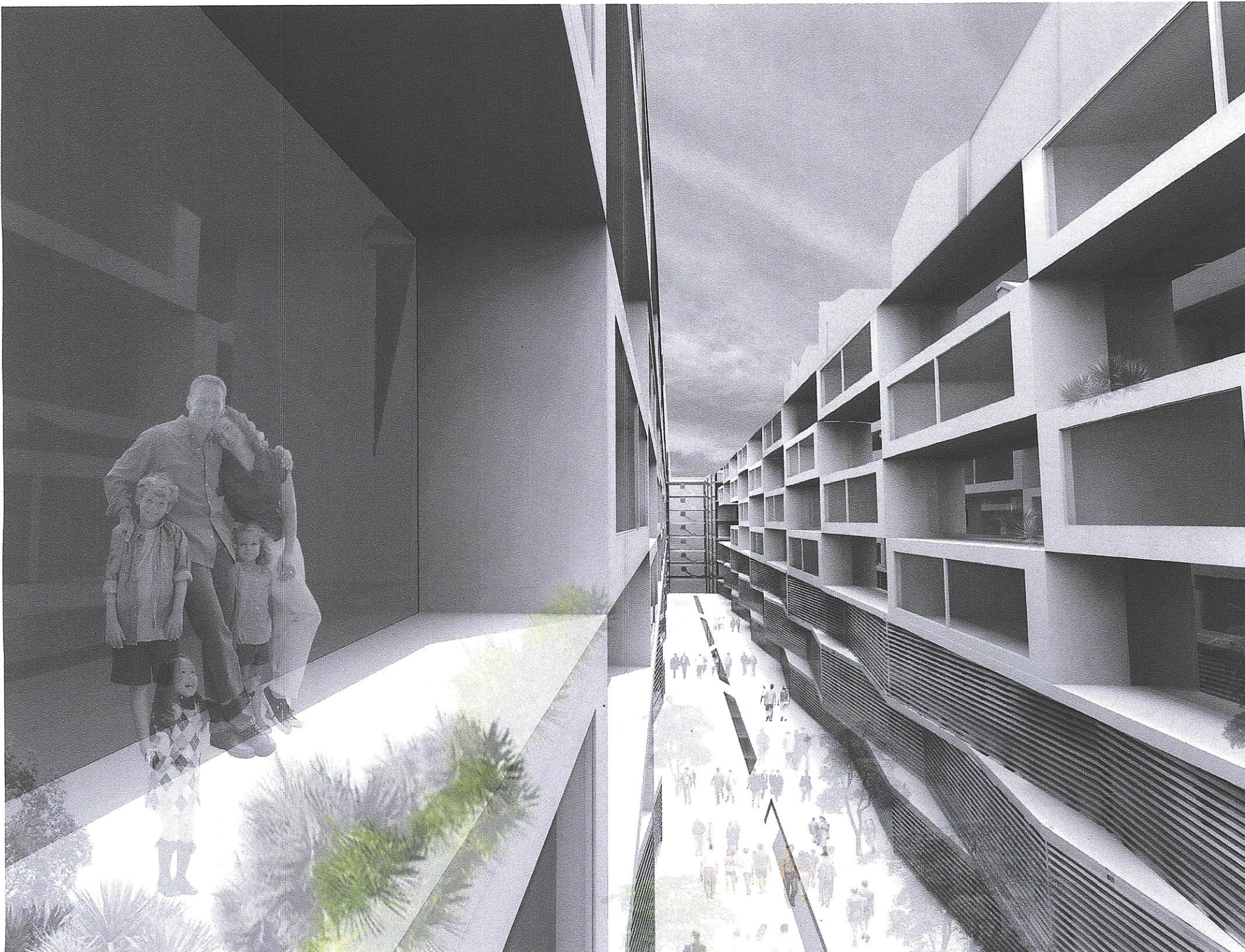


Fig62 Family Community Dwelling Units



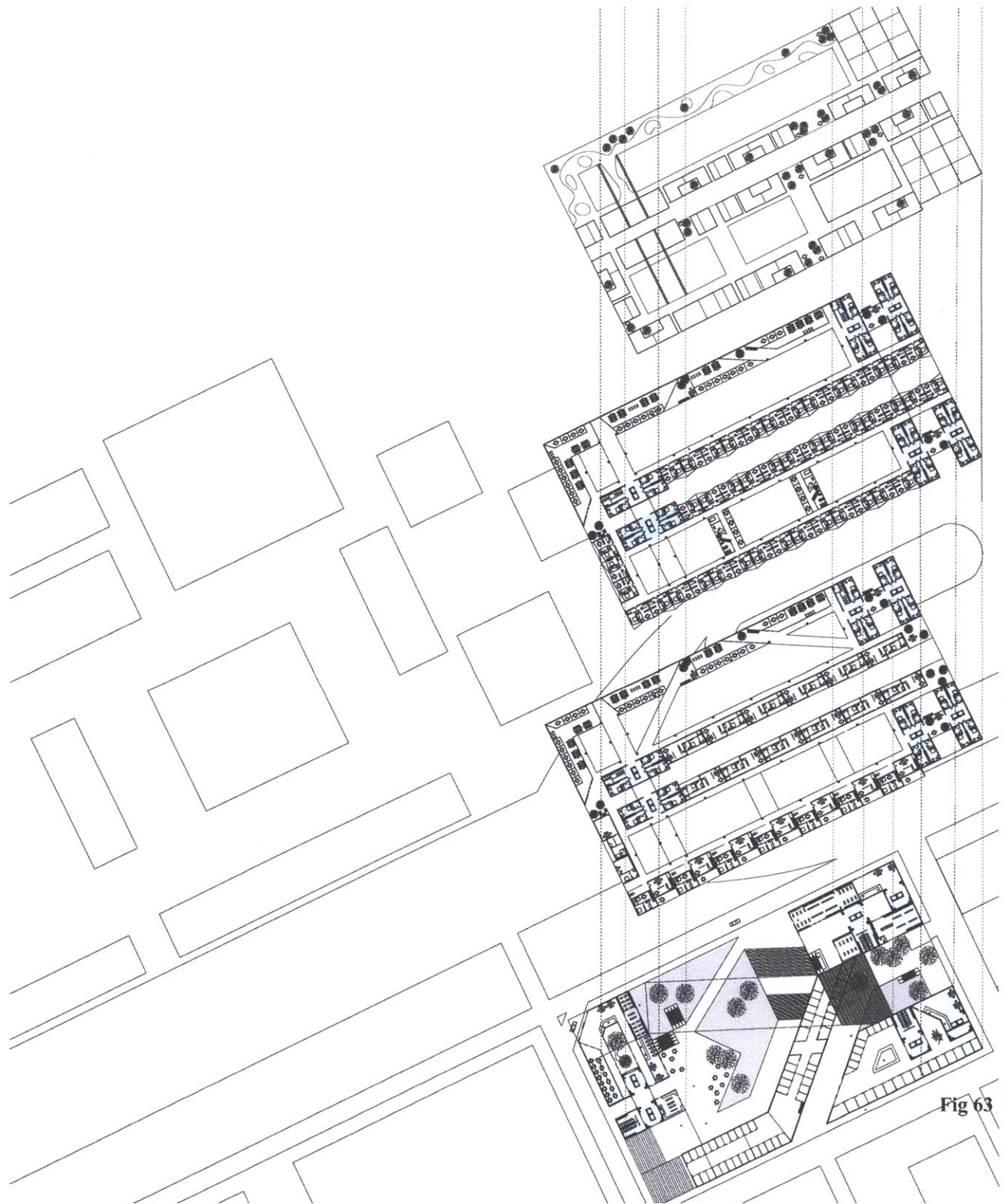


Fig 63 Plan in Layers





3.3 Density

Density of the development is a big challenge. Theoretically given the land value of the place, the density shall be extremely high, however intentionally or not, the market research given by the developer speaks otherwise. The final decision is to incorporate, including the roof top luxury units, around 400 residential units in the building. Nevertheless, given the strategy of the development, a higher density Scenario could be easily constructed. As part of the experimentation, turning what developers and investor's opinion into expression of part of the approach to get close to what reality is. Therefore a low density version is constructed for this design.

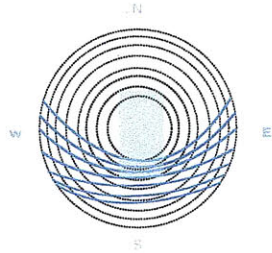
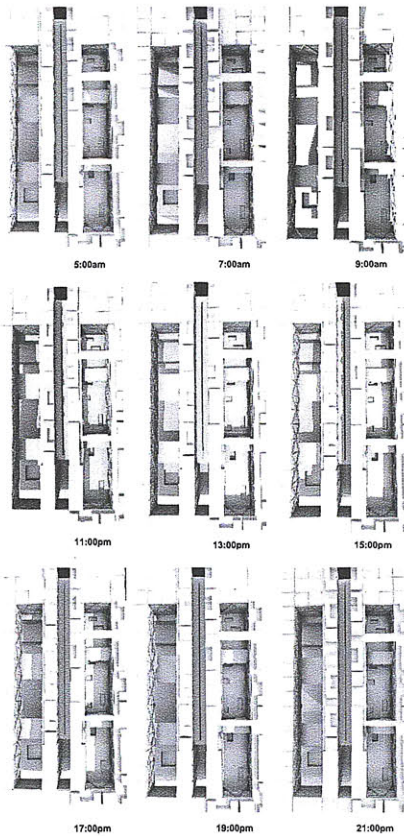
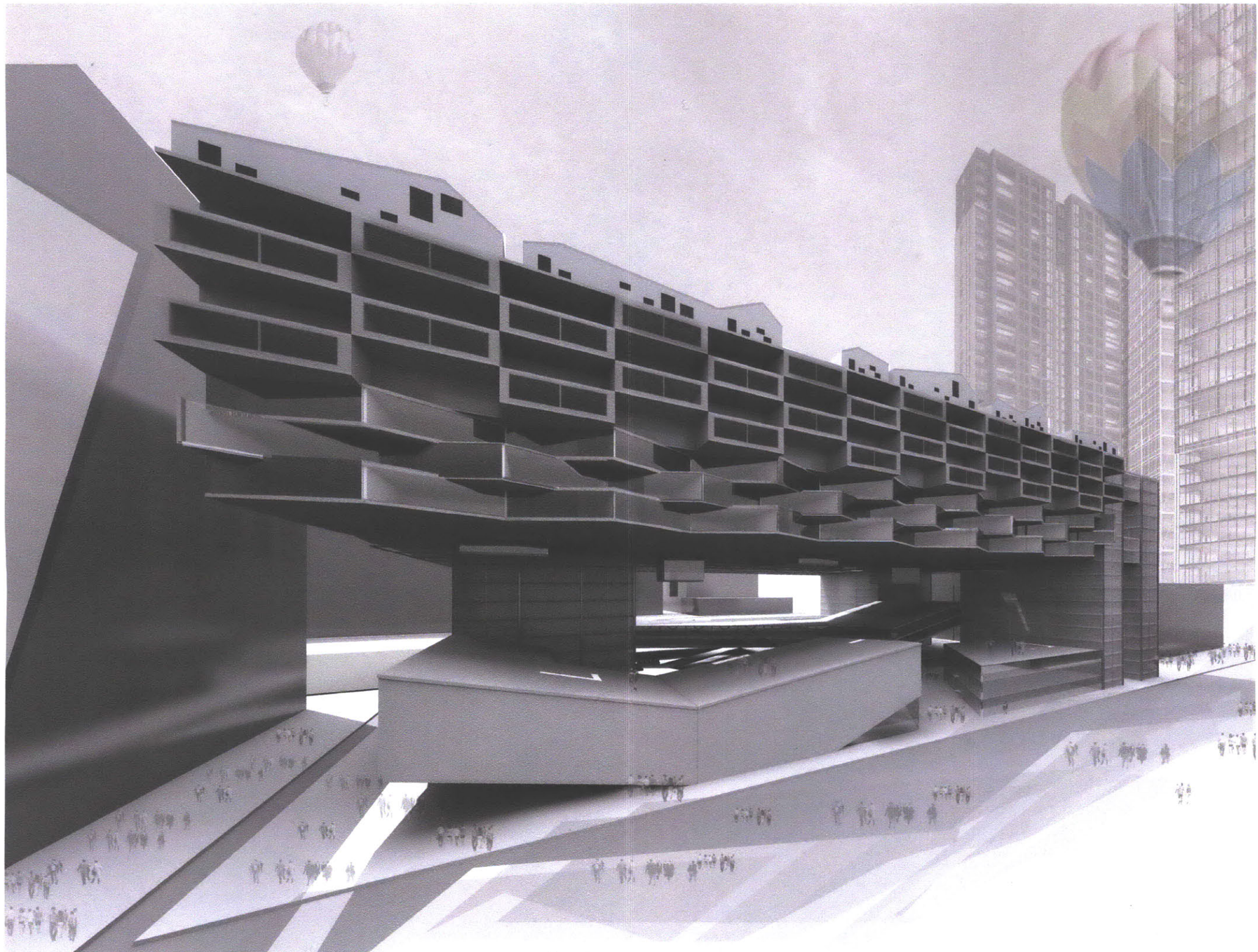


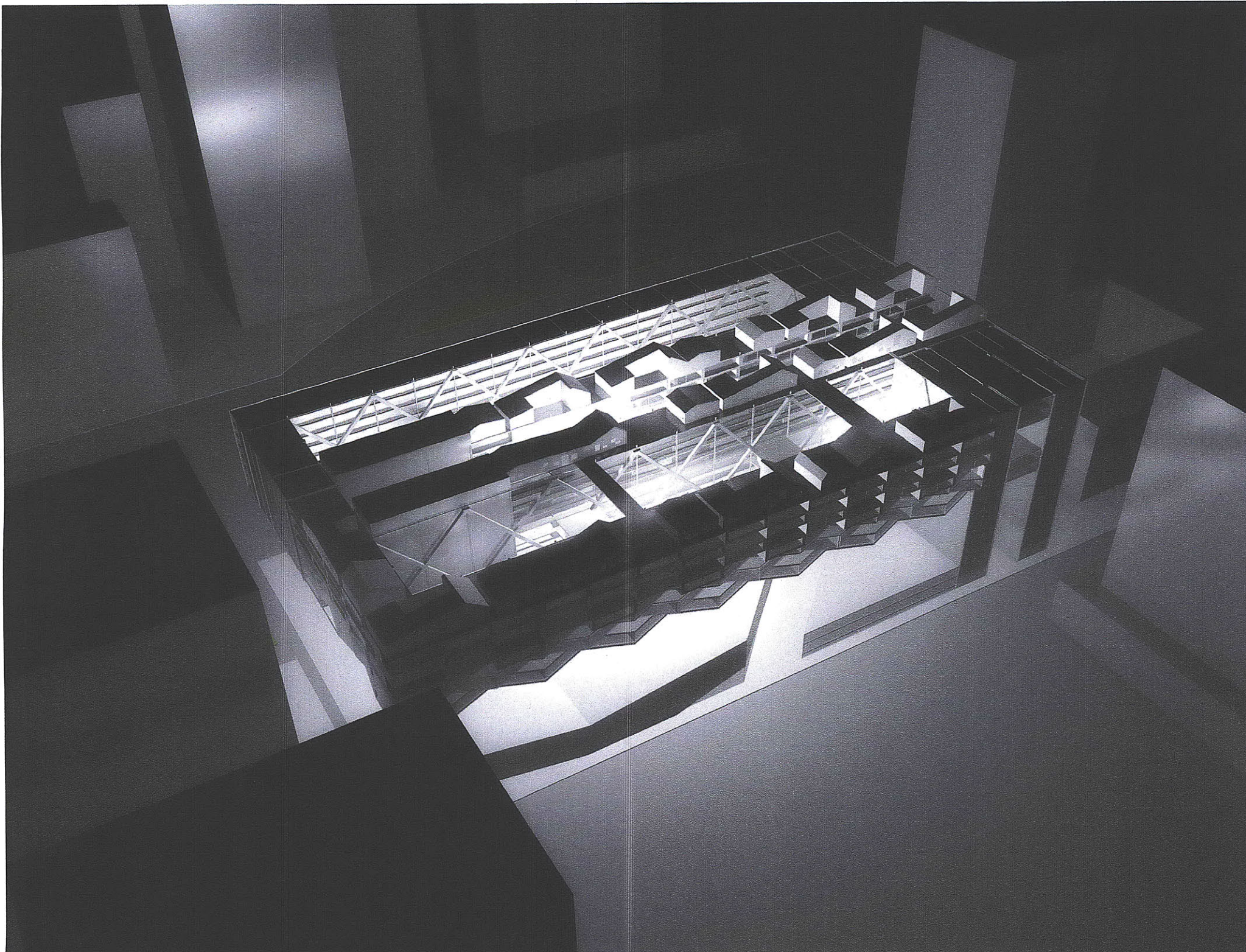
Fig 64 Light Simulations



3.4 Light & Air

Stacking the residential groups creates problem in light and air exposure. Courtyard arrangement is therefore created on each side to create internal light and air penetration. Light simulation is performed with locality precision light simulation software to estimate the amount of light landed to the lowest level throughout the day.





3.5 Circulation

The Circulation are designed primarily through the three concrete core in elevators and staircases. Different community group, including the office and hotel users, have a different entrance on the ground level. On each upper level, elevators located in the core bring people from their respective entrances to the courtyard corridor which feed into each unit. For the Office portion, sky bridges and escalators are design to bring the middle portion straight to the service units in the core .

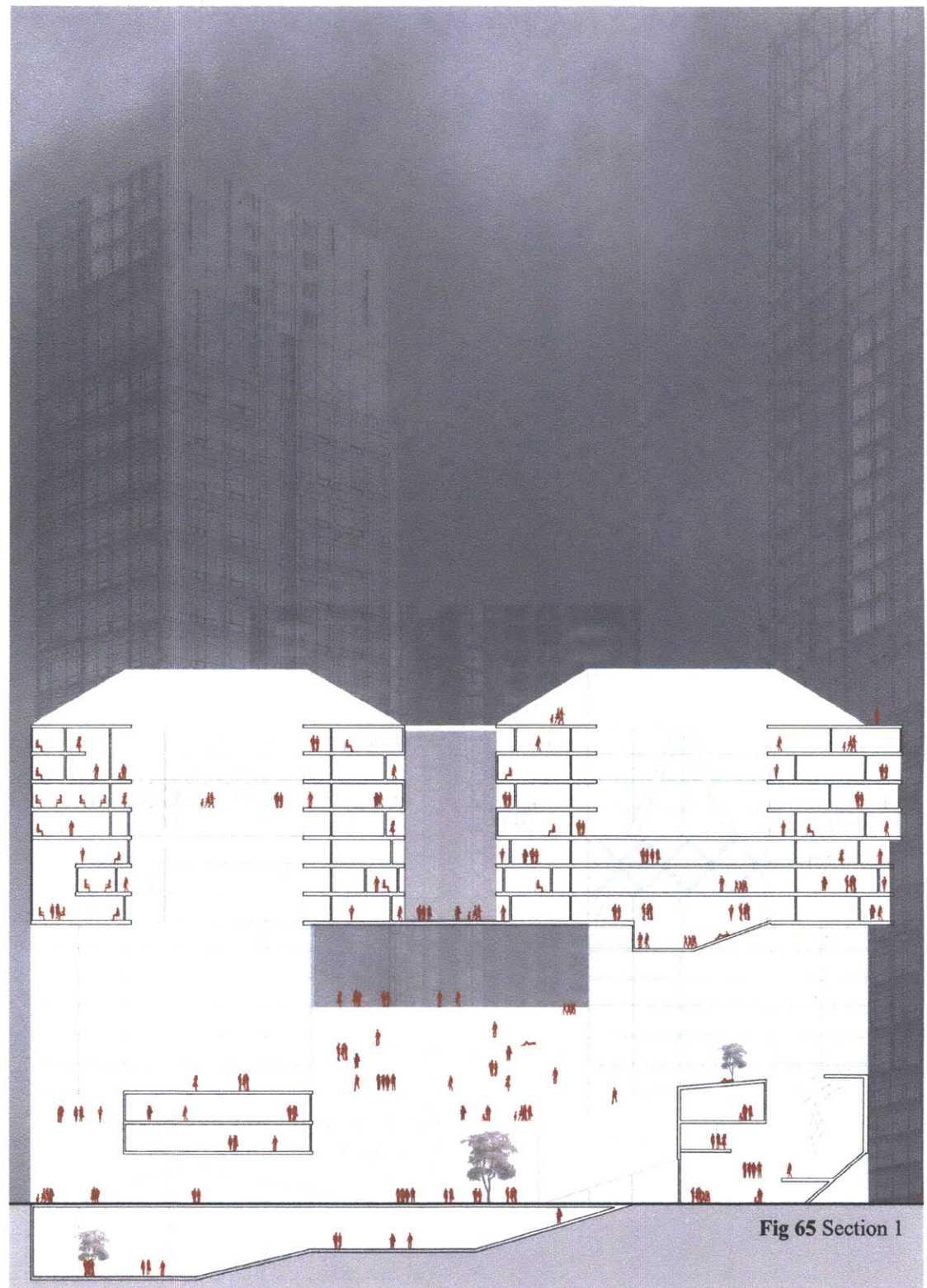
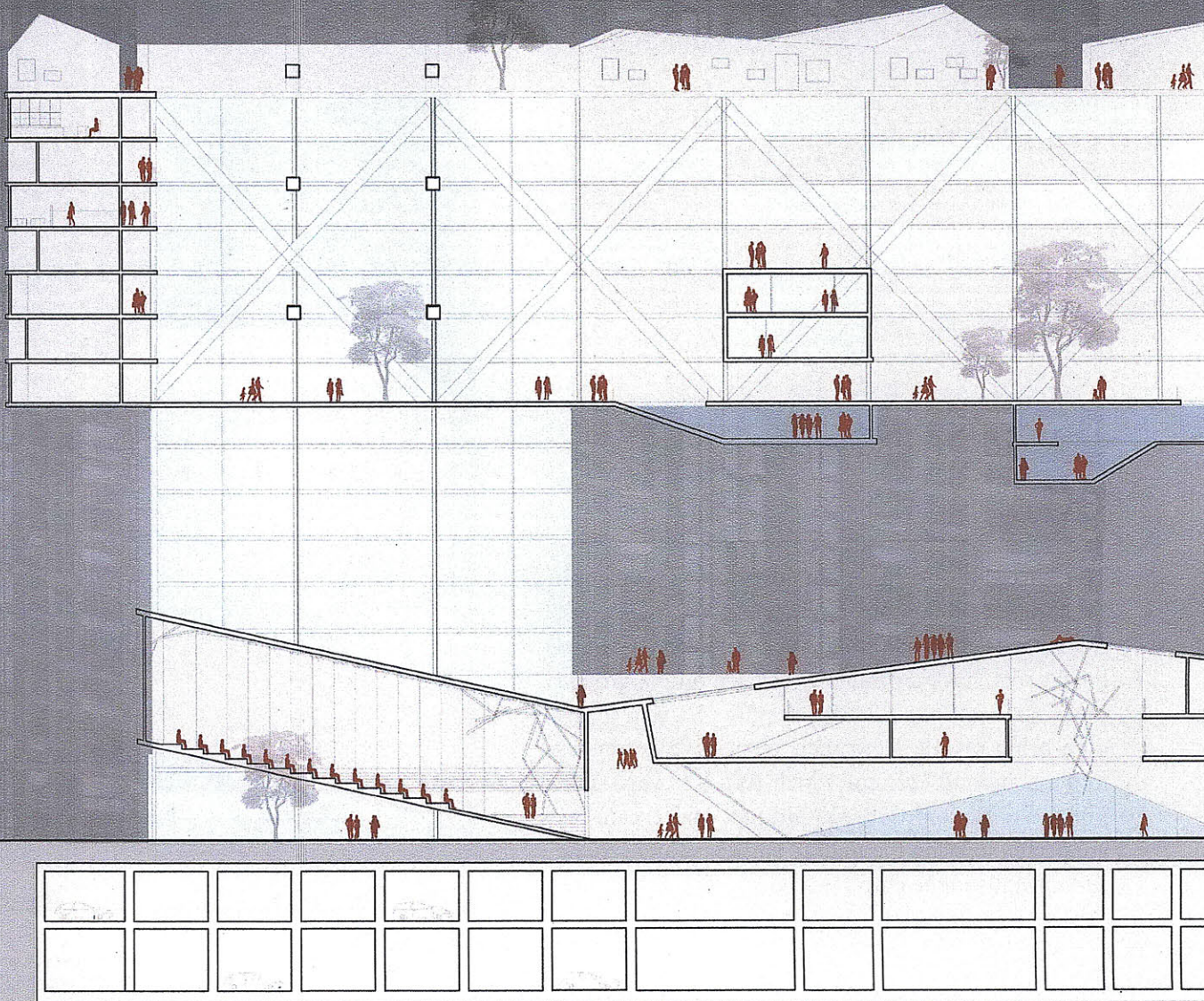


Fig 65 Section 1



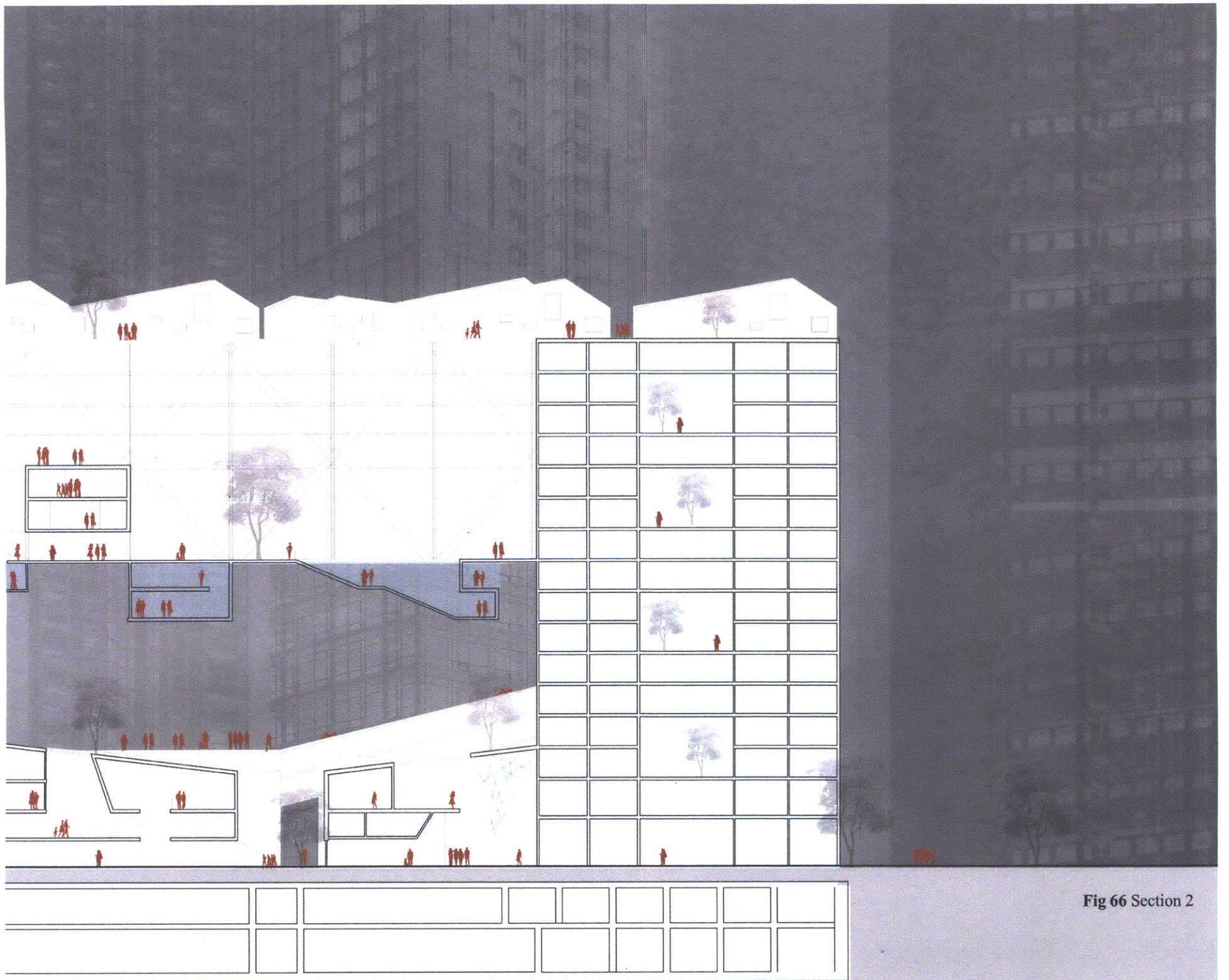
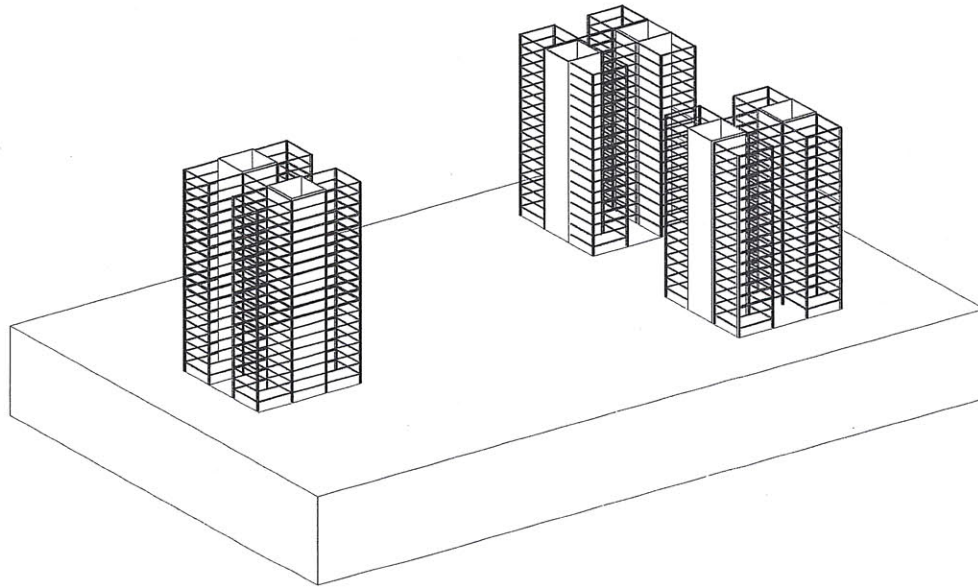
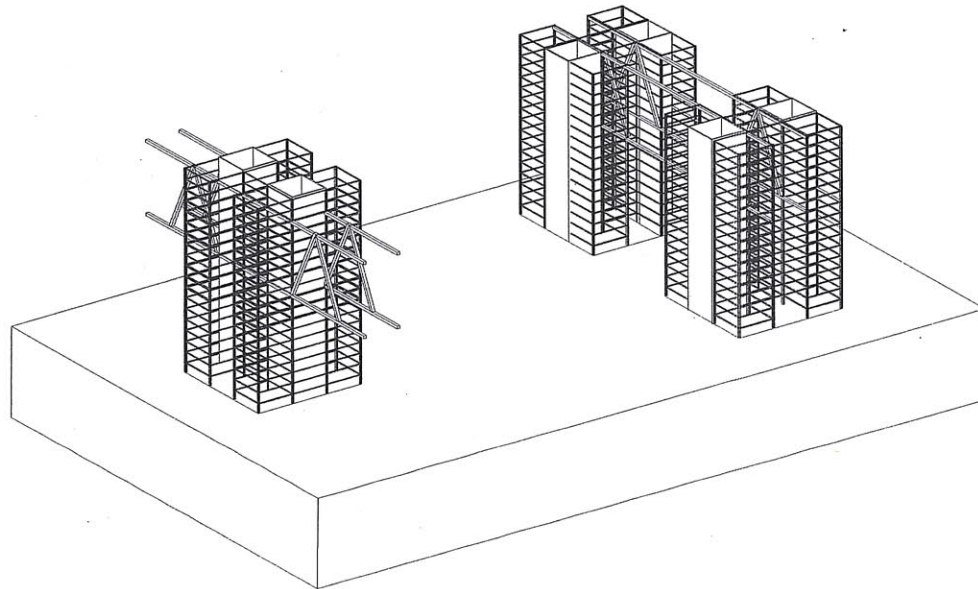


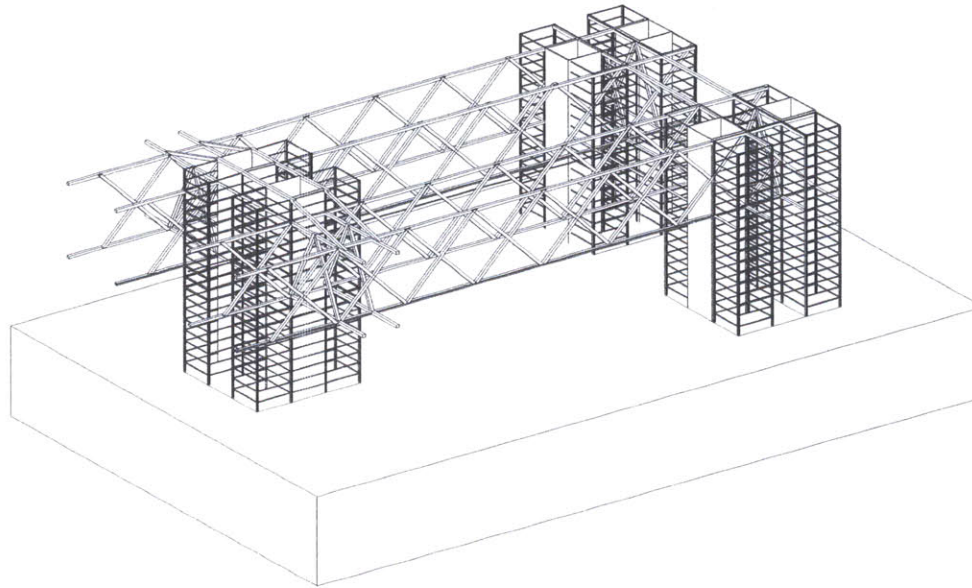
Fig 66 Section 2



Build 01



Build 02

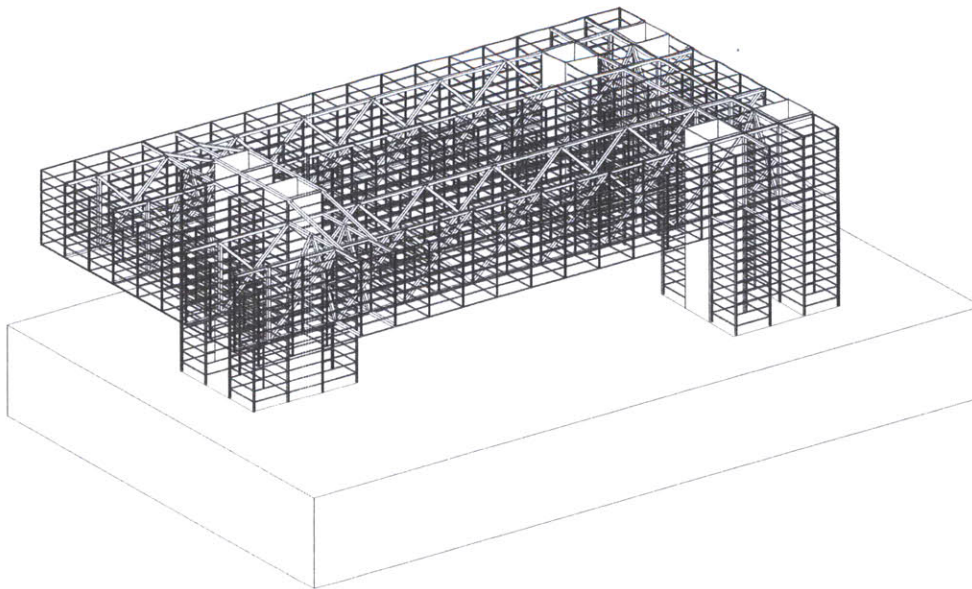


Build 03

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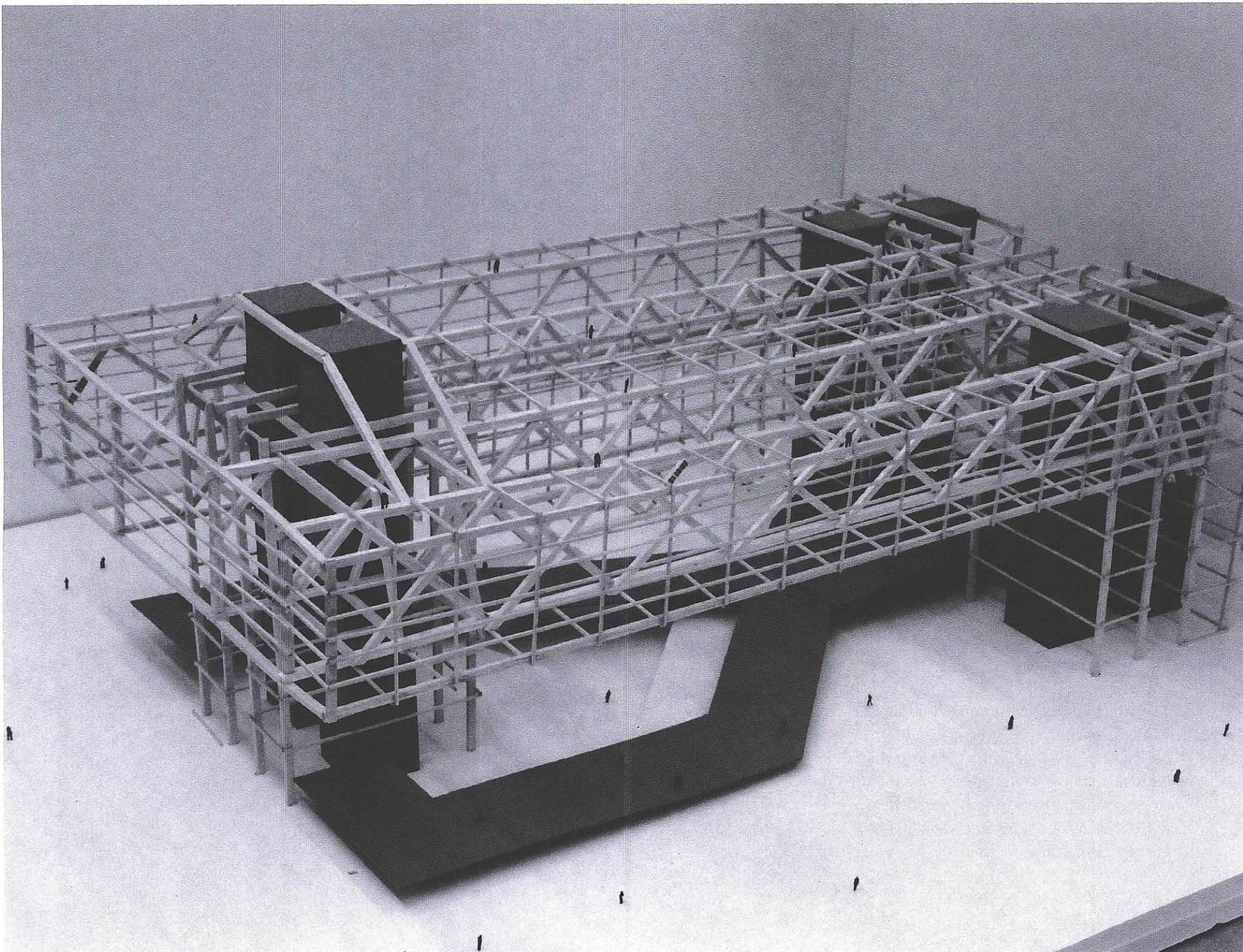
3.6 Structure System

The structure design is centered on three vertical concrete core structure. On each concrete core, a deep truss system is created, on top of which a set of long truss sit perpendicularly on. The trusses help to transfer loan from horizontal members to the vertical members.



Build 04

Fig 68 Structure 2



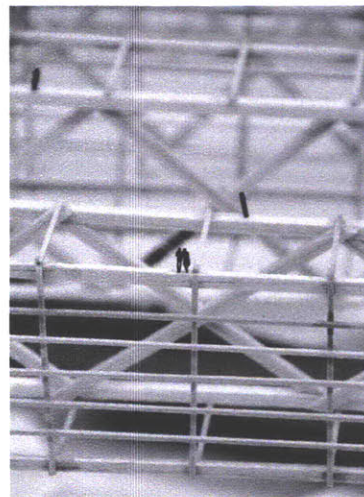
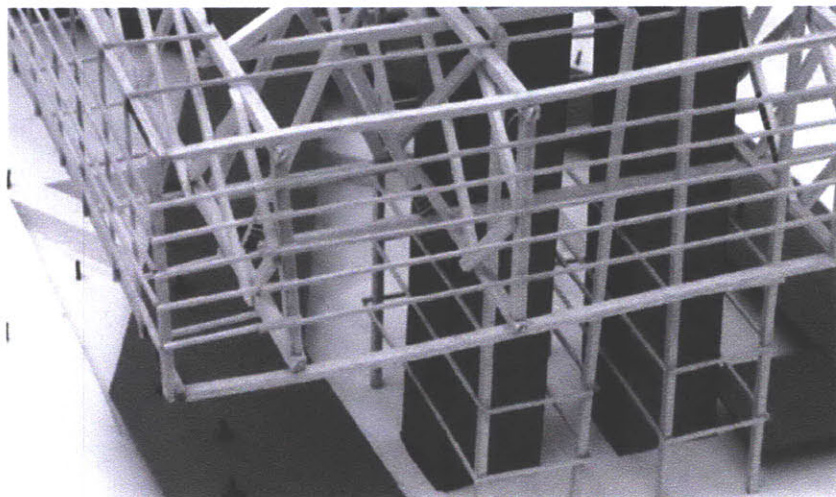
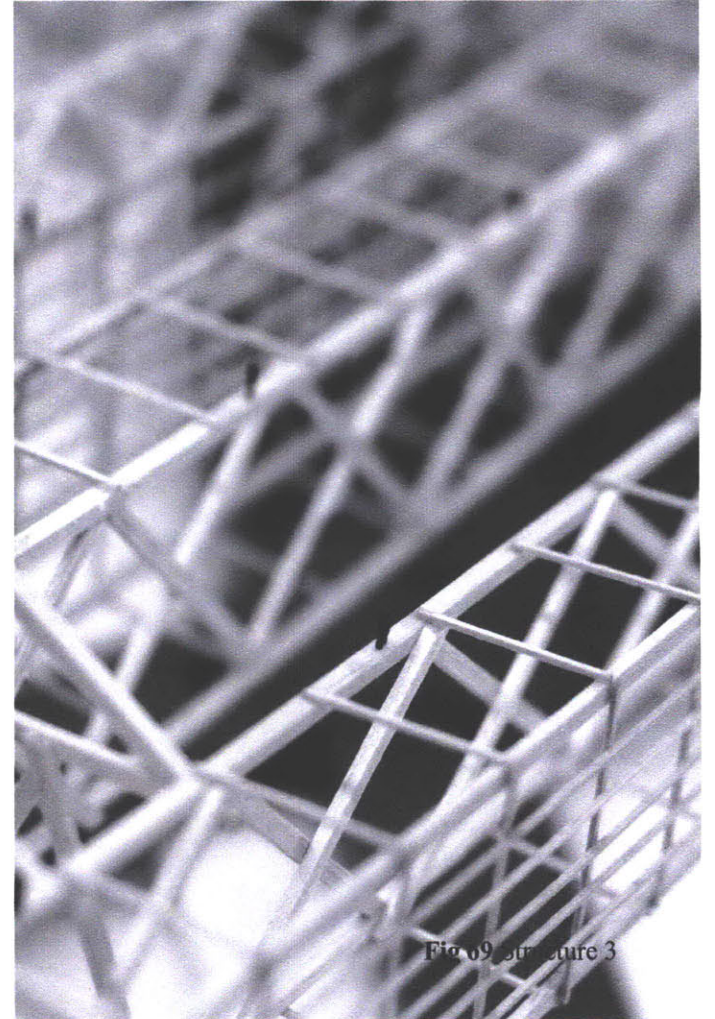
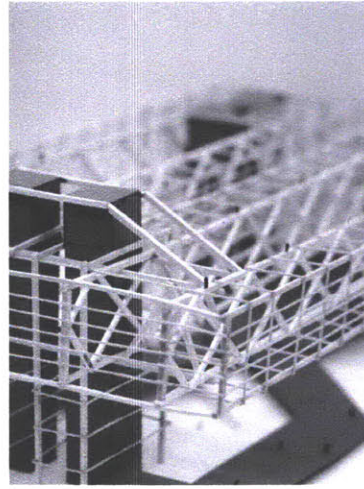
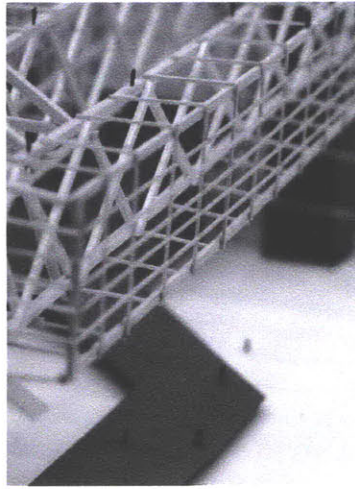
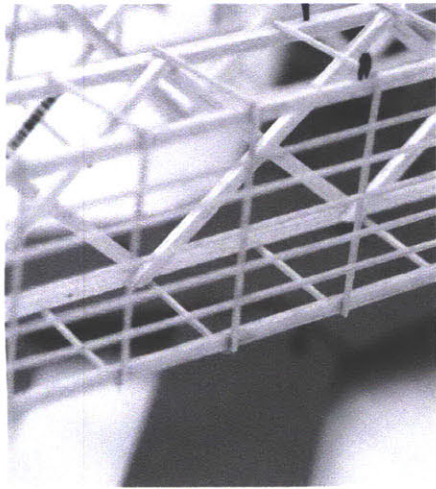
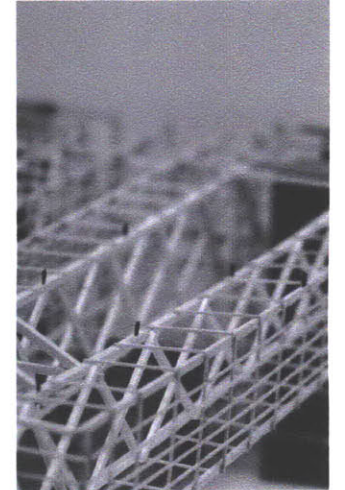
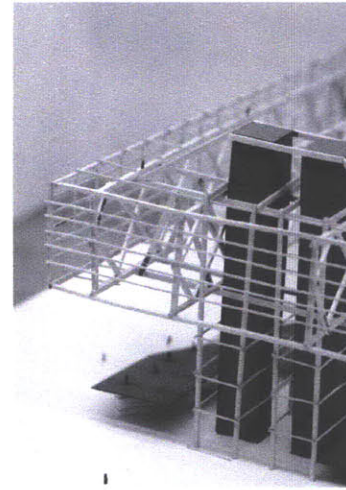
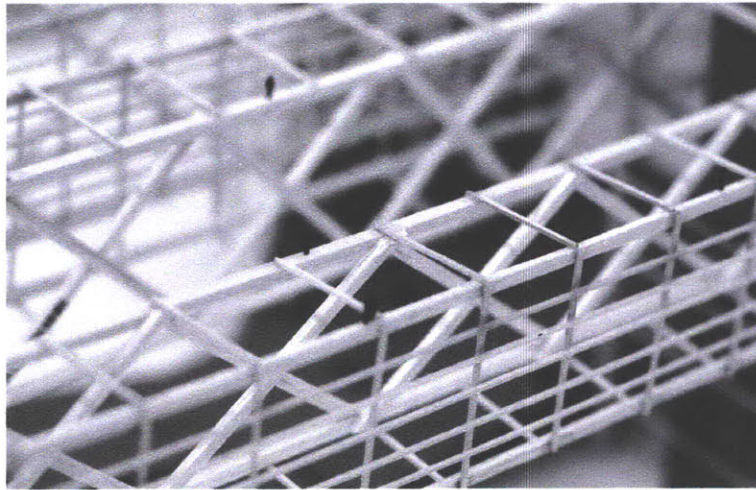
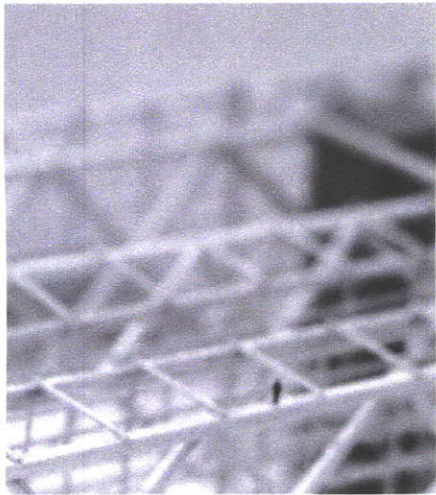


Fig 69 Structure 3

The Utopia of Financial Freedom

As Peter Eisenman has cleverly phrased "genius loci and zeitgeist". Our profession and discipline is constantly regulated, shaped and re-established by the character of the time and locality. Peter firmly believed that we are in a period of "Lateness" a metaphor of Beethoven's Missa Solemnis:

"...written at the end of Beethoven's career. This was the composer's response to the seeming impossibility of innovation. Instead Beethoven wrote a piece that was difficult, even anarchic, that could not be easily understood and was outside of his characteristic and known style. Beethoven's later work is an example of the complexity ambivalence, and the "undecidability" that characterizes a late style."
"

The lateness is probably true for our profession as architects, and also for every non-financial profession. Even the Wall Street faces collapses and re-structuring in this falling world. As stated in chapter two, under the food chain system, the financial OTC system has

extracted as much informational rent as they could, the costs get passed down the food chain layers as it should be and cause the bottom industry to pay for the luxury life style of the capital players which includes endless labour and struggle. Again, in architecture industry, whoever invented the concept of working for free, shall be punished.

Today's architect are deeply aware of the nature of the problems in our industry. For anyone interested in starting an education in architecture in this age one piece of advice is: Architecture is undoubtedly one of the most beautiful disciplines, even more true, it is probably one of the most terrible professions. In my time, comparing to an investment banking analyst closing a deal on their twenties, getting a project designed and built is becoming an unreachable dream for architects in their thirties (good luck if you are not working in China). It is an age when Architect's dreams are trapped by their financial constraints and tortured by materialistic wives. Presumably the statement "architects are mostly philosophical

dreamers" could hardly surprise anyone.

As positive as I could be, like most dreams, it is a comfortably saty place, where architects could hide in and wipe their bitter tears of the reality. Modern Architecture theory seems to also hint on the truth that slowly as new architects climb the ladder of the glory, he kills the "fathers" along the way. Led by famous architecture and world renounced schools, architects of today routinely practice the diagram they are deeply proud of, and experiment transgression in their formal approach, challenge the seemingly fallacious common belief with our speech. Yet very few architects, at least not that I have known of, has the confidence to face up to the real challenge of our time. The financial world has render us pure service providers. No one stand up to Wall Street people who sit at the top of the food chain system and exploit everyone below them. The worst part is, many of them know next to nothing, except their own system and language.

In my opinion, there is little meaning to occupy wall street physically. One little gesture from us would tilt the balance back towards us: learn their system and language, simply put understand their game. Unfortunately, in today's architecture training, finance and business is considered as dirty words.

Taking the dual degree gives me a fair exposure to both the finance program and the architecture program. What really differentiates the programs are in the life style and mentality. Most finance people work in groups, spend a good portion of their time socializing and often drinking after class with friends. Whereas architects hate to work in groups (hate to compromise their ideas) and have little time to socialize after each health consuming submission. Contrary to a lot of people's impression of the creative industry, architects spend way more time staring at computer in cubicals than traveling and seeing the real three dimensional world. The most distinct part happens at the last year before graduation. It is a year when finance guys spend half of their time jumping around the city, socializing with financial service industry firms, trying to reach out to as many alumni and contacts as possible to increase their chance in job interviews. Architects, as expected, spend multiple more time in studio, cooking their stories and diagrams of a thesis design and after that a portfolio. The difference is obvious, so is the pay.

Enough said about architecture education, our age is currently producing a different architect and a different professional practice. It is a practice in which architects participate at the each stage on the capital level, using their capacity to translate architectural/spatial considerations in financial decision making terms. In fact many

today's successful real estate private equity professional has some kind of architecture or civil engineering background. Having a good industry or operational experience allows the investment professional to have a better understanding of the market comparing to a regular analyst from a pure finance background. In the real estate private equity business, for instance, assuming real estate investment are relatively long term holding in nature, one with architecture background has the capacity to actually involve him/herself into the operation portion of the value creation in their portfolio companies.

One example would be the Phoenix Group, a Hong Kong based real estate private equity fund with an internationally educated local team and medium size. They target at niche market in the small and medium real estate development and investment opportunities, and made excellent profit in current bearish market. One distinct character of the fund is that, many of their VP, associate level investment staff come from architectural design or related background, which allow the firm to have their investment, finance, architectural design and asset management platforms to operate in the most integrated manner compared to most real estate investment institution in the market. Furthermore, this allows them to have the quickest turn round when there an opportunity comes up. The bigger investment institution with their operational team on the ground

and ICs in NYC or Chicago could hardly compete with them. With another round of layoff in the big financial institutions, and less cash on the table in even Asia's market, firms like Phoenix Group, with strong local market anchor and versatile talents, would start to grasp more market share.

So where is architect in financial time? For me the answer is simple and straight forward: we need to reinvent ourselves and our competitive edge in the greater realm of real estate industry. Not to hide ourselves in the pleasure of knowing our own skill sets, but also actively participate in the capital level, reverse the food chain structure and create our unique value, not only with our diagrams, but also with our financial intelligence and unique perspective of the market.

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- Manufacturing in the new urban economy / by Willem van Winden
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Appendix 02| Data Sets

Source:

Office Market data: URA Singapore Realis data base (authorized)

Empolyment data: Singapore MOM online data base

Economic data: Singastats online data base

Year	Price	Index	Bank	Temp	Vol	Rate	Length	Value	Offense	Days	Shard	Sp
1975Q1	15.2	43.8					65.4%	16994		25,979		54.5
1975Q2	15.2	43.8					65.4%	16994		25,979		54.5
1975Q3	15.2	43.8					65.4%	16994		25,979		54.5
1975Q4	16.3	44.1					65.4%	17413		27,047		53.0
1976Q1	17.2	44.3			11.8		64.8%	17518		27,047		53.0
1976Q2	17.8	44.6			11.5		64.8%	18071		27,047		53.0
1976Q3	18.5	44.6			11.5		64.8%	18071		27,047		53.0
1976Q4	18.7	47.0			11.8		64.8%	18521		28,595		54.0
1977Q1	18.7	46.6			12.0		65.0%	18979		29,884		55.2
1977Q2	18.7	51.9			12.4		65.0%	19501		29,884		55.2
1977Q3	18.3	50.0			11.7		65.0%	20065		30,851		56.0
1977Q4	17.8	50.0			11.1		65.0%	20639		31,429		56.6
1978Q1	17.8	48.8			11.1		65.7%	21419		32,585		57.8
1978Q2	18.3	46.3			10.4		65.7%	22090		32,585		57.8
1978Q3	18.7	45.4			9.7		65.7%	22666		33,606		58.6
1978Q4	18.7	44.7			9.0		64.1%	23338		34,286		59.2
1979Q1	20.2	43.5			8.3		64.1%	24010		35,647		60.2
1979Q2	21.6	43.5			8.3		64.1%	24682		36,647		60.2
1979Q3	23.6	49.5			5.7	708	62.3%	25353		37,637		63.1
1980Q1	27.1	53.5	2026	0.0	708	708	62.3%	26025		38,229		65.3
1980Q2	33.5	61.6	2026	0.0	708	708	62.3%	26697		40,631		67.1
1980Q3	40.8	61.6	2026	58.0	724	724	62.3%	27369		41,266	11.25	68.3
1980Q4	55.2	72.2	2084	58.0	724	724	62.3%	28041		43,436	11.25	70.7
1981Q1	88.7	79.3	2142	5.4	754	754	62.8%	28713		44,477	11.25	71.6
1981Q2	123.1	93.4	0.0	5.9	755	755	62.8%	29385		45,170	11.25	72.2
1981Q3	123.6	93.4	2200	42.7	770	770	62.8%	30057		46,528	11.25	73.4
1981Q4	123.6	104.2	2243	42.7	790	790	62.8%	30729		47,887	10.5	74.0
1982Q1	97.6	128.8	2285	0.0	800	800	64.1%	31401		49,245	9.25	73.9
1982Q2	97.6	128.8	2328	0.0	800	800	64.1%	32073		50,603	9.25	74.9
1982Q3	93.6	125.8	2328	42.0	800	800	64.1%	32745		51,961	8.5	74.3
1982Q4	92.7	117.3	2370	42.0	807	807	64.1%	33417		53,319	8.5	75.0
1983Q1	90.7	111.6	2412	42.0	811	811	63.0%	34089		54,677	8.5	75.4
1983Q2	88.1	105.0	2454	0.0	820	820	63.0%	34761		56,035	8.75	76.3
1983Q3	83.3	100.2	2454	49.0	830	830	63.0%	35433		57,393	8.75	76.3
1983Q4	78.8	91.6	2503	49.0	830	830	63.0%	36105		58,751	8.75	76.3
1984Q1	78.8	85.8	2552	49.0	839	839	62.4%	36777		60,109	8.75	76.3
1984Q2	68	74.2	2601	0.0	839	839	62.4%	37449		61,467	8.75	76.3
1984Q3	65	74.2	2651	0.0	839	839	62.4%	38121		62,825	8.75	76.3
1984Q4	56.2	72.0	2628	27.3	839	839	62.4%	38793		64,183	8.75	76.3
1985Q1	52.7	65.0	2677	70.1	822	822	65.7%	39465		65,541	8.75	76.3
1985Q2	53.7	67.7	2683	0.0	822	822	65.7%	40137		66,899	8.75	76.3
1985Q3	48.3	60.2	2732	44.0	827	827	65.7%	40809		68,257	8.75	76.3
1985Q4	37.9	61.4	2777	44.0	830	830	65.1%	41481		69,615	8.75	76.3
1986Q1	40.4	49.3	2815	0.0	830	830	65.1%	42153		70,973	8.75	76.3
1986Q2	40.4	49.3	2815	0.0	830	830	65.1%	42825		72,331	8.75	76.3
1986Q3	41.5	49.0	2815	96.0	844	844	65.1%	43497		73,689	8.75	76.3
1986Q4	42.1	50.0	2815	96.0	849	849	65.7%	44169		75,047	8.75	76.3
1987Q1	45.2	50.5	3007	96.0	860	860	65.7%	44841		76,405	8.75	76.3
1987Q2	46.5	51.8	3103	54.7	860	860	65.7%	45513		77,763	8.75	76.3
1987Q3	46.5	51.8	3158	75.3	872	872	65.7%	46185		79,121	8.75	76.3
1987Q4	52.7	56.3	3233	34.0	881	881	65.7%	46857		80,479	8.75	76.3
1988Q1	52.7	61.8	3267	14.0	881	881	65.7%	47529		81,837	8.75	76.3
1988Q2	56.5	66.7	3282	14	898	898	64.7%	48201		83,195	8.75	76.3
1988Q3	60.8	66.5	3302	10	917	917	64.7%	48873		84,553	8.75	76.3
1988Q4	68.2	73.9	3390	7.2	954	954	66.0%	49545		85,911	8.75	76.3
1989Q1	68.2	73.9	3402	12	954	954	66.0%	50217		87,269	8.75	76.3
1989Q2	68.2	73.9	3402	12	954	954	66.0%	50889		88,627	8.75	76.3
1989Q3	68.2	73.9	3402	12	954	954	66.0%	51561		90,000	8.75	76.3
1989Q4	68.2	73.9	3402	12	954	954	66.0%	52233		91,358	8.75	76.3
1990Q1	68.2	73.9	3402	12	954	954	66.0%	52905		92,716	8.75	76.3
1990Q2	68.2	73.9	3402	12	954	954	66.0%	53577		94,074	8.75	76.3
1990Q3	68.2	73.9	3402	12	954	954	66.0%	54249		95,432	8.75	76.3
1990Q4	68.2	73.9	3402	12	954	954	66.0%	54921		96,790	8.75	76.3
1991Q1	68.2	73.9	3402	12	954	954	66.0%	55593		98,148	8.75	76.3
1991Q2	68.2	73.9	3402	12	954	954	66.0%	56265		99,506	8.75	76.3
1991Q3	68.2	73.9	3402	12	954	954	66.0%	56937		100,864	8.75	76.3
1991Q4	68.2	73.9	3402	12	954	954	66.0%	57609		102,222	8.75	76.3
1992Q1	68.2	73.9	3402	12	954	954	66.0%	58281		103,580	8.75	76.3
1992Q2	68.2	73.9	3402	12	954	954	66.0%	58953		104,938	8.75	76.3
1992Q3	68.2	73.9	3402	12	954	954	66.0%	59625		106,296	8.75	76.3
1992Q4	68.2	73.9	3402	12	954	954	66.0%	60297		107,654	8.75	76.3
1993Q1	68.2	73.9	3402	12	954	954	66.0%	60969		109,012	8.75	76.3
1993Q2	68.2	73.9	3402	12	954	954	66.0%	61641		110,370	8.75	76.3
1993Q3	68.2	73.9	3402	12	954	954	66.0%	62313		111,728	8.75	76.3
1993Q4	68.2	73.9	3402	12	954	954	66.0%	62985		113,086	8.75	76.3
1994Q1	68.2	73.9	3402	12	954	954	66.0%	63657		114,444	8.75	76.3
1994Q2	68.2	73.9	3402	12	954	954	66.0%	64329		115,802	8.75	76.3
1994Q3	68.2	73.9	3402	12	954	954	66.0%	65001		117,160	8.75	76.3
1994Q4	68.2	73.9	3402	12	954	954	66.0%	65673		118,518	8.75	76.3
1995Q1	68.2	73.9	3402	12	954	954	66.0%	66345		119,876	8.75	76.3
1995Q2	68.2	73.9	3402	12	954	954	66.0%	67017		121,234	8.75	76.3
1995Q3	68.2	73.9	3402	12	954	954	66.0%	67689		122,592	8.75	76.3
1995Q4	68.2	73.9	3402	12	954	954	66.0%	68361		123,950	8.75	76.3
1996Q1	68.2	73.9	3402	12	954	954	66.0%	69033		125,308	8.75	76.3
1996Q2	68.2	73.9	3402	12	954	954	66.0%	69705		126,666	8.75	76.3
1996Q3	68.2	73.9	3402	12	954	954	66.0%	70377		128,024	8.75	76.3
1996Q4	68.2	73.9	3402	12	954	954	66.0%	71049		129,382	8.75	76.3
1997Q1	68.2	73.9	3402	12	954	954	66.0%	71721		130,740	8.75	76.3
1997Q2	68.2	73.9	3402	12	954	954	66.0%	72393		132,098	8.75	76.3
1997Q3	68.2	73.9	3402	12	954	954	66.0%	73065		133,456	8.75	76.3
1997Q4	68.2	73.9	3402	12	954	954	66.0%	73737		134,814	8.75	76.3
1998Q1	68.2	73.9	3402	12	954	954	66.0%	74409		136,172	8.75	76.3
1998Q2	68.2	73.9	3402	12	954	954	66.0%	75081		137,530	8.75	76.3
1998Q3	68.2	73.9	3402	12	954	954	66.0%	75753		138,888	8.75	76.3
1998Q4	68.2	73.9	3402	12	954	954	66.0%	76425		140,246	8.75	76.3
1999Q1	68.2	73.9	3402	12	954	954	66.0%	77097		141,604	8.75	76.3
1999Q2	68.2	73.9	3402	12	954	954	66.0%	77769		142,962	8.75	76.3
1999Q3	68.2	73.9	3402	12	954	954	66.0%	78441		144,320	8.75	76.3
1999Q4	68.2	73.9	3402	12	954	954	66.0%	79113		145,678	8.75	76.3
2000Q1	68.2	73.9	3402	12	954	954	66.0%	79785		147,036	8.75	76.3
2000Q2	68.2	73.9	3402	12	954	954	66.0%	80457		148,394	8.75	76.3
2000Q3	68.2	73.9	3402	12	954	954	66.0%	81129		149,752	8.75	76.3
2000Q4	68.2	73.9	3402	12	954	954	66.0%	81801		151,110	8.75	76.3
2001Q1	68.2	73.9	3402	12	954	954	66.0%	82473		152,468	8.75	76.3
2001Q2	68.2	73.9	3402	12	954	954	66.0%	83145		153,826	8.75	76.3
2001Q3	68.2	73.9	3402	12	954	954	66.0%	83817</				

Appendix 03| A Hypothetical Studio

Arch1.501 Architectural Design Studio
Studio Instructor: Aoran Alex Sun

Studio Brief: Appetite for Destruction

Hello Students,

You don't know me but I know you. I want to play a GAME. Here's what happens if you lose. The device you are wearing is called EDUCATION, it is hooked into your future career, when the timer in the back goes off, and your career will be permanently damaged. Think of it like a bomb. I like that word. Here, I'll show you the only key that opens the device:

Despite being at the bottom of the food chain in the development industry, getting disgraceful wages and health-destructive lifestyle, architecture students of today shall have the luxury to envision the future: a future where a regular architect with talent and a good heart, can make a difference.

We undoubtedly are the victims of the tyranny today. Like our great leader John Locke, an English activist who was born 370 years ahead of us, once believed, any "government" that rules without the consent of the people shall in theory, be overthrown. This particular studio allows students, who have an appetite for destruction, to critically examine the social dark side in global context. The mission is to counter tyranny with architectural brutality. We, as the descendants of the great leader, shall design to confront the common, challenge the pre-conceived norm, tear apart the unfair social contract, and with our architecture, f**k the majority.

The "site" of our first "bombing" target is secretly selected at Tokyo Shinjuku, probably the world's most popular site for headquarters of adult entertainment. Our client Mr. Takizawa and Ms Mihiro is targeted to be the victim of this operation. The pair both work in adult entertainment industry. Mr. Takizawa (51) works as a photographer for a pornography website and Ms Mihiro (20) is a rising AV star. They recently launched a production LLP, and will be using the HOUSE as the head quarter for their growing business.

Believe me, they would tell you places for children are important in this house, for they adopted a girl from Mainland China named Nana (6). They claim their love for children and pose like a happy family; nevertheless they hate Nana and secretly joked about nurturing her into a prostitute. Nana's baby sitter strongly suggested screening family spaces away from the couple's work. Plus Nana

loves to bring friends home at weekends. The couple is homosexually promiscuous but heterosexually monogamous, hence lengthy visits from their respective lovers would be an unspoken request.

In terms of schedule of accommodation, Mr. Takizawa would like to have a personal gallery, and Ms Mihiro has a passion for dog, strangely dogs die very often in her house. They both like wine, and watch movie while making love in open spaces like a private garden. Ms Mihiro slightly hinted on the idea of having reflective surfaces in the house that captures unexpected view of her guests.

House keeping:

01. For the first week 10 students in the studio will each come out with one conceptual proposition that targets to address one specific problem in the design while paying attention to the overall programmatic construct.
02. The next two weeks students will be asked to perform a fast track design solution that best represent his or her own proposition. Try to make the design your own beloved creation.
03. The following week, a "fair" blind voting procedure will take place, in which student vote for the best design. And of course, the rest of the designs will be discontinued from the studio work.
04. The discontinued ones have to accept the common idea and faithfully work on it for the rest of the semester.
05. The final design will be ONLY accessed and graded on how well one takes the narrative of the common and turn it into a project of GUERILLA ACTIVITY.
06. Anyone who did not fulfill any of requirements stated above would be automatically disqualified from studio final review, which would immediately lead to one's expulsion from the university.

Now let the GAME begin, may the most brutal architect win.

