CHAPTER 4

MEASURES OF COST OF EQUITY

4.1 Descriptive Statistics of the Time Series Data

This chapter describes briefly the statistical behaviour of the time series data used in the estimation of cost of equity. The estimates of the risk measures and cost of equity for the different models are reported and examined for the full sample and sub-sectors.

The averages for firm stock returns, market returns, risk-free rates and market risk premiums for the period 2001-2008 are shown in Table 4.1. All of them are ex-post values except for the market risk premiums which are the ex-ante values.

Overall, the 2001 Dot.Com bubble burst was felt in 2001 and 2002 where the market returns for both Malaysia and the U.S. as well as some sectoral stock returns recorded negative values. The 2001 Dot.Com bubble was a speculative bubble hovering on internet stocks in the late 1990s where the stock prices of the internet sector increased rapidly due to over optimism of investors on internet-related firms even though these firms may not be generating profits. The bubble deflated at an accelerated speed in 2001, resulting in financial difficulties for many firms. It is interesting to discover that the Plantations sector is sheltered from the adverse impact of the bubble burst and was the only sector with a positive average return in 2002.

Nevertheless, the market seemed to have recovered from the aftermath temporarily where the KLCI and the MSCI US achieve average positive returns of 21.37 percent and 22.19 percent, respectively in 2003. It was a good year where most sectors had outperformed the market index. In the following two years, the stock markets were on the downtrend again with majority of stock returns deteriorated below zero percent. Market performance seems to pick up in 2006 and peaked in 2007 with the KLCI recorded a positive average weekly return of 28 percent while for some sectors, average returns was as high as 55.75 percent. The U.S. subprime crisis finally took its toll on the stock markets when large negative returns were recorded in 2008. Not even the Plantations sector was spared. In sum, the period of 2001-2008 saw ups and downs in the Malaysian and world stock market movements.

On the other hand, local and global annual risk-free rates are relatively more stable with an average of 4.28 percent and 2.69 percent, respectively. Extracted from Damodaran's website, the annual ex-ante market risk premium for Malaysia were between 6.07 percent to 7.63 percent while the global market risk premium fluctuated within a narrower range of 4.51 percent to 5.51 percent. If the excess market return computation $(R_m - R_f)$ is used to calculate market risk premiums, negative values would have been found for the Malaysian market, for example, large negative return in KLCI was recorded in 2008. Since negative values could not be used for the market risk premium, the problem is hence solved by using the market risk premiums obtained via Damodaran's sovereign bond premium approach.

Table 4.1: Firm Returns, Risk-Free Rates and the Market Risk Premiums (in percent)

Year	(No. of Firms)	2001	2002	2003	2004	2005	2006	2007	2008	Grand Mean
Average Annual Firm Returns										
Construction	(28)	4.70	-18.53	36.55	-28.31	-39.13	32.51	46.11	-63.11	-3.65
Consumer Products	(54)	0.46	-15.61	14.21	-3.89	-9.38	8.42	7.89	-31.05	-3.62
Industrial Products	(129)	-2.97	-16.59	31.00	-10.06	-38.54	20.19	10.61	-46.30	-6.58
Plantations	(21)	9.29	10.56	16.07	10.16	-4.37	28.69	55.75	-48.51	9.71
Properties	(33)	-4.07	-23.22	27.96	-7.61	-39.69	28.39	45.69	-70.17	-5.34
Technology	(12)	2.09	-18.09	29.76	-32.08	-47.46	11.31	-6.15	-53.61	-14.28
Trading/Services	(77)	-3.62	-17.49	26.66	-3.11	-22.92	20.73	19.33	-52.38	-4.10
Average Annual Market Returns										
KLCI		-3.79	-3.52	21.37	15.49	-0.86	19.13	28.00	-45.88	3.74
MSCI US		-9.88	-26.21	22.19	10.14	4.75	11.84	5.58	-47.65	-3.66
Annual Risk-Free Rate										
Local		4.78	3.66	2.46	2.82	4.57	6.12	5.75	4.05	4.28
Global (US)		3.48	1.64	1.03	1.39	3.22	4.85	4.48	1.42	2.69
Ex-Ante Annual Market Risk Premium										
Local		6.81	6.54	6.25	6.27	6.15	6.19	6.07	7.63	6.49
Global (US)		5.51	4.51	4.82	4.84	4.80	4.91	4.79	5.00	4.90

Notes: The returns were computed on the basis of the US dollars.

4.2 Estimates of the Risk Measures and Their Properties

Estimated risk measures from equations (3.2a), (3.3a), (3.4a), (3.5a), (3.6a), (3.7a), (3.8a) and (3.9a) are tabulated in Table 4.2 for the full sample and Table 4.3 to Table 4.9 for each sector.

In line with Estrada (2000), as can be seen from Table 4.2, the risk measures based on total risk and downside risk are substantially higher than those based on systematic risk with the exception of the two-factor model where β_{Li}^{D} is lower than β_{Li} in 2001 and 2002. The estimated beta from LCAPM, β_i, ranges from 0.7717 to 1.4061. Using market index covering the 1988-1998 period, Estrada (2000) found an average beta of 1.30 for Malaysia. We also found β_i to be much larger than β_i^{G} for the one-factor CAPM model. This observation is also true for its downside version, except for 2001, where β_i^{DG} is slightly larger than β_i^{D}. In the joint estimation of local beta and global beta, that is, the two-factor version, it is shown that local beta estimates are higher too. This indicates that the local market index has a dominant influence on stocks in Malaysia, and firms have higher exposure to local market movements. Estrada (2000) documented that the semi-deviation and standard deviation (total risk) for Malaysian market index as 6.67 and 9.96, respectively. In this study, the semi-deviation is found to be in the range of 3.2360-5.6498 and the standard deviation ranges from 4.6977-7.3888. This could mean that the overall risk has reduced for the Malaysian market since 1998.

Tables 4.3, 4.4, 4.5, 4.6, 4.7, 4.8 and 4.9 report the annual average of risk measures for firms in the Construction sector, Consumer Products sector, Industrial Products sector, Plantations sector, Properties sector, Technology sector and Trading/Services sector, respectively. In general, there are consistencies in results across the seven sectors with those of the full sample on two aspects. First, larger risk measures were found based on total risk and downside risk than those based on systematic risk. Second, the local market dominance influence on stock returns is also true for the different sectors. The range of β_i for the Construction sector (0.7217–1.4308), Consumer Products (0.4997–1.1894), Industrial Products sector (0.6245–1.4128), Properties sector (1.0008–1.8528) and Technology sector (0.4381–1.6395) are larger than the values for the full sample (0.7717–1.4061). On the other hand, the Plantations sector (0.8415–1.3269) and Trading/Services sector (0.8276–1.4004) have smaller β_i estimates compared to the full sample. All seven sectors also share the exception in the two-factor model where β_{Li}^D is not found to be greater than β_{Li} in 2001 and 2002. Nonetheless, for the Plantations sector, β_{Li}^D is less than β_{Li} only found for 2001.

Sectors which have a higher range than range of the full sample β_i range also have higher range for $\delta_{R_{ft},i}$ and σ_i. However, it appears that the Consumer Products sector has switched place with the Plantations sector with the $\delta_{R_{ft},i}$ and σ_i of the former having a lower range while the latter has a higher range for both estimates. Besides having the highest range for β_i, the Technology sector also has the highest σ_i range among all the sectors. Despite being recorded as the sector with the lowest β_i range, the Plantations sector is shown to have the highest $\delta_{R_{ft},i}$ range. On the other hand, the Trading/Services sector has been consistently less risky than most of the sectors by having lower range of β_i, $\delta_{R_{ft},i}$ and σ_i than the range for the full sample.

Table 4.2: Annual Averages of Firm Risk Measures for Full Sample

Risk Measure	2001	2002	2003	2004	2005	2006	2007	2008
β_i	1.1900	0.9620	1.4061	0.7717	0.9729	1.1347	0.8856	0.7720
β_i^D	1.3268	1.2222	2.0895	1.6624	2.1527	1.8647	1.6255	1.1032
β_i^G	0.6645	0.1616	0.2502	0.0960	-0.0220	0.5522	0.5506	0.1867
β_i^{DG}	1.4254	0.7553	1.4231	1.4222	1.4775	1.6479	1.2682	0.5170
β_{Li}	1.1076	0.9600	1.3947	0.8048	1.0390	1.0873	0.8804	0.7849
β_{Gi}	0.3414	0.0049	0.0554	-0.1465	-0.2719	0.1148	0.0109	-0.0298
β_{Li}^D	0.8798	0.8762	2.2446	1.3162	1.2475	1.4721	1.3635	1.0264
β_{Gi}^D	0.8258	0.3724	0.5839	0.7217	0.9929	0.8292	0.3387	0.1251
$\delta_{R_{ft},i}$	4.9826	3.4972	3.6229	3.2360	3.6856	3.4398	3.9382	5.6498
σ_i	7.0893	5.0900	5.9581	4.6977	4.9487	5.5828	6.2605	7.3888

Notes: The risk measures are as depicted in equations (3.2a), (3.3a), (3.4a), (3.5a), (3.6a), (3.7a), (3.8a) and (3.9a).

Table 4.3: Annual Averages of Firm Risk Measures for Construction Sector

Risk Measure	2001	2002	2003	2004	2005	2006	2007	2008
β_i	1.2923	1.0860	1.4547	0.7217	1.0089	1.4308	1.1737	1.1460
β_i^D	1.4054	1.2103	2.2250	1.8866	2.1363	2.1094	2.1685	1.3404
β_i^G	0.6743	0.1988	0.2127	0.0571	0.1929	1.0008	0.6792	0.3204
β_i^{DG}	1.4648	0.8080	1.4963	1.7582	1.6350	2.0109	1.5006	0.6832
β_{Li}	1.2151	1.0765	1.4527	0.7607	1.0218	1.2205	1.2006	1.1439
β_{Gi}	0.3198	0.0231	0.0098	-0.1721	-0.0528	0.5099	-0.0567	0.0049
β_{Li}^D	0.9133	0.7828	2.2801	1.4274	1.3275	1.4895	2.0655	1.2382
β_{Gi}^D	0.8604	0.4513	0.6382	0.9950	1.0359	1.2713	0.0697	0.2061
$\delta_{R_{ft},i}$	5.1204	3.6767	3.6608	3.7034	3.7982	3.5356	4.2006	6.5937
σ_i	7.3882	5.4447	6.3180	4.8091	4.8116	6.0411	7.0449	8.4674

Notes: The risk measures are as depicted in equations (3.2a), (3.3a), (3.4a), (3.5a), (3.6a), (3.7a), (3.8a) and (3.9a).

Table 4.4: Annual Averages of Firm Risk Measures for Consumer Products Sector

Risk Measure	2001	2002	2003	2004	2005	2006	2007	2008
β_i	0.9482	0.8154	1.1894	0.6653	0.8009	0.8026	0.5522	0.4997
β_i^D	1.0810	1.0165	2.0712	1.4908	1.8092	1.4763	1.1502	0.8646
β_i^G	0.5030	0.1194	0.2136	0.1060	-0.1035	0.2806	0.3855	0.1459
β_i^{DG}	1.2082	0.5823	1.2825	1.1724	1.2026	1.2644	0.9040	0.4365
β_{Li}	0.8894	0.8215	1.1794	0.6883	0.8774	0.8235	0.5208	0.4957
β_{Gi}	0.2436	-0.0147	0.0489	-0.1014	-0.3145	-0.0506	0.0663	0.0091
β_{Li}^D	0.6667	0.7507	2.0054	1.2860	0.9249	1.1489	0.9309	0.7288
β_{Gi}^D	0.7341	0.2730	0.4826	0.5665	0.7953	0.6842	0.2826	0.1578
$\delta_{R_{ft},i}$	4.2507	2.9790	3.3189	2.9742	3.1697	3.2714	3.1448	4.6257
σ_i	5.9969	4.3745	5.0881	4.2924	4.4625	5.0039	4.8707	6.0524

Notes: The risk measures are as depicted in equations (3.2a), (3.3a), (3.4a), (3.5a), (3.6a), (3.7a), (3.8a) and (3.9a).

Table 4.5: Annual Averages of Firm Risk Measures for Industrial Products Sector

Risk Measure	2001	2002	2003	2004	2005	2006	2007	2008
β_i	1.1976	0.9297	1.4128	0.7049	1.0000	1.1735	0.8916	0.6245
β_i^D	1.3696	1.2303	2.1000	1.7043	2.3928	2.0321	1.7406	1.0316
β_i^G	0.6766	0.1415	0.2685	0.0340	-0.0065	0.4997	0.5537	0.1746
β_i^{DG}	1.5163	0.7633	1.4525	1.5119	1.6313	1.7869	1.3785	0.4715
β_{Li}	1.1127	0.9343	1.3977	0.7483	1.0638	1.1597	0.8869	0.6234
β_{Gi}	0.3521	-0.0110	0.0732	-0.1915	-0.2624	0.0333	0.0101	0.0026
β_{Li}^D	0.8746	0.8717	2.4101	1.2890	1.4994	1.6396	1.4115	1.0387
β_{Gi}^D	0.9209	0.3817	0.5396	0.8102	1.0575	0.8454	0.4269	0.0806
$\delta_{R_{ft},i}$	5.1886	3.5969	3.7847	3.3511	4.1087	3.6994	4.4052	5.9520
σ_i	7.2926	5.1816	6.3270	4.8623	5.3007	5.9847	6.7728	7.9414

Notes: The risk measures are as depicted in equations (3.2a), (3.3a), (3.4a), (3.5a), (3.6a), (3.7a), (3.8a) and (3.9a).

Table 4.6: Annual Averages of Firm Risk Measures for Plantations Sector

Risk Measure	2001	2002	2003	2004	2005	2006	2007	2008
β_i	1.0601	0.8415	1.0422	0.8427	0.8844	1.0065	0.8516	1.3269
β_i^D	1.1674	1.0925	1.8016	1.7299	1.5597	1.4339	1.3117	1.5278
β_i^G	0.6387	0.1515	0.1028	-0.0039	0.1404	0.5845	0.4574	0.2695
β_i^{DG}	1.3355	0.6902	1.0158	1.1322	1.0779	1.2126	1.1242	0.6063
β_{Li}	0.9746	0.8352	1.0512	0.9053	0.9030	0.9176	0.8948	1.3743
β_{Gi}	0.3544	0.0152	-0.0440	-0.2767	-0.0768	0.2154	-0.0911	-0.1096
β_{Li}^D	0.7478	0.8532	1.6541	1.3174	1.0028	1.1618	1.0014	1.4821
β_{Gi}^D	0.7804	0.3116	0.5100	0.3324	0.6132	0.6174	0.3236	0.0320
$\delta_{R_{ft},i}$	4.2782	2.8496	2.8593	3.0037	2.3664	2.3091	2.8857	5.4204
σ_i	6.4615	4.6220	4.5492	4.5276	3.4720	3.9556	5.3939	6.7516

Notes: The risk measures are as depicted in equations (3.2a), (3.3a), (3.4a), (3.5a), (3.6a), (3.7a), (3.8a) and (3.9a).

Table 4.7: Annual Averages of Firm Risk Measures for Properties Sector

Risk Measure	2001	2002	2003	2004	2005	2006	2007	2008
β_i	1.3840	1.1003	1.8528	1.0202	1.3110	1.5281	1.2415	1.0008
β_i^D	1.4812	1.4060	2.4006	1.7468	2.5939	2.1289	2.0303	1.3998
β_i^G	0.8662	0.2435	0.2767	0.1613	0.0558	0.8352	0.6569	0.1739
β_i^{DG}	1.5233	0.8891	1.8386	1.5136	1.7723	1.6457	1.4997	0.5910
β_{Li}	1.2639	1.0721	1.8490	1.0557	1.3779	1.4190	1.3111	1.0509
β_{Gi}	0.4975	0.0685	0.0184	-0.1568	-0.2756	0.2644	-0.1467	-0.1160
β_{Li}^D	1.0446	0.9280	3.1278	1.5245	1.3473	1.8083	1.7862	1.3139
β_{Gi}^D	0.8505	0.4989	0.5631	0.7460	1.3267	0.7224	0.3504	0.1078
$\delta_{R_{ft},i}$	5.5049	4.0795	4.3558	3.4406	4.4013	3.7388	4.5015	6.3861
σ_i	7.9725	5.9226	7.3144	5.3233	5.7580	6.0352	7.6322	8.1069

Notes: The risk measures are as depicted in equations (3.2a), (3.3a), (3.4a), (3.5a), (3.6a), (3.7a), (3.8a) and (3.9a).

Table 4.8: Annual Averages of Firm Risk Measures for Technology Sector

Risk Measure	2001	2002	2003	2004	2005	2006	2007	2008
β_i	1.3917	1.3214	1.6395	0.6222	0.4381	1.4572	0.8149	0.7538
β_i^D	1.4711	1.3785	2.0885	1.4713	1.8827	2.5539	1.5441	1.0522
β_i^G	0.8670	0.3276	0.4876	0.2322	0.0510	1.0945	0.5598	0.1605
β_i^{DG}	1.6158	0.8523	1.4147	1.1987	1.2285	2.2451	1.1941	0.4745
β_{Li}	1.2721	1.2721	1.5849	0.6113	0.4521	1.2059	0.7745	0.7771
β_{Gi}	0.4959	0.1200	0.2662	0.0480	-0.0578	0.6095	0.0851	-0.0539
β_{Li}^D	0.9589	1.0086	2.1035	1.1679	1.1773	2.0192	1.2803	0.8021
β_{Gi}^D	0.9354	0.4495	0.8532	0.7011	0.7435	1.1888	0.3979	0.1108
$\delta_{R_{ft},i}$	5.0774	3.5000	3.1291	2.9482	3.2504	4.2582	3.7280	5.9522
σ_i	7.7948	5.1649	5.3333	3.7434	3.8926	6.8580	5.7409	7.2887

Notes: The risk measures are as depicted in equations (3.2a), (3.3a), (3.4a), (3.5a), (3.6a), (3.7a), (3.8a) and (3.9a).

Table 4.9: Annual Averages of Firm Risk Measures for Trading/Services Sector

Risk Measure	2001	2002	2003	2004	2005	2006	2007	2008
β_i	1.2305	0.9912	1.4004	0.8737	0.9975	1.0110	0.8724	0.8276
β_i^D	1.3539	1.2895	1.9809	1.6062	2.0118	1.6644	1.4936	1.0695
β_i^G	0.6431	0.1531	0.2507	0.1853	-0.1578	0.4527	0.5929	0.1740
β_i^{DG}	1.3638	0.7893	1.3803	1.3997	1.3766	1.5784	1.2057	0.5399
β_{Li}	1.1568	0.9951	1.3888	0.8927	1.1002	0.9882	0.8335	0.8542
β_{Gi}	0.3057	-0.0094	0.0567	-0.0837	-0.4225	0.0552	0.0820	-0.0616
β_{Li}^D	0.9789	0.9690	1.9267	1.2760	1.0576	1.2672	1.2616	0.9250
β_{Gi}^D	0.7028	0.3482	0.6964	0.6819	1.0071	0.7906	0.3181	0.1824
$\delta_{R_{ft},i}$	5.0541	3.5552	3.5225	3.0773	3.4183	3.1406	3.6954	5.2181
σ_i	7.0890	5.0685	5.7196	4.5924	4.9703	5.2000	5.8211	6.8897

Notes: The risk measures are as depicted in equations (3.2a), (3.3a), (3.4a), (3.5a), (3.6a), (3.7a), (3.8a) and (3.9a).

In order to have a better understanding of the trend of various risk measures across the year for the full sample and the seven sectors, the estimates are plotted in Figure 4.1 to

Figure 4.10. Figure 4.1 shows the local beta estimates across sectors as well as for the full sample from 2001 to 2008. Overall, declining local beta values are observed for all the sectors, except for the Plantations sector which show a jump in the beta estimate for 2008. Besides that, the trend portrayed by the Technology sector deviates slightly from the rest, especially in 2005 where it experienced a drop in the local beta estimate rather than an increase as is the case of the other sectors. The rest of the risk measures also show declining trend especially in recent years – downside local beta (Figure 4.2), global beta (Figure 4.3), downside global beta (Figure 4.4), local and global betas for the two-factor model (Figure 4.5 and Figure 4.6, respectively) as well as their downside versions (Figure 4.7 and Figure 4.8, respectively). However, for semi-deviation (Figure 4.9) and standard deviation (Figure 4.10), an increasing trend is observed.

For the one-factor model, the Plantations sector and the Technology sector frequently show behaviour different from the rest although their trends are more uniform with the others for the global market related risk measures. Similar observations are also found for the risk measures from the two-factor model. It is clear from the line graphs provided in Figures 4.1 through Figure 4.10 that although the trend shown by the sectors seems to conform to each other, some sectors tend to deviate more from the common trend such as the Plantations sector and the Technology sector, being the more obvious. This justifies the need to examine the cost of equity on a sectoral basis. Most of the time, the Property sector and the Technology sector have the highest risk estimates and occasionally, the Construction sector. On the contrary, the Plantations sector and the Consumer Products sector are shown to have lower risk estimates.

In order to have a clearer comparison of the estimated risk measures across the various sectors, a summary of the averages is provided in Table 4.10. On average, semi-deviation estimates are lower than those of standard deviation, while estimated downside betas are greater than standard betas. This observation is in accord with Estrada's (2000, 2001) findings. Estimated local betas are roughly three times higher than the estimates of global betas, suggesting firm returns are more responsive to the variations in the local market than to the global market movements. The estimated β_i for four out of seven sectors have average figures of greater than one. The sectors are Construction (1.1643), Properties (1.3048), Technology (1.0549), and Trading/Services (1.0255). It also means that they have higher risk exposure than the market, with the Properties sector attaining the highest β_i values. The other three sectors, Consumer Products, Industrial Products, and Plantations have lower average β_i of 0.7842, 0.9918 and 0.9820, respectively.

On the contrary, β_i^G estimates are less than 0.5, suggesting that firm stock returns are less responsive to global market returns. Estimated downside betas have been consistently above one. When the local and global betas were jointly estimated in the two-factor model, β_{Li} ends up with average values greater than β_{Gi}. This is also true for its downside version. This finding is consistent with the one-factor model. The average of the estimates of local betas from the two-factor model does not differ much from that of the one-factor model but this is not the case for global betas. The figure of β_{Gi} from the two-factor model is much lower than β_i^G from the one-factor model. Bodnar *et al*. (2003) addressed this observation as the phenomenon of 'local pricing', whereby, for unknown reasons, local stock indices have a dominant influence on the securities traded on the local stock exchange when applying a hybrid CAPM.

Not only does the Properties sector has the highest local beta estimates for both one-factor and two-factor models, it also has the largest semi-deviation and standard deviation estimates. The Technology sector is shown to have the highest figures for β_i^G and β_{Gi} while the largest β_i^{DG} and β_{Gi}^D estimates are found for the Construction sector. On the other hand, the Consumer Products sector recorded the lowest estimates for six out of the ten risk measures while the Plantations sector for the other four. The results suggest that the Properties sector has the highest risk while the Consumer Products sector has the lowest risk among the seven sectors.

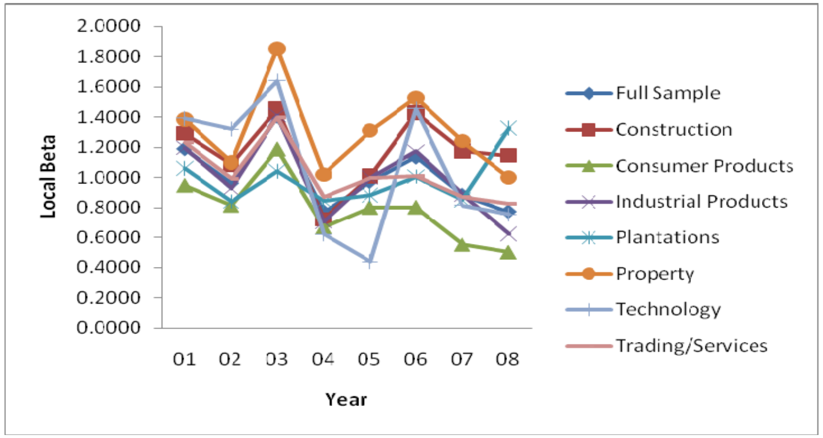

Figure 4.1 Local Beta Estimates across Sectors from 2001 to 2008

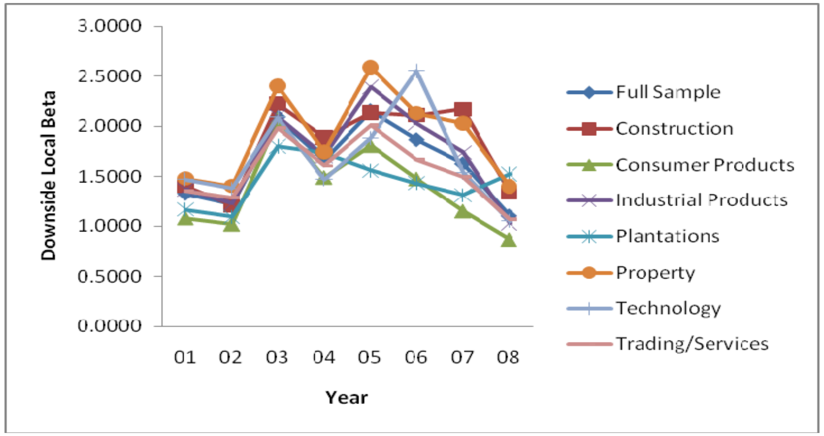

Figure 4.2 Downside Local Beta Estimates across Sectors from 2001 to 2008

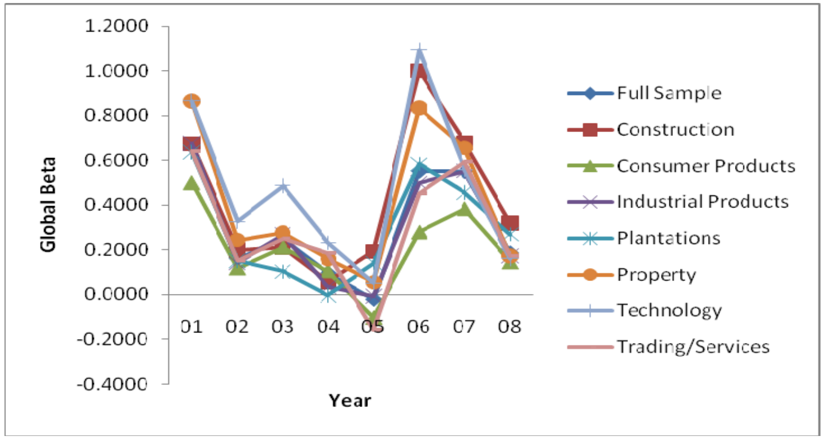

Figure 4.3 Global Beta Estimates across Sectors from 2001 to 2008

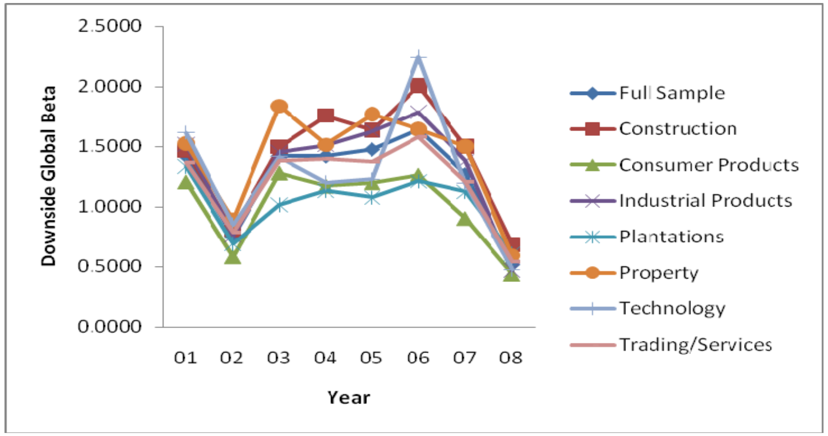

Figure 4.4 Downside Global Beta Estimates across Sectors from 2001 to 2008

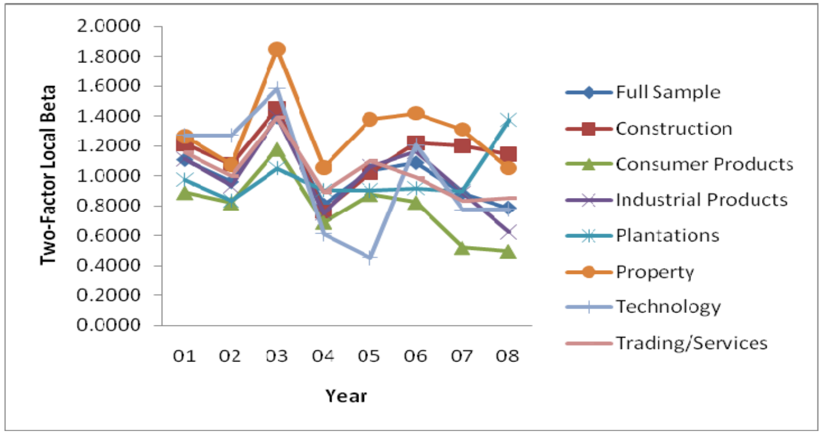

Figure 4.5 Two-Factor Local Beta Estimates across Sectors from 2001 to 2008

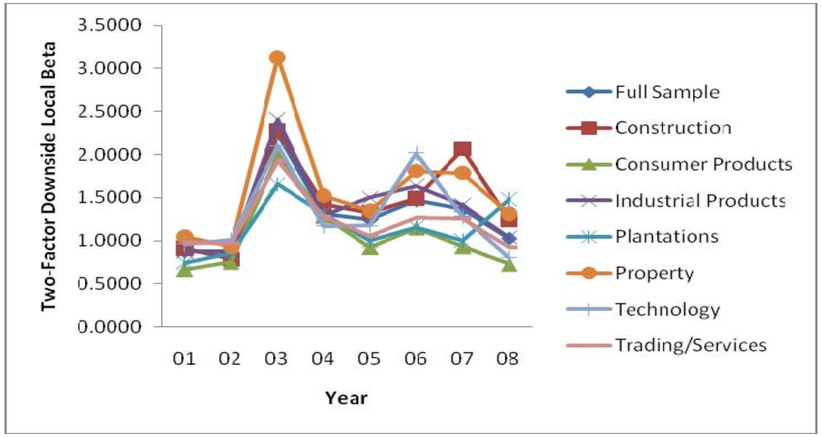

Figure 4.6 Two-Factor Downside Local Beta Estimates across Sectors from 2001 to 2008

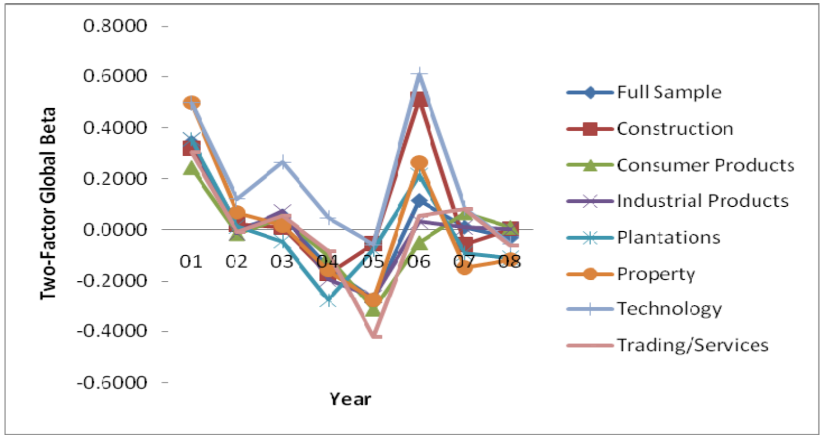

Figure 4.7 Two-Factor Global Beta Estimates across Sectors from 2001 to 2008

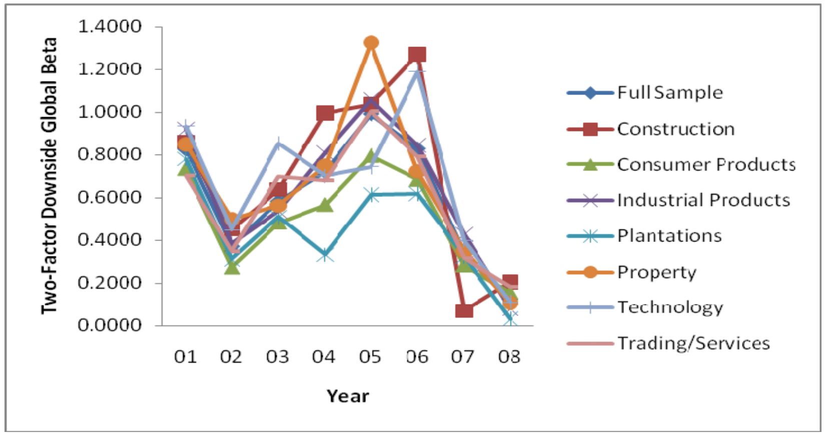

Figure 4.8 Two-Factor Downside Global Beta Estimates across Sectors from 2001 to 2008

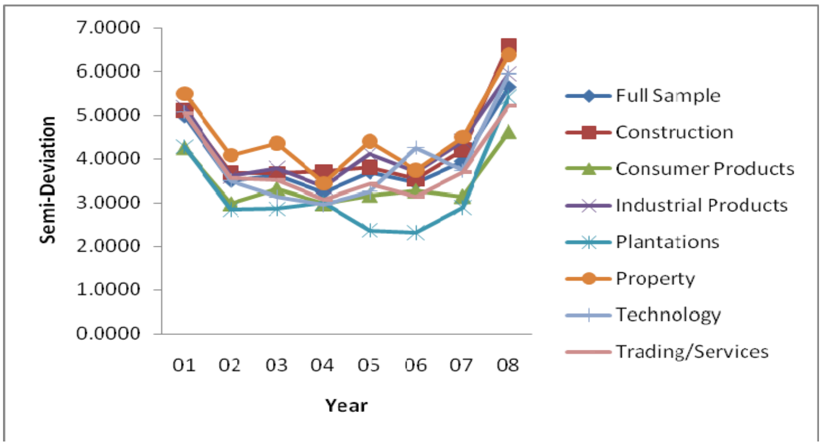

Figure 4.9 Semi-Deviation Estimates across Sectors from 2001 to 2008

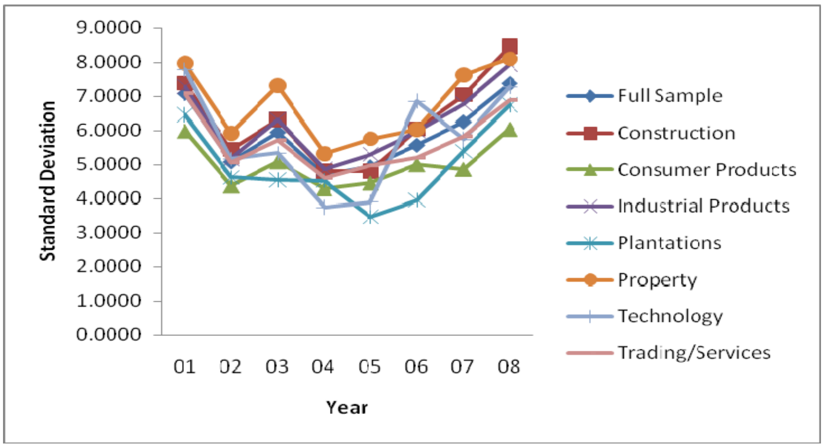

Figure 4.10 Standard Deviation Estimates across Sectors from 2001 to 2008

Table 4.10: Average of the Firm Risk Measures by Sector

Risk Measure	Construction	Consumer Products	Industrial Products	Plantations	Properties	Technology	Trading/ Services
β_i	1.1643	0.7842	0.9918	0.9820	1.3048	1.0549	1.0255
β_i^D	1.8102	1.3700	1.7002	1.4531	1.8984	1.6803	1.5587
β_i^G	0.4170	0.2063	0.2928	0.2926	0.4087	0.4725	0.2867
β_i^{DG}	1.4196	1.0066	1.3140	1.0243	1.4092	1.2780	1.2042
β_{Li}	1.1365	0.7870	0.9908	0.9820	1.3000	0.9937	1.0262
β_{Gi}	0.0732	-0.0142	0.0008	-0.0016	0.0192	0.1891	-0.0097
β_{Li}^D	1.4405	1.0553	1.3793	1.1526	1.6101	1.3147	1.2078
β_{Gi}^D	0.6910	0.4970	0.6328	0.4401	0.6457	0.6725	0.5909
$\delta_{R_{ft},i}$	4.2862	3.4668	4.2608	3.2466	4.5511	3.9804	3.8352
σ_i	6.2906	5.0177	6.2079	4.9667	6.7582	5.7271	5.6688

Notes: The risk measures are as depicted in equations (3.2a), (3.3a), (3.4a), (3.5a), (3.6a), (3.7a), (3.8a) and (3.9a).

4.3 Estimates of the Cost of Equity and Their Properties

Before we proceed to select the best risk measure, perhaps it is best to examine the cost of equity generated from all risk measures across the eight different cost-of-equity models. With 354 sample firms and eight variations of cost of equity measures, we calculated a total of: (354 firms) x (8 years) x (8 risk measures) = 22, 656 observations of annual firm-level cost of equity, and this amounts to a total of: (354 firms) x (8 risk measures) = 2, 832 series of firm-level cost of equity.

Table 4.11 reports the averages of the calculated cost of equity for the full sample from 2001 to 2008. Among the one-factor models, the GCAPM appears to produce the lowest cost of equity figures. The model postulates that the global market portfolio is the only priced risk factor to be considered in cost of equity estimation. The global equity market portfolio is considered the optimum market portfolio where the risk is at its lowest possible value without compromising return. Therefore, the calculated cost of equity should end up with a lower figure to justify the lower risk.

The opposite is observed for the downside CAPM models. The calculated costs of equity are generally higher than those obtained from the standard CAPM models. This result is in line with Estrada (2002, 2007) who also found higher cost of equity estimates when using downside beta. As for the non-CAPM-based models, cost of equity calculated based on STD is the highest. This is expected as STD measures the total risk. The calculation based on SMSTD produces cost of equity figures that are in between the high figures from the STD and the low figures generated by the CAPM. The results provide support for the argument by Estrada (2000, 2001) that advocated the downside risk models since they produce estimates of cost of equity that are halfway between the 'rather low' figures produced by the systematic risk approach (standard beta) and the higher figures generated by the total risk (standard deviation or STD) method.

The results from the two-factor models revealed that the 2F-CAPM produces cost of equity values that are slightly higher than those from the GCAPM. The difference in the cost of equity figures generated from both models is rarely more than one percent. Although the cost of equity figures obtained from the 2F-CAPM is higher than those from the GCAPM, these figures are lower than those calculated from the LCAPM. This observation concurs with the rationale that since the 2F-CAPM is suitable for partially integrated economies as opposed to fully segmented markets (the LCAPM) at one end and fully integrated markets (the GCAPM) at the other extreme, the calculated cost of equity should reflect a figure between the two latter models. However, the same observation does not apply to their downside counterparts. Since the calculation of downside betas for the 2F-DCAPM involves isolating instances when the firm and the local market index returns as well as the global market index returns are less than zero, the generated downside series are relatively smaller. This could have caused the inconsistencies in the results observed for the downside version.

Further analysis is conducted on the calculated cost of equity at the sectoral level and the results are presented from Tables 4.12 to 4.18. Table 4.12 reports the annual average of calculated cost of equity figures for the Construction sector. The results show that the cost of equity figures in 2008 are lower than in 2001 for the CAPM models, that is, LCAPM, GCAPM, DLCAPM, DGCAPM, 2F-CAPM and 2F-DCAPM. The non-CAPM estimations, that is, SMSTD and STD, show that the calculated cost of equity has increased in 2008 as compared to 2001. Such an observation could be linked to an increase in unsystematic risks for firms in the Construction sector. Another interesting finding is that the cost of equity figures based on SMSTD and STD are exceptionally high in 2001 and 2008, where the Dot.Com bubble and the U.S. subprime crisis took effect. This could mean that the Construction sector is highly susceptible to adverse factors from outside the country and considering that the cost of equity is higher in 2008 than in 2001, probably the U.S. subprime crisis has a greater impact on this sector.

On the contrary, the impact of the U.S. subprime crisis seems to be less on the Consumer Products sector (Table 4.13) and the Trading/Services sector (Table 4.18). In fact, these two sectors recorded higher costs of equity in 2001 when the Dot.Com bubble burst. This is understandable as firms in the Consumer Products sector and the Trading/Services sector probably have closer link to internet-related firms than the property firms. Other sectors including Industrial Products (Table 4.14), Properties (Table 4.16) and Technology (Table 4.17), do not show clear indication as the SMSTD cost of equity increased in 2008 but STD indicates otherwise. Nonetheless, the costs of equity calculated via the CAPM models have lower figures in 2008 than in 2001. The Plantation sector, as always, gives a slightly different view. Costs of equity calculated from the LCAPM and the DLCAPM are shown to be higher instead of lower in 2008 than in 2001. In sum, cost of equity differs across sectors, not only in figures but also in trend. Crises are also found to have different degree of impact on different sectors.

Table 4.11: Annual Averages of the Calculated Cost of Equity for Full Sample

Model	2001	2002	2003	2004	2005	2006	2007	2008
LCAPM	12.8851	9.9481	11.2371	7.6545	10.5532	13.1418	11.1261	9.9382
GCAPM	8.4428	4.3904	3.6623	3.2847	4.4645	8.8349	8.3921	4.9812
DLCAPM	13.8170	11.6488	15.5054	13.2349	17.8089	17.6568	15.6137	12.4655
DGCAPM	12.6350	7.0681	9.3158	9.7033	11.6619	14.2148	11.8293	6.6328
2F-CAPM	8.7003	5.3711	5.0736	3.4743	4.9931	8.5080	7.2568	5.5150
2F-DCAPM	10.9578	6.8925	9.0438	8.5154	11.4199	12.6645	9.5966	6.7933
SMSTD	32.2352	19.4343	19.9188	18.4821	22.2607	23.0130	24.6189	32.2965
STD	43.8434	26.6176	31.1744	25.5566	28.3239	33.5355	35.7426	40.9918

Notes: The models are as depicted in equations (3.2), (3.3), (3.4), (3.5), (3.6), (3.7), (3.8) and (3.9).

Table 4.12: Annual Averages of the Calculated Cost of Equity for Construction Sector

Model	2001	2002	2003	2004	2005	2006	2007	2008
LCAPM	13.5818	10.7585	11.5410	7.3414	10.7750	14.9731	12.8733	12.7915
GCAPM	8.4965	4.5584	3.4817	3.0962	5.4960	11.0375	9.0082	5.6497
DLCAPM	14.3518	11.5709	16.3516	14.6394	17.7080	19.1706	18.9065	14.2749
DGCAPM	12.8522	7.3057	9.6685	11.3297	12.4178	15.9971	12.9427	7.4635
2F-CAPM	8.0632	5.0555	4.1657	2.8508	5.4732	10.0107	6.8168	5.6660
2F-DCAPM	10.6658	6.6329	8.1299	9.2655	11.0512	14.0466	8.3643	6.8016
SMSTD	32.9946	20.2436	20.1012	20.7443	22.8013	23.4835	25.8758	37.0162
STD	45.4901	28.2172	32.9091	26.0961	27.6657	35.7854	39.4997	46.3849

Notes: The models are as depicted in equations (3.2), (3.3), (3.4), (3.5), (3.6), (3.7), (3.8) and (3.9).

Table 4.13: Annual Averages of the Calculated Cost of Equity for Consumer Products Sector

Model	2001	2002	2003	2004	2005	2006	2007	2008
LCAPM	11.2381	8.9903	9.8842	6.9881	9.4956	11.0880	9.1039	7.8602
GCAPM	7.5526	4.2000	3.4860	3.3328	4.0732	7.5016	7.6012	4.7772
DLCAPM	12.1426	10.3046	15.3909	12.1598	15.6964	15.2547	12.7305	10.6443
DGCAPM	11.4385	6.2881	8.6381	8.4945	10.3426	12.3321	10.0852	6.2301
2F-CAPM	7.2069	4.5558	4.0099	3.1006	4.0258	6.7867	6.6373	4.7702
2F-DCAPM	9.6383	5.7708	7.0234	7.0034	9.4054	10.7545	8.1186	5.8318
SMSTD	28.2023	17.0968	18.4532	17.2148	19.7845	22.1865	20.8183	27.1760
STD	37.8240	23.3909	26.9808	23.5951	25.9902	30.6928	29.0852	34.3097

Notes: The models are as depicted in equations (3.2), (3.3), (3.4), (3.5), (3.6), (3.7), (3.8) and (3.9).

Table 4.14: Annual Averages of the Calculated Cost of Equity for Industrial Products Sector

Model	2001	2002	2003	2004	2005	2006	2007	2008
LCAPM	12.9369	9.7376	11.2791	7.2363	10.7202	13.3817	11.1626	8.8125
GCAPM	8.5094	4.2998	3.7503	2.9844	4.5386	8.5775	8.4068	4.9205
DLCAPM	14.1083	11.7015	15.5710	13.4976	19.2857	18.6922	16.3113	11.9190
DGCAPM	13.1360	7.1043	9.4573	10.1373	12.4003	14.8975	12.3579	6.4052
2F-CAPM	8.9471	5.4057	5.3736	3.2703	5.2325	8.3944	7.3832	5.4580
2F-DCAPM	11.6052	7.0567	9.4790	9.1135	12.3549	13.2541	10.3144	6.7787
SMSTD	33.3705	19.8838	20.6986	19.0394	24.2919	24.2879	26.8555	33.8079
STD	44.9634	27.0305	32.9527	26.3536	30.0135	35.5089	38.1967	43.7545

Notes: The models are as depicted in equations (3.2), (3.3), (3.4), (3.5), (3.6), (3.7), (3.8) and (3.9).

Table 4.15: Annual Averages of the Calculated Cost of Equity for Plantation Sector

Model	2001	2002	2003	2004	2005	2006	2007	2008
LCAPM	12.0007	9.1606	8.9648	8.0993	10.0089	12.3487	10.9198	14.1720
GCAPM	8.3003	4.3450	2.9520	2.8011	5.2440	8.9936	7.9456	5.3951
DLCAPM	12.7313	10.8012	13.7075	13.6578	14.1623	14.9924	13.7103	15.7049
DGCAPM	12.1399	6.7745	7.3523	8.2997	9.7440	12.0774	11.1395	7.0793
2F-CAPM	8.6837	5.3336	4.1728	3.1471	5.8330	8.8488	6.9129	6.5800
2F-DCAPM	10.5775	6.7051	7.9490	6.8533	9.3251	11.2662	9.0893	7.5297
SMSTD	28.3543	16.5135	16.2382	17.3578	15.9287	17.4613	19.5774	31.1495
STD	40.3843	24.5069	24.3836	24.7333	21.2358	25.5460	31.5918	37.8059

Notes: The models are as depicted in equations (3.2), (3.3), (3.4), (3.5), (3.6), (3.7), (3.8) and (3.9).

Table 4.16: Annual Averages of the Calculated Cost of Equity for Properties Sector

Model	2001	2002	2003	2004	2005	2006	2007	2008
LCAPM	14.2060	10.8519	14.0272	9.2114	12.6324	15.5750	13.2847	11.6841
GCAPM	9.5539	4.7598	3.7900	3.6007	4.8380	10.2244	8.9012	4.9172
DLCAPM	14.8678	12.8498	17.4478	13.7634	20.5227	19.2909	18.0684	14.7285
DGCAPM	13.1748	7.6713	11.3182	10.1459	13.0773	14.2043	12.9382	7.0025
2F-CAPM	10.0511	6.0288	5.9374	4.0041	5.7367	10.0004	7.3879	5.8234
2F-DCAPM	11.5575	7.6932	10.9087	9.2363	13.3722	12.9564	10.6157	7.5316
SMSTD	35.1133	22.0601	23.4510	19.4726	25.6963	24.4814	27.3170	35.9784
STD	48.7099	30.3726	37.7119	28.5849	32.2084	35.7567	42.3131	44.5824

Notes: The models are as depicted in equations (3.2), (3.3), (3.4), (3.5), (3.6), (3.7), (3.8) and (3.9).

Table 4.17: Annual Averages of the Calculated Cost of Equity for Technology Sector

Model	2001	2002	2003	2004	2005	2006	2007	2008
LCAPM	14.2587	12.2974	12.6953	6.7177	7.2642	15.1368	10.6969	9.7996
GCAPM	9.5581	5.1393	4.8067	3.9436	4.8147	11.4978	8.4365	4.8503
DLCAPM	14.7991	12.6701	15.4992	12.0376	16.1489	21.9199	15.1200	12.0757
DGCAPM	13.6841	7.5058	9.2753	8.6217	10.4668	17.1471	11.4747	6.4203
2F-CAPM	10.0585	6.6450	6.6472	4.1772	5.1096	11.3074	7.5425	5.5203
2F-DCAPM	11.8535	7.6255	10.4277	8.3628	10.2660	15.6296	9.9418	6.3996
SMSTD	32.7575	19.4465	17.5384	17.0894	20.1718	27.0316	23.6117	33.8085
STD	47.7304	26.9556	28.1626	20.9378	23.2546	39.7968	33.2539	40.4912

Notes: The models are as depicted in equations (3.2), (3.3), (3.4), (3.5), (3.6), (3.7), (3.8) and (3.9).

Table 4.18: Annual Averages of the Calculated Cost of Equity for Trading/Services Sector

Model	2001	2002	2003	2004	2005	2006	2007	2008
LCAPM	13.1611	10.1392	11.2019	8.2938	10.7044	12.3768	11.0459	10.3624
GCAPM	14.0015	12.0888	14.8270	12.8826	16.9429	16.4180	14.8137	12.2077
DLCAPM	8.3246	4.3520	3.6645	3.7165	3.8124	8.3463	8.5948	4.9178
DGCAPM	12.2957	7.2215	9.1093	9.5944	11.1778	13.8739	11.5301	6.7474
2F-CAPM	8.7797	5.5297	5.2774	4.0576	4.5299	8.1903	7.6327	5.6544
2F-DCAPM	10.6117	7.0922	9.3476	8.4690	11.3149	12.3080	9.5266	7.0331
SMSTD	32.6290	19.6954	19.4346	17.7139	20.9780	21.5440	23.4556	30.1382
STD	43.8415	26.5205	30.0249	25.0471	28.4276	31.6559	33.6377	38.4963

Notes: The models are as depicted in equations (3.2), (3.3), (3.4), (3.5), (3.6), (3.7), (3.8) and (3.9).

Table 4.19 shows the averages of the calculated cost of equity across sectors for the different models. It seems that none of the models produce consistently the highest or lowest cost for equity for a particular sector. For example, cost of equity calculated from the LCAPM, DLCAPM, 2F-DCAPM, SMSTD, and STD indicate that the Properties sector has the highest figures while the GCAPM and 2F-CAPM based costs of equity are the highest for the Technology sector. On the other hand, according to the DGCAPM, calculated cost of equity is highest for the Construction sector. Nonetheless, most models agree that the Consumer Products sector has the lowest cost of equity. An exception is found for the SMSTD and STD, whereby, according to these two models, the Plantations sector has the lowest cost of equity. Overall, the results found for cost of equity are consistent with those from the risk measures in that the Properties sector is among the riskiest while Consumer Products scores as one of the least risky sectors.

Table 4.19: Averages of the Calculated Cost of Equity by Sector

Model	Construction	Consumer Products	Industrial Products	Plantations	Properties	Technology	Trading/ Services
LCAPM	11.8295	9.3310	10.6584	10.7094	12.6841	11.1083	10.9107
GCAPM	6.3530	5.3156	5.7484	5.7471	6.3232	6.6309	5.7161
DLCAPM	15.8717	13.0405	15.1358	13.6835	16.4424	15.0338	14.2728
DGCAPM	11.2471	9.2311	10.7370	9.3258	11.1916	10.5745	10.1938
2F-CAPM	6.0127	5.1367	6.1831	6.1890	6.8712	7.1260	6.2065
2F-DCAPM	9.3697	7.9433	9.9946	8.6619	10.4839	10.0633	9.4629
SMSTD	25.4076	21.3666	25.2794	20.3226	26.6963	23.9319	23.1986
STD	35.2560	28.9836	34.8467	28.7735	37.5300	32.5729	32.2064

Notes: The models are as depicted in equation (3.2), (3.3), (3.4), (3.5), (3.6), (3.7), (3.8) and (3.9).

4.4 Correlations of Cost of Equity

Correlation coefficients are calculated and paired-sample tests of equality-in-mean are carried out to ascertain whether the calculated cost of equity is significantly different across models (3.2) through (3.9). The results are displayed in Table 4.20. The upper diagonal of Table 4.20 reports the t-statistics for equality-in-mean. All 28 pair-wise mean differences in the calculated cost of equity from different models are significant at 1% level. The lower diagonal of Table 4.20 reports the correlation values. The pair-wise correlations between the pooled series of all the costs of equity are all below 0.7, except for three cases, that is, between the GCAPM and 2F-CAPM, the DGCAPM and 2F-DCAPM and, the SMSTD and STD.

With the established evidence of significant differences in the calculated cost of equity from the different models, the next step is to examine the explanatory power of the risk measures on the actual returns. We believe risk measures that have good explanatory power are also better measures for the calculation of cost of equity.

4.5 Selection of the Best Fit Risk Measure

A pooled regression analysis is estimated where actual returns of all the firms are regressed on each of the different risk measures and the explanatory power of the estimated models is compared. The risk measure with the highest R^2 and adjusted R^2 is considered to yield the best model.

Table 4.21 reports the R^2 and adjusted R^2 figures for the different risk measures according to sectors. It appears that the R^2 and adjusted R^2 figures do not differ much between the LCAPM, GCAPM 2F-CAPM and their downside risk model counterparts. In most instances, the standard CAPM models have higher explanatory power than their downside models counterparts, except for the GCAPM in four sectors (Construction, Industrial Products, Plantations and Trading/Services) and 2F-CAPM in the Industrial Products sector and the Plantations sector. It is also shown by four out of seven sectors that the two-factor model, which considers both local and global risk factors, has higher explanatory power than the models that consider only a single risk factor. Based on the average rankings from the selection criteria, the semi-deviation approach is ranked one and therefore, yields the best model. This model explains about 40 percent of variations in stock returns and for some sectors, the figure goes up to more than 50 percent. The implication from this is that practitioners should move away from using the traditional modern finance approach of using the CAPM for calculating the cost of equity. They should shift to using downside risk measures or specifically the semi-deviation.

Before proceeding to the determinant of cost of equity analysis, we examine the costs of equity estimated from SMSTD across the various sectors as shown in Table 4.22. Basically, declining cost of equity is observed from year 2001 to 2004 across sectors. This finding is consistent with Ameer (2007) whereby, using sample period from 1990 to 2004, he recorded a declining pattern in his cost of equity estimates for Malaysia. The cost of equity figures for all the sectors in 2004 have reduced by least one third of their respective figures in 2001. Nonetheless, after 2004, the costs of equity seem to be constantly on the rise and the trend continues into 2008. For the Construction sector, the Industrial Products sector, the Plantations sector, the Properties sector and the Technology sector, their costs of equity in 2008 are the highest along the sample period. More often than not, the Properties sector is documented to have the highest average cost of equity. Rising cost of building materials during the sample period could have contributed to the high cost of equity. For example, the price of cement was revised at the end of 2006. Not only that, the price of steel bars was revised upwards three times in

April 2007, June 2007 and December 2007 by a total of 45 percent. On the other hand, the Plantations sector is shown to have the lowest average cost of equity. As Malaysia does not experience dramatic climate changes throughout the year, harvests are relatively stable. The only factor that might have a significant impact on the Plantations sector is changes in global commodity prices. Therefore, the sector appears as the least risky sector among all.

4.6 Concluding Remarks

This chapter examines the estimates of risk measures based on eight different models and the costs of equity calculated using these risk measures. Although some consistency in results is observed across sectors, deviations are also found. This justifies the need for an analysis on a sectoral basis. Model selection based on the goodness-of-fit criteria, that is, R^2 and adjusted R^2, selected the non-CAPM-based downside risk approach, the SMSTD, as the method with the best fit. This finding is consistent with Estrada's (2000, 2001). The SMSTD will be used for the analysis which will be reported in the subsequent chapter.

Table 4.20: Correlation Coefficients and Paired T-Tests for Equality of the Calculated Cost of Equity

Model	LCAPM	GCAPM	DLCAPM	DGCAPM	2F-CAPM	2F-DCAPM	SMSTD	STD
LCAPM	-	44.3305***	-25.2255***	3.2977***	42.5039***	9.9562***	-56.2004***	-71.1748***
GCAPM	0.4763***	-	-64.7544***	28.5685***	-3.6038***	-32.7104***	-81.2762***	-89.3771***
DLCAPM	0.6193***	0.2214***	-	28.5685***	63.4137***	33.8427***	-37.5406***	-57.0077***
DGCAPM	0.5266***	0.4633***	0.6932***	-	40.2588***	6.9329***	-58.5328***	-72.8900***
2F-CAPM	0.5630***	0.9545***	0.2632***	0.4511***	-	-30.6343***	-80.3321***	-88.6278***
2F-DCAPM	0.4273***	0.3551***	0.5596***	0.8237***	0.3823***	-	-61.8841***	-75.4178***
SMSTD	0.4167***	0.2171***	0.5347***	0.4508***	0.2531***	0.3822***	-	-24.8577***
STD	0.4794***	0.2560***	0.5502***	0.4993***	0.2910***	0.4132***	0.9424***	-

Note: The upper diagonal results are the paired t-tests on equality in mean; the lower diagonal values are the correlation coefficients. The symbol *** denotes significance at 1% level. The models are as depicted in equations (3.2), (3.3), (3.4), (3.5), (3.6), (3.7), (3.8) and (3.9).

Table 4.21: Model Selection Based on Goodness-of-Fit Criteria

Model	Construction	Consumer Products	Industrial Products	Plantations	Properties	Technology	Trading/ Services
Panel A: R^2							
LCAPM	0.5853	0.3086	0.4109	0.6589	0.5565	0.5532	0.3819
GCAPM	0.5735	0.3032	0.4118	0.6560	**0.5814**	0.5815	0.3873
DLCAPM	0.5753	0.3008	0.4088	0.6552	0.5550	0.5523	0.3738
DGCAPM	0.5744	0.3008	0.4131	0.6679	0.5527	0.5537	0.3946
2F-CAPM	0.5973	0.3322	0.4132	0.6591	0.5732	**0.5958**	0.3865
2F-DCAPM	0.5968	0.3135	0.4179	0.6611	0.5608	0.5564	0.3838
SMSTD	**0.6148**	**0.3735**	**0.4290**	0.6646	0.5692	0.5917	**0.4263**
STD	0.5741	0.3007	0.4249	**0.6804**	0.5634	0.5522	0.3771
Panel B: Adjusted R^2							
LCAPM	0.5081	0.1946	0.3214	0.5902	0.4769	0.4415	0.2842
GCAPM	0.4941	0.1883	0.3224	0.5867	**0.5063**	0.4769	0.2904
DLCAPM	0.4962	0.1855	0.3189	0.5858	0.4752	0.4404	0.2747
DGCAPM	0.4951	0.1856	0.3239	0.6010	0.4725	0.4422	0.2988
2F-CAPM	0.5172	0.2179	0.3225	0.5845	0.4920	0.4811	0.2868
2F-DCAPM	0.5165	0.1960	0.3279	0.5869	0.4773	0.4305	0.2837
SMSTD	**0.5431**	**0.2702**	**0.3423**	0.5970	0.4920	**0.4896**	**0.3355**
STD	0.4948	0.1854	0.3375	**0.6160**	0.4851	0.4402	0.2785

Notes: The models are as depicted in equations (3.2), (3.3), (3.4), (3.5), (3.6), (3.7), (3.8) and (3.9).

Table 4.22: Cost of Equity Calculated Using the SMSTD model

Year	Construction	Consumer Products	Industrial Products	Plantations	Properties	Technology	Trading/ Services	Full Sample
2001	32.9946	28.2023	33.3705	28.3543	35.1133	32.7575	32.6290	32.2352
2002	20.2436	17.0968	19.8838	16.5135	22.0601	19.4465	19.6954	19.4343
2003	20.1012	18.4532	20.6986	16.2382	23.4510	17.5384	19.4346	19.9188
2004	20.7443	17.2148	19.0394	17.3578	19.4726	17.0894	17.7139	18.4821
2005	22.8013	19.7845	24.2919	15.9287	25.6963	20.1718	20.9780	22.2607
2006	23.4835	22.1865	24.2879	17.4613	24.4814	27.0316	21.5440	23.0130
2007	25.8758	20.8183	26.8555	19.5774	27.3170	23.6117	23.4556	24.6189
2008	37.0162	27.1760	33.8079	31.1495	35.9784	33.8085	30.1382	32.2965
Grand Mean	25.4076	21.3666	25.2794	20.3226	26.6963	23.9319	23.1986	24.0324