

Accounting Beta: Which Measure Is the Best? Findings from Italian Market

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Abstract

The estimation of cost of equity represents one of the themes more debated. In fact cost of equity is often used in evaluation reports and so It is necessary to employ fair cost of equity. However in literature there is a lack about models addressed to unlisted companies, while methods thought for listed companies are largely studied. So the aim of this research is to focus attention on the accounting beta, a model that can be used also for unlisted companies. After a literature review we have conduct an empirical analysis on Italian market to check the stability of accounting beta respect to CAPM beta. Furthermore a second level of analysis has been carried forward in order to identify which accounting measure is preferable to use.

Keywords: cost of equity, beta, CAPM, accounting beta, unlisted companies, Italian market.

1. Introduction

The purpose of this article is to verify the adaptability of accounting beta model. This model represents one of the alternative to Capital asset pricing model beta introduced by Sharpe (1964) as an expansion of Markowitz theory (1958). The CAPM is a model that analyzes the relationship between systematic risk and expected return for stocks. CAPM is widely used in financial matters because It allows to estimate expected returns for assets, expected returns that represent cost of equity. One of the most important component of CAPM that influenced the expected returns is beta that is calculated through a linear regression between stock returns and market returns. Then this value of cost of capital is used as discount rate of asset side evaluation. It is clear that using CAPM beta for unlisted companies is possible to incur in a value that does not reflect the effective risk of companies and can bring to an

overvaluation. Anyway professionals often use CAPM beta in order to calculate the cost of equity of unlisted companies. They identify sector where unlisted companies operate and after that they create a sample composed by listed companies with the same core business. Finally they calculate CAPM beta for each stocks of the sample and the average CAPM beta. This value is the cost of equity of unlisted companies. In this way in the sample can be added companies that have same core business but are different in size, financial structure etc. Professionals must use this process because unlisted companies do not have quoted prices and so It is impossible to do the linear regression. The assumption of this process is that unlisted companies replicate same characteristics of listed companies. This problem is more important in country where there is a large presence of small and medium enterprise like in Italy. In fact small and medium enterprise very often does not go public so the CAPM beta is not so suitable for them.

Therefore in this context the need of alternative models emerges.

An alternative is represented by Business Risk Index (BRI) Model. Analysts suggest to estimate beta of unlisted companies starting from a sample of peers listed companies. But differently from the previous process the BRI model allows to consider financial structure. The beta levered of each company of the sample is transformed in unlevered beta in order to eliminate the distortion produced by financial risk. The average of these values is the BRI that represents the business risk of the sector. Then this BRI is weighted with financial structure of unlisted company and we obtain beta. The assumption of this model is that all the companies that operate in a sector have the same business risk. The critical issue is that the starting point is always CAPM beta.

Another alternative model is fundamental beta. This model is introduced by Beaver, Kettles, Scholes (1970) and Rosenberg, Marathe (1979). Fundamental beta provides that CAPM beta are strictly linked to fundamental measure of the enterprise. So there is a regression between CAPM beta (independent variable) and accounting measure (dependent variables). Then a regression function is estimated and inserting accounting measure of unlisted companies is possible to have its beta. The assumption of this model is that accounting measure are predictive of CAPM beta. Also Damodaran (2006) use this approach and estimate a regression function where are present some accounting measure like leverage, variability of EBIT, dividend yield.

Finally there is accounting beta. This is the only model that does not deal with CAPM beta. In fact It provides a linear regression between accounting measure of company and the average of the same accounting measure of related to all the listed companies of the market.

Accounting beta and fundamental beta seem suitable for unlisted companies. Anyway the aim of this paper is to check the eligibility of accounting beta. So the next paragraph will focus on literature about accounting beta.

2. Literature Review

Accounting beta represents a good alternative to CAPM beta for unlisted companies because the only information about unlisted company required is an accounting measure. So the model is easily available.

The first researchers that pay attention to accounting beta are Ball, Brown (1969). They analyze the predictive ability of accounting measure in order to estimate the company risk. They conclude that accounting income have an explanatory power of about 40% of the changes in market beta.

Beaver, Kettles, Scholes (1970) deal with this topic. They show an high degree (from 23% to 44%) of association between beta and accounting variables.

Beaver, Manegold (1975) confirm a significative statistic relationship between market beta and accounting beta.

Hill, Stone (1980) focus their study on the use of accounting beta and accounting measures of financial structure to explain and predict market beta and they conclude that changes in financial structure and changes in systematic operating risk are significant determinants of changes in market beta.

Ismail, Kim (1989) complete a similar analysis but they focus on cash flow measure. They observe a strong correlation between cash flow based measures of risk and CAPM beta.

So all these studies confirm a relation between accounting beta and CAPM beta and endorse the idea that accounting beta could be a valid model for unlisted companies that cannot use CAPM beta.

On the other hand some authors have doubts about this relation. In the study of Kim (2004) emerges that the two beta do not move in the same direction. Author sustains that the effects of leverage and financial difficulties can affect the interest of the equity holders. This can lead to an increase in the risk measured by market beta while accounting beta do not immediately report the changes in the debt-equity ratio. Instead Er, Kaya (2012) assert that they are unable to report a significant association between the accounting variables and the CAPM beta. They conclude that this relation is strong in developed markets but the Turkish Market do not have this characteristic.

Furthermore we have the study of Almisher, Kish (2000) that is about accounting beta and IPOs. According to authors there is a direct relationship between beta accounting and the initial return of the IPOs. This relationship is stronger when income before extraordinary management and net income are used as accounting measure. Therefore, the accounting beta can be used as an ex ante measure of the riskiness of the companies that will enter the IPO market. Authors do not explore relation between accounting beta and market beta because they cannot calculate market beta for private companies.

After this review of the results It is important to investigate which accounting measure are used in the different studies.

The most used accounting measure is net income (Ball, Brown 1969, Beaver, Kettles, Scholes 1970, Beaver, Manegold 1975, Kim 2004, Almisher, Kish 2000) while another measure often cited is operating income (Ball, Brown 1969, Kim 2004). Authors used also ratio like current ratio, interest coverage ratio, measures about financial structure and cash flow.

3. Data and Methodology

The target of this paper is to compare CAPM beta and accounting beta in order to evaluate the use of accounting beta for unlisted companies. So the work involves the following steps: calculation of CAPM beta; calculation of accounting beta; comparison between CAPM and accounting beta; identification of the best measure for accounting beta.

The empirical analysis is focused on the Italian market.

Data about accounting measure and price are collected from Thomson Reuters Datastream for a ten years period (2006-2015). Panel is composed by the 303 companies that was listed in Italian market in 2015.

Firstly we compute CAPM beta for the 303 companies with a linear regression between returns of each stock (dependent variable) and returns of FTSE MIB (independent variable). We use monthly observations for a 5 years period (2011-2015) and so we have 60 observations of returns. Campbell, Lo, MacKinlay (1997) sustain that in the CAPM beta is preferable to use weekly or monthly observations because autocorrelation decreases. We calculate CAPM beta only for companies that have information about price for the period 2011-2015. If a company have price information for a limited time the CAPM beta is not calculated.

The second step involves accounting beta. We compute this beta only for companies that have n. 10 balance sheet (2006-2015) on the Datastream database. Accounting beta is the result of the linear regression between an accounting measure (dependent variable) and the market average of the same accounting measure (independent variable). For example, if a company does not have balance sheet for years 2015 we do not calculate its accounting beta, but their accounting values contribute to create the market average value of accounting measure. Accounting beta require the choice of explanatory accounting measures. We decide to use net income and operating income like in the prevalent literature. We use also ROE because that this ratio allows us to consider not only the absolute value of net income but also risky capital of the companies.

4. Results

The first result is that starting from a panel of 303 companies only for 156 is possible to calculate CAPM beta and the 3 accounting beta and make a comparison between all them. In fact many companies do not have complete data along observation period.

Results are summarized in the following table.

	Accounting Beta - ROE	Accounting Beta - Net Income	Accounting Beta - Operating Income	CAPM Beta
Company n. 1	0,306843557	9,732393911	3,716238008	0,834931261
Company n. 2	-0,443969901	0,036174882	0,03186258	0,074209461
Company n. 3	0,069587849	-0,203426024	-0,332504998	0,734059377
Company n. 4	0,170115248	0,170186633	0,468447691	0,314879461
Company n. 5	0,596853673	0,180788549	0,207109027	0,444516757
Company n. 6	-1,169638099	-0,452466028	-0,548411894	0,4657935
Company n. 7	0,111165293	0,119584335	0,194072015	0,364874642
Company n. 8	0,089456589	2,369902658	-4,140280527	0,511829197
Company n. 9	0,05964944	0,248257264	0,143263826	0,314942038
Company n. 10	0,964025987	3,309689933	6,232524361	0,697146575
Company n. 11	0,312794913	0,419830807	0,744912219	0,087050243
Company n. 12	0,149279056	6,405877017	6,179436193	0,929288477
Company n. 13	0,155629644	1,012218403	4,388436746	0,57458594
Company n. 14	0,058848621	0,261907552	1,084145793	0,554471822
Company n. 15	0,18742559	2,649926844	3,5624753	1,213127675
Company n. 16	0,495795998	23,26468863	27,584306	0,645418916
Company n. 17	-0,000457987	-0,033101596	0,11800655	0,692277899
Company n. 18	0,299616094	10,04001251	13,15334	0,927779717
Company n. 19	0,544434363	61,64408235	76,21914869	0,627877525
Company n. 20	0,392500396	35,43793498	27,92580289	0,839940155
Company n. 21	0,364573102	0,131612478	0,402410221	0,367274219
Company n. 22	0,155680473	0,454915541	1,688801947	0,703916806
Company n. 23	0,048372369	-0,151853548	-0,724880128	0,176961801
Company n. 24	0,015801421	-0,022495158	-0,029516196	0,2264354
Company n. 25	0,040980763	-0,016311533	-0,094644664	0,092429894
Company n. 26	-0,030902867	-0,190172312	-0,512993719	0,378060617
Company n. 27	0,214465126	0,066599599	0,258110615	0,279593651
Company n. 28	0,132103236	0,38415405	1,195814468	0,240752885
Company n. 29	0,155966511	0,032008023	0,074829986	-0,178811988
Company n. 30	0,290300154	0,238863512	0,307224265	0,637635986
Company n. 31	0,162609607	0,048176218	-0,005926686	-0,06492386
Company n. 32	0,15141171	0,074955378	0,156160217	0,19247286
Company n. 33	0,216366248	2,377118163	5,524755543	0,251044482
Company n. 34	0,148684214	0,385473101	0,890873448	0,309841571
Company n. 35	0,276405777	1,738810339	3,842813347	0,287413363
Company n. 36	0,184367964	1,491167296	5,614129977	0,111115112
Company n. 37	0,033260019	-0,535873365	-0,345271557	0,519072339
Company n. 38	0,014531582	0,00912385	-0,003216919	-0,055846128
Company n. 39	-0,013631318	0,05380593	-0,37558855	0,475561197
Company n. 40	-1,39746891	-0,028239315	-0,050557309	0,122424589
Company n. 41	0,084796571	6,072134356	-15,45702258	0,552176084
Company n. 42	-0,028256076	-0,389099435	-1,874851395	0,288086458
Company n. 43	0,084256563	0,164572198	-1,051058886	0,381155883
Company n. 44	0,244003708	2,119981147	0,467185861	0,784303521
Company n. 45	0,351631795	0,092829974	0,329176668	0,134894828
Company n. 46	0,20565801	0,002965547	0,056447082	0,289899239
Company n. 47	-0,013640995	-0,075027716	-0,047515867	-0,055123196
Company n. 48	0,396427394	0,025516658	0,087796153	0,064767216
Company n. 49	0,118846971	-0,007031767	0,000780581	0,361304367
Company n. 50	0,122771257	0,034873983	0,062766043	0,289453349
Company n. 51	0,26356041	0,015481113	0,082317689	0,127226659
Company n. 52	0,112415664	0,001479266	0,160378149	0,062683334

	Accounting Beta - ROE	Accounting Beta - Net Income	Accounting Beta - Operating Income	CAPM Beta
Company n. 53	0,239303716	0,143861028	0,260868796	0,264366024
Company n. 54	0,067993169	-0,224200525	-0,456344013	0,681892709
Company n. 55	-0,043432185	-0,275912387	-0,835078113	0,073781574
Company n. 56	0,119855536	0,234708825	0,794191618	0,300340367
Company n. 57	-0,063401741	-0,063352406	0,015260137	0,138635527
Company n. 58	1,011591372	-0,017736524	-0,014545013	0,094899808
Company n. 59	-0,215292647	-3,254792835	-32,46737869	0,51983097
Company n. 60	0,495597285	-0,001647693	0,002994918	-0,405965215
Company n. 61	-0,032625312	-0,019253161	-0,047127653	0,393580052
Company n. 62	0,254540657	25,49548843	11,55352419	0,214752136
Company n. 63	-0,041441031	-0,100751511	-0,068621868	0,215753484
Company n. 64	0,160766271	1,421130301	-0,111842714	0,364379268
Company n. 65	0,052456707	0,007984494	0,013259806	-0,160248741
Company n. 66	0,009143028	-1,732781338	-7,41203577	0,269872128
Company n. 67	0,12667619	0,401111931	0,291796101	0,480493853
Company n. 68	-0,010608323	-0,220786409	0,540818001	0,372728273
Company n. 69	-0,031049528	-0,026961919	-0,014553697	0,448386654
Company n. 70	0,092976003	4,548219285	0,541762472	0,11470769
Company n. 71	0,097543079	-0,030986182	0,024703594	0,147661093
Company n. 72	-0,046377445	-0,035138325	0,053177475	0,553503445
Company n. 73	0,317900044	0,8276536	3,766033848	0,572685444
Company n. 74	0,430291291	0,078371347	0,198044661	-0,032087079
Company n. 75	0,05837026	-0,071830738	-0,200456997	0,027751397
Company n. 76	-0,011559765	-0,307774163	-0,67689189	0,234804737
Company n. 77	-0,111256395	-0,380947479	-0,859496164	0,196092734
Company n. 78	0,099662666	0,01135816	0,02860812	0,228154587
Company n. 79	0,08601777	0,018461773	0,090733682	0,424705652
Company n. 80	0,738754579	-0,021482244	0,059640317	0,483570075
Company n. 81	0,53305153	0,006096773	0,018514116	0,104435276
Company n. 82	0,132484215	0,027741514	0,023585942	0,1302045
Company n. 83	0,179018034	0,04831026	0,060716394	-0,131254019
Company n. 84	0,014138598	-0,061344911	-0,219182442	0,369697062
Company n. 85	0,094018811	-0,00690092	-0,002182518	0,129502389
Company n. 86	0,302820411	0,013842566	0,066684766	0,266976266
Company n. 87	0,133290061	0,037159223	0,135216209	0,399809571
Company n. 88	0,178385334	0,052803282	0,171691824	0,37867639
Company n. 89	0,266119509	-0,079843826	-0,02848173	0,502449643
Company n. 90	0,057321601	-0,19236463	0,156491029	0,294948782
Company n. 91	0,29680948	0,100224748	0,438272101	0,2418037
Company n. 92	0,051618411	-0,464113328	-1,037979321	0,586083917
Company n. 93	0,05441237	-0,012537071	-0,040442551	0,100032843
Company n. 94	0,080230027	-0,007758685	-0,002196393	0,085248147
Company n. 95	-0,012981469	-1,084863261	1,335347414	0,490944884
Company n. 96	0,235215813	0,268377802	0,274410586	0,133597681
Company n. 97	0,086599122	-0,178198713	-1,022805557	0,671218696
Company n. 98	0,066687355	-0,012152329	0,014434806	0,039956337
Company n. 99	0,361767336	-0,004908153	-0,001185201	0,086132752
Company n. 100	0,038811925	0,099920431	-0,408644271	0,274870591
Company n. 101	0,104477498	-0,282212626	-31,5301487	0,671644601
Company n. 102	0,082043071	-0,017823028	-0,078193153	0,579987091
Company n. 103	0,229098457	0,397612092	0,392915873	0,003957138
Company n. 104	-0,801389745	-0,101959716	0,094605976	0,249790177
Company n. 105	0,556937239	-0,006558837	0,008263331	0,09856944
Company n. 106	0,353574291	0,047837595	0,089555544	0,523979989
Company n. 107	0,953664178	0,766917672	1,002882845	0,417210706
Company n. 108	0,33733265	-0,000661053	-0,009716899	0,078053642
Company n. 109	0,210021358	0,24670143	0,926395901	0,463708762
Company n. 110	0,207506789	2,202458819	5,964312193	0,765347175
Company n. 111	1,232656123	2,291883026	2,693678677	0,39092366

	Accounting Beta - ROE	Accounting Beta - Net Income	Accounting Beta - Operating Income	CAPM Beta
Company n. 112	0,056820714	0,037439004	0,082457876	0,196665898
Company n. 113	0,202319091	1,034121657	2,316342052	0,573476517
Company n. 114	0,22582134	-4,9823E-05	-0,419813033	0,311186897
Company n. 115	0,158580812	5,080318346	2,568551756	0,45276253
Company n. 116	0,186653393	2,545461945	3,870171705	0,952631634
Company n. 117	0,023991886	0,029652666	0,005063878	0,411331093
Company n. 118	0,158559223	25,42202831	74,01622808	0,356847487
Company n. 119	0,18936376	0,905873478	0,595295724	0,432833339
Company n. 120	0,395722079	2,064772182	1,952442982	0,420703993
Company n. 121	0,106889683	-0,592788234	-1,927319516	0,092183255
Company n. 122	-0,058814974	-0,259943859	-0,398878969	0,176259783
Company n. 123	0,369382409	0,062137527	-0,159786248	-0,074264476
Company n. 124	0,55440333	0,481614805	1,142610414	0,30671529
Company n. 125	0,264139431	-0,027396747	0,529844587	0,471924448
Company n. 126	-0,254653574	-0,073957758	-0,040990848	-0,069986832
Company n. 127	0,235169417	0,052316494	0,210630018	0,125105095
Company n. 128	0,090376535	0,008234997	-0,007857243	0,296862078
Company n. 129	0,095871147	-0,036882861	-0,011874128	0,234092346
Company n. 130	0,03066564	-0,25443412	-0,709837415	0,138265706
Company n. 131	-0,096537616	-0,002666207	0,019323165	-0,066759921
Company n. 132	0,224674331	0,130496483	0,02597025	0,211923662
Company n. 133	1,21258527	-0,090875786	-0,166377334	0,88315807
Company n. 134	0,10474867	0,805733203	-0,191509435	0,585682719
Company n. 135	0,102882952	0,149130359	-0,206180903	0,504137066
Company n. 136	-0,043299107	-0,090511693	-0,139750854	0,362137797
Company n. 137	-1,875870565	-0,054361663	-0,047122744	0,086226939
Company n. 138	0,130681341	0,018550586	0,070102304	-0,011101142
Company n. 139	0,28543892	0,065030802	0,081150129	0,425165869
Company n. 140	-0,358108912	-0,014347434	-0,03617553	0,038111376
Company n. 141	-1,275455459	-0,032472593	-0,019004979	-0,005071808
Company n. 142	0,047907755	0,002059321	-0,021512444	0,046234459
Company n. 143	0,597577494	0,017047584	0,013466231	-0,00707713
Company n. 144	-0,103217717	-0,102357911	-0,262607126	0,237180603
Company n. 145	-0,112458	-0,006850918	-0,01361947	-0,062512975
Company n. 146	0,193896812	-0,00607671	-0,029112446	0,290389702
Company n. 147	-0,443969901	0,036174882	0,03186258	0,074209461
Company n. 148	-0,175470818	0,027507673	0,042717216	0,284856586
Company n. 149	0,139766499	0,000526109	0,000474191	0,26886514
Company n. 150	0,232611778	0,087171575	0,238129511	0,652758763
Company n. 151	0,073354743	-0,100947341	-0,248748605	0,080120911
Company n. 152	0,16170664	0,032120703	0,138920158	-0,39840416
Company n. 153	-0,037716554	-0,042739795	-0,83026282	-0,031890489
Company n. 154	0,215604267	0,045762898	0,096792962	0,174249095
Company n. 155	0,212199101	0,242399004	1,583297493	0,303178799
Company n. 156	0,829517972	0,251347943	0,27658882	-0,065877984

After the calculation of CAPM and accounting beta of each company we make a careful check on deviations in order to check stability of accounting beta respect to CAPM beta. The following column represents the difference between accounting beta and CAPM beta.

	Accounting Beta ROE - CAPM Beta	Accounting Beta Net Income - CAPM Beta	Accounting Beta Operating Income - CAPM Beta
Company n. 1	-0,52809	8,897463	2,881307
Company n. 2	-0,51818	-0,03803	-0,04235
Company n. 3	-0,66447	-0,93749	-1,06656
Company n. 4	-0,14476	-0,14469	0,153568
Company n. 5	0,152337	-0,26373	-0,23741
Company n. 6	-1,63543	-0,91826	-1,01421

	Accounting Beta ROE - CAPM Beta	Accounting Beta Net Income - CAPM Beta	Accounting Beta Operating Income - CAPM Beta
Company n. 7	-0,25371	-0,24529	-0,1708
Company n. 8	-0,42237	1,858073	-4,65211
Company n. 9	-0,25529	-0,06668	-0,17168
Company n. 10	0,266879	2,612543	5,535378
Company n. 11	0,225745	0,332781	0,657862
Company n. 12	-0,78001	5,476589	5,250148
Company n. 13	-0,41896	0,437632	3,813851
Company n. 14	-0,49562	-0,29256	0,529674
Company n. 15	-1,0257	1,436799	2,349348
Company n. 16	-0,14962	22,61927	26,93889
Company n. 17	-0,69274	-0,72538	-0,57427
Company n. 18	-0,62816	9,112233	12,22556
Company n. 19	-0,08344	61,0162	75,59127
Company n. 20	-0,44744	34,59799	27,08586
Company n. 21	-0,0027	-0,23566	0,035136
Company n. 22	-0,54824	-0,249	0,984885
Company n. 23	-0,12859	-0,32882	-0,90184
Company n. 24	-0,21063	-0,24893	-0,25595
Company n. 25	-0,05145	-0,10874	-0,18707
Company n. 26	-0,40896	-0,56823	-0,89105
Company n. 27	-0,06513	-0,21299	-0,02148
Company n. 28	-0,10865	0,143401	0,955062
Company n. 29	0,334778	0,21082	0,253642
Company n. 30	-0,34734	-0,39877	-0,33041
Company n. 31	0,227533	0,1131	0,058997
Company n. 32	-0,04106	-0,11752	-0,03631
Company n. 33	-0,03468	2,126074	5,273711
Company n. 34	-0,16116	0,075632	0,581032
Company n. 35	-0,01101	1,451397	3,5554
Company n. 36	0,073253	1,380052	5,503015
Company n. 37	-0,48581	-1,05495	-0,86434
Company n. 38	0,070378	0,06497	0,052629
Company n. 39	-0,48919	-0,42176	-0,85115
Company n. 40	-1,51989	-0,15066	-0,17298
Company n. 41	-0,46738	5,519958	-16,0092
Company n. 42	-0,31634	-0,67719	-2,16294
Company n. 43	-0,2969	-0,21658	-1,43221
Company n. 44	-0,5403	1,335678	-0,31712
Company n. 45	0,216737	-0,04206	0,194282
Company n. 46	-0,08424	-0,28693	-0,23345
Company n. 47	0,041482	-0,0199	0,007607
Company n. 48	0,33166	-0,03925	0,023029
Company n. 49	-0,24246	-0,36834	-0,36052
Company n. 50	-0,16668	-0,25458	-0,22669
Company n. 51	0,136334	-0,11175	-0,04491
Company n. 52	0,049732	-0,0612	0,097695
Company n. 53	-0,02506	-0,1205	-0,0035
Company n. 54	-0,6139	-0,90609	-1,13824
Company n. 55	-0,11721	-0,34969	-0,90886
Company n. 56	-0,18048	-0,06563	0,493851
Company n. 57	-0,20204	-0,20199	-0,12338
Company n. 58	0,916692	-0,11264	-0,10944
Company n. 59	-0,73512	-3,77462	-32,9872
Company n. 60	0,901563	0,404318	0,40896
Company n. 61	-0,42621	-0,41283	-0,44071
Company n. 62	0,039789	25,28074	11,33877
Company n. 63	-0,25719	-0,3165	-0,28438
Company n. 64	-0,20361	1,056751	-0,47622
Company n. 65	0,212705	0,168233	0,173509

	Accounting Beta ROE - CAPM Beta	Accounting Beta Net Income - CAPM Beta	Accounting Beta Operating Income - CAPM Beta
Company n. 66	-0,26073	-2,00265	-7,68191
Company n. 67	-0,35382	-0,07938	-0,1887
Company n. 68	-0,38334	-0,59351	0,16809
Company n. 69	-0,47944	-0,47535	-0,46294
Company n. 70	-0,02173	4,433512	0,427055
Company n. 71	-0,05012	-0,17865	-0,12296
Company n. 72	-0,59988	-0,58864	-0,50033
Company n. 73	-0,25479	0,254968	3,193348
Company n. 74	0,462378	0,110458	0,230132
Company n. 75	0,030619	-0,09958	-0,22821
Company n. 76	-0,24636	-0,54258	-0,9117
Company n. 77	-0,30735	-0,57704	-1,05559
Company n. 78	-0,12849	-0,2168	-0,19955
Company n. 79	-0,33869	-0,40624	-0,33397
Company n. 80	0,255185	-0,50505	-0,42393
Company n. 81	0,428616	-0,09834	-0,08592
Company n. 82	0,00228	-0,10246	-0,10662
Company n. 83	0,310272	0,179564	0,19197
Company n. 84	-0,35556	-0,43104	-0,58888
Company n. 85	-0,03548	-0,1364	-0,13168
Company n. 86	0,035844	-0,25313	-0,20029
Company n. 87	-0,26652	-0,36265	-0,26459
Company n. 88	-0,20029	-0,32587	-0,20698
Company n. 89	-0,23633	-0,58229	-0,53093
Company n. 90	-0,23763	-0,48731	-0,13846
Company n. 91	0,055006	-0,14158	0,196468
Company n. 92	-0,53447	-1,0502	-1,62406
Company n. 93	-0,04562	-0,11257	-0,14048
Company n. 94	-0,00502	-0,09301	-0,08744
Company n. 95	-0,50393	-1,57581	0,844403
Company n. 96	0,101618	0,13478	0,140813
Company n. 97	-0,58462	-0,84942	-1,69402
Company n. 98	0,026731	-0,05211	-0,02552
Company n. 99	0,275635	-0,09104	-0,08732
Company n. 100	-0,23606	-0,17495	-0,68351
Company n. 101	-0,56717	-0,95386	-32,2018
Company n. 102	-0,49794	-0,59781	-0,65818
Company n. 103	0,225141	0,393655	0,388959
Company n. 104	-1,05118	-0,35175	-0,15518
Company n. 105	0,458368	-0,10513	-0,09031
Company n. 106	-0,17041	-0,47614	-0,43442
Company n. 107	0,536453	0,349707	0,585672
Company n. 108	0,259279	-0,07871	-0,08777
Company n. 109	-0,25369	-0,21701	0,462687
Company n. 110	-0,55784	1,437112	5,198965
Company n. 111	0,841732	1,900959	2,302755
Company n. 112	-0,13985	-0,15923	-0,11421
Company n. 113	-0,37116	0,460645	1,742866
Company n. 114	-0,08537	-0,31124	-0,731
Company n. 115	-0,29418	4,627556	2,115789
Company n. 116	-0,76598	1,59283	2,91754
Company n. 117	-0,38734	-0,38168	-0,40627
Company n. 118	-0,19829	25,06518	73,65938
Company n. 119	-0,24347	0,47304	0,162462
Company n. 120	-0,02498	1,644068	1,531739
Company n. 121	0,014706	-0,68497	-2,0195
Company n. 122	-0,23507	-0,4362	-0,57514
Company n. 123	0,443647	0,136402	-0,08552
Company n. 124	0,247688	0,1749	0,835895

	Accounting Beta ROE - CAPM Beta	Accounting Beta Net Income - CAPM Beta	Accounting Beta Operating Income - CAPM Beta
Company n. 125	-0,20779	-0,49932	0,05792
Company n. 126	-0,18467	-0,00397	0,028996
Company n. 127	0,110064	-0,07279	0,085525
Company n. 128	-0,20649	-0,28863	-0,30472
Company n. 129	-0,13822	-0,27098	-0,24597
Company n. 130	-0,1076	-0,3927	-0,8481
Company n. 131	-0,02978	0,064094	0,086083
Company n. 132	0,012751	-0,08143	-0,18595
Company n. 133	0,329427	-0,97403	-1,04954
Company n. 134	-0,48093	0,22005	-0,77719
Company n. 135	-0,40125	-0,35501	-0,71032
Company n. 136	-0,40544	-0,45265	-0,50189
Company n. 137	-1,9621	-0,14059	-0,13335
Company n. 138	0,141782	0,029652	0,081203
Company n. 139	-0,13973	-0,36014	-0,34402
Company n. 140	-0,39622	-0,05246	-0,07429
Company n. 141	-1,27038	-0,0274	-0,01393
Company n. 142	0,001673	-0,04418	-0,06775
Company n. 143	0,604655	0,024125	0,020543
Company n. 144	-0,3404	-0,33954	-0,49979
Company n. 145	-0,04995	0,055662	0,048894
Company n. 146	-0,09649	-0,29647	-0,3195
Company n. 147	-0,51818	-0,03803	-0,04235
Company n. 148	-0,46033	-0,25735	-0,24214
Company n. 149	-0,1291	-0,26834	-0,26839
Company n. 150	-0,42015	-0,56559	-0,41463
Company n. 151	-0,00677	-0,18107	-0,32887
Company n. 152	0,560111	0,430525	0,537324
Company n. 153	-0,00583	-0,01085	-0,79837
Company n. 154	0,041355	-0,12849	-0,07746
Company n. 155	-0,09098	-0,06078	1,280119
Company n. 156	0,895396	0,317226	0,342467
Average	-0,17491	1,231223	1,017018

As we can see accounting beta ROE has the lower average difference in absolute value (0,17). In particular It is lower respect to CAPM beta while accounting beta net income and operating income bring to higher beta. Anyway the average difference is very small in the case of ROE.

In order to compare stability of betas we calculate their standard deviations.

	Accounting Beta - ROE	Accounting Beta - Net Income	Accounting Beta - Operating Income	CAPM Beta
Standard deviation	0,366161884	6,665550966	9,981882019	0,267713392

As expected standard deviation of accounting beta ROE (0,37) is similar to CAPM beta (0,27) and give some information about the stability. Instead accounting beta net income and operating income are more variable.

Another level of analysis is about the study of the sign of the difference between accounting betas and CAPM beta.

	Accounting Beta ROE - CAPM Beta	Accounting Beta Net Income - CAPM Beta	Accounting Beta Operating Income - CAPM Beta
Positive difference	28%	31%	38%
Negative difference	72%	69%	62%

In 72% of companies Accounting Beta ROE is lower than corresponding CAPM beta. This replicates the results of average differences. The case of accounting beta net income and operating income are particular: nevertheless a positive value of average differences (net income: 1,23; operating income: 1,01) in the sample analyzed we find that only 31% (net income) and 38% (operating income) of the companies have an accounting beta higher than corresponding CAPM beta. These findings seems to confirm previous results: Accounting beta ROE is the more stable, while net income and operating income show some critical issues.

5. Conclusions

After a literature review we find that accounting beta is one of the alternative model to estimate beta. The strength of this model is that It do not use market beta as starting point (like in BRI e fundamental beta). It try to rebuild market beta starting from explanatory accounting measure. Authors that have studied this model have used different accounting measure. We find that most used are net income and operating income and in the same way in our empirical analysis we consider them adding ROE. The core of work is the comparison between accounting betas and CAPM beta in order to check stability of model and to identify which accounting measure is the best. The results show that the three accounting beta (ROE, net income and operating income) have different characteristic. In particular net income and operating income seems to bring to accounting beta not very stable. The average difference than corresponding CAPM beta are 1,23 (net income) and 1,02 (operating income) while ROE has -0,17. Same results are confirmed by analysis of standard deviation. Finally we find that also the study of the signs of difference between accounting beta and CAPM beta corroborate the hypothesis that accounting beta ROE is the best and with an acceptable stability. In fact study of signs of difference between accounting beta ROE and CAPM beta is consistent with the corresponding average difference. Definitively accounting beta ROE seems to be the only accounting model usable in Italian market. However this model shows some problems: ROE is a measure that contain net income which is influences by budgetary policies of management; accounting beta regression of this empirical analysis has only ten observations (annual budgets from 2006 to 20015) and so its significance is lower. Therefore a possible evolution of this study should consider these critical issue and maybe use accounting measures free from budgetary policies (like cash flows that not often are available for all companies) and quarterly (instead of annual) accounting measures in order to make linear regression more significative.

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