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The Beta coefficient of an unlisted bank

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Abstract

The problem that we set ourselves in this work is related to the determination of capital return invested in an unlisted bank, particularly, in a credit cooperative bank. The model that we use is the *Capital Asset Pricing Model* (CAPM) equation, with its various difficulties in applying it to a category of unlisted activities. The biggest obstacle in using CAPM is given by the Beta determination representing the systematic risk of the units under examination. Therefore, to determine this risk coefficient, we assumed a first step in which we consider a similar sector sample, consists of a portfolio of listed banks, from which we obtain a *Business Risk Index* (BRI), that we use to go back to unlisted bank Beta under consideration. In a second case, it is thought of a target market constituted by the whole unlisted banks sample of the same sector under analysis, then relating the returns of individual observed banks with average returns provided by this market, we obtain the Regression Beta. A third step, provides the *Business Risk Index* determination of the sector, in this case obtained from the unlisted banks market, and then to reach to our banks Beta under observation. Comparing the results obtained from this analysis allows us to suggest a quite satisfying line for determining the Beta of an unlisted bank and consequently for its expected return estimation.

Keywords: Risk capital; Unlisted banks; Beta evaluation; Risk capital return

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1. Introduction

The continuous attention to the required return by an investment actually reflects the risk taken, leads both investors and the company to careful analysis and evaluation of the operations that are done. It is fundamental the estimate of the invested capital return. The expected return by shareholders, that is the estimate of the risk capital relating to the risk assumed in the business activity. In this work we will deal with a particular sector, the Cooperative Credit Banks, unlisted banks, so it is not immediate the invested capital return evaluation and determination.

In literature there are several studies and therefore different methods, one of the models structured on an analytical and quantitative logic is the *Capital Asset Pricing Model*[1]. This model is based on the principle of risk-return, were the risk is the dispersion of the actual returns versus the expected returns and among the main basic elements, there is the determination of the title risk relating to systematic risk that produces in the portfolio, so the Beta evaluation, to obtain the expected return relating to this risk.

2. The basis of the model

The model is based on restrictive assumptions, such as:

- investors are risk averse and maximize their expected utility[2];
- the adoption of the mean-variance criterion to select portfolios;
- the decisions are taken on the basis of single-period horizons;
- investments and indebtedness are possible at the same risk-free rate;
- the expectations in terms of expected returns, variances and covariances are uniform for each investor;
- transaction costs and tax liens are not considered.[3]

Starting from these assumptions we formulate the relationship between risk and return, which is the thesis of *CAPM*.

Here introduce the paper, and put a nomenclature if necessary, in a box with the same font size as the rest of the paper. The paragraphs continue from here and are only separated by headings, subheadings, images and formulae. The section headings are arranged by numbers, bold and 10 pt. Here follows further instructions for authors.

3. Some observations

Observing the *Capital Market Line (CML)*[4] expresses the relationship between risk and expected return of the market portfolios, that is it compares each level of risk-return with the market portfolios, as the only efficient portfolio, we soon become aware that in the case of a portfolio made up of *n* titles, with r_i the *i-th* title return, its return will be:

$$r_{ptf} = \sum_{i=1}^{n} x_i r_i \tag{1}$$

[1]The model was developed in the Sixties and can be attributed to W.F. Sharpe, *Capital Asset Price: A Theory of Market Equilibrium Under Condition of Risk*, in Journal of Finance, n. 19, 1964; J. Mossin, *Equilibrium in a Capital Asset Market*, in Econometria, ottobre 1966; J. Lintner, *The Valutation of Risk Asset and Selection of Risk Investment in Stock Portfolios and Capital Budget*, in The Review Economics and Statistics, n. 47, 1965. Model used in Europe only in the mid eighties.

[2]M. Blume, I Friend, *The Asset Structure of Individual Portfolios and Some Application for Utility Function*, in The Journal of Finance, maggio 1974

[3]Vincenzo Capizzi, *Costo del Capitale e operazioni di investment banking*, Egea, 2003

[4] Berk J, De Marzo, *Finanza aziendale*, Perason, Mondadori, Milano, 2008

The calculation of this portfolio volatility is more difficult, since it is not the weighted average of the individual volatility[5], but also it considers the covariance between the stocks and the market:

$$Cov(r_i, r_m) = \frac{\sum_{i,t=0}^{n} \sum_{m,t=0}^{n} (r_{i,t} - \bar{r}_{i,t})(r_{m,t} - \bar{r}_{m,t})}{n-1}$$

or even better the correlation between the title returns and the reference market r_m :

$$Corr(r_i, r_m) = \frac{Cov(r_i, r_m)}{\sigma_i \sigma_m} \in [-1,1]$$

coefficient very useful for its limited set of values and for a further relation with the Beta, systematic risk expression. If we observe that the *i-th* activity Beta is:

$$\beta_i = \frac{Cov(r_i, r_m)}{\sigma_i \sigma_i} = Corr(r_i, r_m)\frac{\sigma_m}{\sigma_i}, \text{ or } Corr(r_i, r_m) = \beta_i \frac{\sqrt{\sum_{t=1}^{n} (r_{i,t} - \bar{r}_i)^2}}{\sqrt{\sum_{t=1}^{n} (r_{m,t} - \bar{r}_m)^2}}$$

therefore

$$Corr(r_i, r_m) = \frac{n\sum_{t=1}^{n} r_{i,t} r_{m,t} - \sum_{t=1}^{n} r_{i,t} \sum_{t=1}^{n} r_{m,t}}{\sqrt{n\sum_{t=1}^{n} (r_{i,t})^2 - \left(\sum_{t=1}^{n} r_{i,t}\right)^2} \sqrt{n\sum_{t=1}^{n} (r_{m,t})^2 - \left(\sum_{t=1}^{n} r_{m,t}\right)^2}}$$

we obtain the following interesting equation for any subsequent evaluations and comparisons:

$$\beta_i = \frac{n\sum_{t=1}^{n} r_{i,t} r_{m,t} - \sum_{t=1}^{n} r_{i,t} \sum_{t=1}^{n} r_{m,t}}{\sqrt{n\sum_{t=1}^{n} (r_{i,t})^2 - \left(\sum_{t=1}^{n} r_{i,t}\right)^2} \sqrt{n\sum_{t=1}^{n} (r_{m,t})^2 - \left(\sum_{t=1}^{n} r_{m,t}\right)^2}} \frac{\sqrt{\sum_{t=1}^{n} (r_{m,t} - \bar{r}_m)^2}}{\sqrt{\sum_{t=1}^{n} (r_{i,t} - \bar{r}_i)^2}} \qquad (2)$$

If we consider that the variance of a portfolio is:

$\sigma_{ptf}^2 = Cov(r_{ptf}, r_{ptf})$, in the case of only two titles, we have: $\sigma_{ptf}^2 = Cov(x_1 r_1 + x_2 r_2, x_1 r_1 + x_2 r_2)$

$$\text{or } \sigma_{ptf}^2 = x_1 x_1 Cov(r_1, r_1) + x_1 x_2 Cov(r_1, r_2) + x_2 x_1 Cov(r_2, r_1) + x_2 x_2 Cov(r_2, r_2)$$

therefore $\sigma_{ptf}^2 = x_1^2 \sigma_1^2 + x_2^2 \sigma_2^2 + 2 x_1 x_2 Cov(r_1, r_2)$

[5]Berk J., De Marzo P., Venanzi D., Capital budgeding, 2009, Perason

In a portfolio composed of only two titles, one of which is risk-free, the portfolio return is:

$$r_{ptf} = xr_f + (1-x)r_i \tag{3}$$

x represents the risk-free asset in the portfolio, r_i represents the average expected return of the risky asset, and r_f the risk-free titles return. The volatility of this portfolio will instead:

$$\sigma_{ptf} = (1-x)\cdot\sigma_i \tag{4}$$

because the risk-free component volatility is zero.

If we now consider a portfolio consisting of two sets, one of risky assets and the other of risk-free assets, we can represent the set of portfolio combinations that can be obtained from the composition of risky assets with the risk-free asset. If we observe the two extreme cases, the first composed by only risk free activities and the second of only risky activities, in a cartesian axes system with standard deviations on the x-axis and the returns on the y-axis, we have respectively two coordinate points $A = (0, r_f)$ and $B = (\sigma_i, r_i)$, for which all possible combinations of the portfolio, will be found along the line passing through these points, line that satisfies the following equation:

$$\frac{r_i - r_f}{y - r_f} = \frac{\sigma_i - 0}{x - 0} \Leftrightarrow \frac{r_i - r_f}{\sigma_i} = \frac{y - r_f}{x}\text{, with } \frac{r_i - r_f}{\sigma_i}$$

that represents the angular coefficient of the line, the measure of reward per unit of risk, while r_f , is the intercept with the ordinates, for which the line is identified by the following function, with the independent variable the risk expressed through portfolio volatility

$$r_{ptf} = r_f + \frac{r_i - r_f}{\sigma_i}\sigma_{ptf}$$, from which the *Capital Market Line (CML)*: $$r_{ptf} = r_f + \frac{r_m - r_f}{\sigma_m}\sigma_{ptf}$$

that considers the risk and the market expected return, as the efficient portfolios are composed by market portfolio.

If we observe a portfolio divided into α quantity of the *i-th* title, and $(1-\alpha)$ quantity in the market, the return of this portfolio will be the expression of the function

$$f(\alpha) = \alpha r_i + (1-\alpha)r_m$$

while the risk in terms of standard deviation, will be given by the function

$$g(\alpha) = \left[\alpha^2\sigma_i^2 + 2\alpha(1-\alpha)\sigma_{i,m} + (1-\alpha)^2\sigma_m^2\right]^{\frac{1}{2}}$$

from which the derivatives of the respective functions are

$$f'(\alpha) = r_i - r_m \text{ and } g'(\alpha) = \frac{\alpha\sigma_i^2 + (1-2\alpha)\sigma_{i,m} + (\alpha-1)\sigma_m^2}{\sigma_m}$$

per $\alpha = 0$ the curve of this portfolio is tangent to the curve of *CML* into point corresponds to the market portfolio and must not overcome *CML*[6],and if we take into account that the inclination of the curve is equal to

$$\frac{f'(0)}{g'(0)} = \left(\frac{\sigma_{i,m} - \sigma_m^2}{\sigma_m}\right)^{-1}(r_i - r_m) = \frac{(r_i - r_m)}{\sigma_{i,m} - \sigma_m^2}\sigma_m$$

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[6]D.G. Luenberger, *Investment Science*, Oxford University Press, 1998 (trad. It., *Finanza e Investimenti*, Apogeo, Milano, 2006)

in the tangent point of market portfolio, the drawn curve has the same slope of the *CML*, therefore

$$\frac{(r_i - r_m)}{\sigma_{i,m} - \sigma_m^2}\sigma_m = \frac{r_m - r_f}{\sigma_m} \Leftrightarrow r_i - r_m = \frac{r_m - r_f}{\sigma_m^2}\left(\sigma_{i,m} - \sigma_m^2\right) \Leftrightarrow r_i - r_m = \left(r_m - r_f\right)\left(\frac{\sigma_{i,m}}{\sigma_m^2} - 1\right)$$

For which resolving the previous equation considering the expected return of the *i-th* title and remembering what the Beta corresponds, we have:

$r_i = r_f + \left(r_m - r_f\right)\beta_i$, that is, the *CAPM* equation. (5)

4. The Beta coefficient

The investors may be interested in the risk-return relation of individual risky assets in which put their capitals, so interested in the systematic risk of the individual asset, which depends on the correlation between this and the market, and that we can express it as a correlation between activities and market, weighted by its volatility:

$\sigma_{sist,i} = \rho_{i,m} \cdot \sigma_i$, in the *CML* equation, we have: $r_i = r_f + \frac{r_m - r_f}{\sigma_m}\rho_{i,m} \cdot \sigma_i$

function that expresses the relationship between risk and return of a specific activity. If in the end, we consider the beta coefficient, which expresses the systematic risk of the asset versus the reference market volality:

$\beta_i = \frac{\sigma_{sist,i}}{\sigma_m} \Leftrightarrow \beta_i = \frac{\rho_{i,m} \cdot \sigma_i}{\sigma_m}$, or: $r_i = r_f + \left(r_m - r_f\right)\beta_i$

function that identifies the *Security Market Line (SML)*, which express of the linear relationship between the return of individual risky asset and the market return, relation in function of the coefficient β, that provides an efficient frontier of individual risky assets, therefore the thesis of *Capital Asset Pricing Model (CAPM)*, according to which the expected returns of the observed activities, if regularly "priced", must be placed along the *SML*, which is along the line which considers the risk measured by the coefficient β [7],[8].The Beta is also considered as an expression of the systematic risk of the asset, equal to the covariance of the excess returns of the entity compared to the excess returns of the market portfolio[9]. As in *asset pricing theory*, the cost of capital is a function of only systematic risk, coefficient beta can be understood as the link between macro-economic determinants and the premium for equity risk of a specific activity, which in our case study is an unlisted bank[10].

The methodologies to determine the beta coefficient are different:

- Bottom-Up Beta;
- Regression Beta;
- Accounting Beta.

In this paper we used the Regression Beta, that considers the linear correlation between the variables, through the calculation of the covariance of market returns and the *i-th* activity, measure of the intensity of the linear link of the regression line which is built. Therefore the more the regression model will be valid, the more reliable will be the

[7] L. Guatri, M. Bini, *Nuovo trattato sulla valutazione delle aziende*, Egea, 2005
[8] Berk J, De Marzo, *Finanza aziendale*, Perason, Mondadori, Milano, 2008
[9] L. Guatri, M. Bini, *Nuovo trattato sulla valutazione delle aziende*, Egea, 2005
[10] A. Poli, *Il costo del capitale. Teoria della finanza e mercati finanziari*, Etas libri, 1997

estimation of the Beta coefficient. The reliability of the determination of the Beta, is first tested by the coefficient of determination:

$$R^2 = \rho^2_{(r_m,r_i)} = \left(\frac{\sigma_{(r_m,r_i)}}{\sigma_{(r_m)}\sigma_{(r_i)}} \right)^2 \in [0,1] \quad (6)$$

This coefficient indicates how much of the variability of the dependent variable is explained by the independent variable, explaining in this way, how much of the *i-th* risk assets has systematic nature. More this value tends to unity, greater is the dependence of the Beta from the benchmark portfolio.

Besides, considering the relation between the individual activities Beta and the market return

$$\beta_i = \frac{\rho_{i,m} \cdot \sigma_i}{\sigma_m} = \frac{\sigma_{i,m}}{\sigma^2_m}$$

particularly important is the Beta market evaluation as the weighted average of the individual Beta with their respective percentage shares of capitalization, value that approximates the unit:

$$\beta_m = \sum_{i=1}^{m} x_i \beta_i = 1 \quad (7)$$

Determining the market return, in theory requires the definition of the market portfolio.[11]Since it is an analysis of unlisted Banks, precisely on a sample consisting of 23 Apulia and Basilicate BCC, which for convenience is designated with consecutive numbering, we do not have the option possibility to take as an market portfolio a stock market index, since there is no correlation between the two variables, so we have decided to identify three steps leading to the determination of our Beta.

5. The analyzed hypotheses

Our first hypothesis aims to identify a *Business Risk Index (BRI)*, on a sample of listed Banks, made up of 17 units (*UniCredit, Ubi Banca, Mediobanca, Intesa Sanpaolo, Finecobank, Credito Valtellinese, Credito Emiliano, Banco Popolare, Banco di Sardegna Rsp, Banco di Desio e Brianza, Banca Profilo, Banca Pop Sondrio, Banca Pop Milano, Banca Pop Emilia Romagna, Banca Monte Paschi Siena, Banca Finnat*e *Banca Carige*), and for each of them we have calculated the annual return, r_{bq} for an interval of 9 years, similar to that considered for BCC, from 2006 to 2014

$$r_{bq} = \frac{P_t - P_{t-1}}{P_{t-1}} + \frac{Div_t}{P_{t-1}} = \frac{P_t + Div_t}{P_{t-1}} - 1, \text{ in the continuous } \delta_{bq} = \log(r_{bq} + 1)$$

By regression between each individual bank returns in the considered interval and average market returns, market made by 17 listed Banks portfolio, we have been determined β_L *Beta Levered* of individual listed Banks.

Being such beta object a valuation, we corrected this value according to a correction criterion applied also to other financial corporations (Merrill Lynch), which[12]:

$$\beta_{L,2} = \beta_{L,1}\lambda + \kappa \quad (8)$$

with $\lambda = 0.677$ and $k = 0.343$ .Criterion followed also in the subsequent working hypotheses.

[11] L. Caprio, *Le decisioni di investimento nei mercati di capitali. I modelli media-varianza*, Utet, Torino, 1989
[12] M. E. Blume, *Beta and Their Regression Tendencies*, in The Journal of Finance, giugno 1975

Since $\beta_{L,2}$, suffers the financial structure of the considered units, we have proceeded to determine *Beta Unlevered*, β_U:

$$\beta_U = \frac{\beta_{L,2}}{1+\left[\frac{Dq}{Eq}\left(1-t_q\right)\right]}$$

where Dq indicates the debt level, Eq the risk capital and t_q the tax burden of the individual listed Banks.

The average of β_U expresses *BRI*, amounted to **0.17** and from which we departed to relevering it, according to the financial structure of each BCC and to get thus the risk coefficient of the unlisted banks sample:

$$\beta_{RL} = BRI\left[1+\frac{Dc}{Ec}\left(1-t_c\right)\right] \tag{9}$$

where Dc indicates the debt level, Ec the risk capital and t_c the tax burden of the considered BCC.

Before using the *BRI*, we carried out a further verification. A property of the regression line $y = \beta x + \alpha$ is that this line passes through the midpoints, with coordinates, average return of the individual listed banks $\bar{r}_{bq}$ and average return of the market portfolio, $\bar{r}_m$:

$$\bar{r}_{bq} = \beta_L \bar{r}_m + \alpha \Leftrightarrow \alpha = \bar{r}_{bq} - \beta_L \bar{r}_m$$

for which we have deduced alpha coefficients of each bank, then the line that binds the return of each bank $r_{t,bq}$, to market return r_m

$$r_{t,bq} = \beta_L r_m + \alpha \tag{10}$$

If the calculated Beta, perfectly fits the systematic risk of the bank compared with the market, Alpha should be zero. An Alpha different from zero, may be due to random and no systematic errors, so we used the test T Student to verify the following hypotheses:

$$H_1 : \beta_L = 0 \text{ and } H_2 : \beta_L \neq 0 \text{ and } H_1 : \alpha = 0 \text{ and } H_2 : \alpha \neq 0$$

The procedure followed will be valid, if the test T Student shows that: $\beta_L \neq 0$ e $\alpha = 0$

The value of T, respectively for Alpha and Beta, is thus obtained:

$$T_\beta = \beta / err.std\beta \text{ and } T_\alpha = \alpha / err.std\alpha \tag{11}$$

To determine the standard error, it is necessary to calculate the theoretical returns $r_{t,bq}$, of each bank for the whole time interval analyzed, necessary to identify the squares residuals sum SS_E, and therefore the variance compared to logarithmic returns, or the variance σ_E^2 of the model errors:

$$\sigma_E^2 = SS_E / n-2$$

and finally, the sum of the squares of the deviations of the market returns, compared to its mean value S_{xx}, so taking into consideration that the variance of the market σ_M^2, it results:

$$\sigma_M^2 = S_{xx} / n-1 \Leftrightarrow S_{xx} = \sigma_M^2 (n-1)$$

We can determine the Beta and Alpha standard errors, which are:

$$ErrStd\beta = \sqrt{\frac{\sigma_E^2}{S_{xx}}} \text{ and } ErrStd\alpha = \sqrt{\frac{S_{xx} + n\bar{r}_M^2}{nS_{xx}}}$$

and therefore T_β and T_α and compare them to the theoretical values of T Student's table, that for a 5% probability level, is equal to 1.645, so if T_β is above this value, the probability that the calculated Beta is different from zero for random errors, is only 5%. We can accept the hypothesis of Beta different from zero. The same reasoning is done for T_α, and if we assume values lower than the level of 1.645, it means that the probability that Alpha is equal to zero is not due to random errors, it is of 95%.Thus we can accept the hypothesis of Alpha equal to zero. The hypothesis of the *CAPM* that links the asset return to the market return, from only Beta coefficient is confirmed. These comparisons were also performed with the test T Student for a probability level of 10%, which is equal to 1.282.

It is specified that, in the *CAPM* equation the market return used, has been the average return of the examined BCC, which is of 5.35%. More complicated is the evaluation of the risk-free return. We have considered government bonds with life on maturity covering the entire period under analysis. Because we didn't want to refer to only ten-year BTPs, we have included government bonds with life deadlines contained in that range, such as BOT 6 and 12 months[13] , the BTP 3, 5, 7 and 10 years[14]. For each of these, not to dwell to a single emission, we have considered the average returns of 12 emissions made in 2014, obtaining the following structure of spot rates, on an annual schedule, with $t = 0$

$$i(t,t_k) = \{0.00360,0.00478,0.0081,0.0155,0.0192,0.0297\} \Big/ \left\{\frac{1}{2},1,3,5,7,10\right\}$$

considering that

$$\frac{\left[1+i(t,t_k)\right]^{t_k - t}}{\left[1+i(t,t_{k-1})\right]^{t_{k-1}-t}} = \left[1+i(t,t_{k-1},t_k)\right]^{t_k - t_{k-1}} \Leftrightarrow i(t,t_{k-1},t_k) = \left(\frac{\left[1+i(t,t_k)\right]^{t_k - t}}{\left[1+i(t,t_{k-1})\right]^{t_{k-1}-t}}\right)^{\frac{1}{t_k - t_{k-1}}} - 1$$

we have the following forward rate structure

$$i(t,t_{k-1},t_k) = \{0.00360,0.00598,0.00976,0.02670,0.02850,0.05462\} \Big/ \left\{\frac{1}{2},1,3,5,7,10\right\}$$

and also taking into account that we are interested in a return on an annual basis to cover the ten years, so the spot return of a market fairly representative, will be given by

$$i(t,t_k) = \left(\prod_{j=1}^{k}\left[1+i(t,t_{j-1},t_j)\right]^{t_j - t_{j-1}}\right)^{\frac{1}{t_k - t}} - 1 \Leftrightarrow i(t,t_{10}) = \left(\prod_{j=1}^{t_{10}}\left[1+i(t,t_{j-1},t_j)\right]^{t_j - t_{j-1}}\right)^{\frac{1}{t_{10} - t}} - 1 = 0.02969$$

The second analyzed hypothesis considers as market reference the 23 BCC sample, and, always using the Regression Beta we evaluated the systematic risk of each of them. Therefore for the purposes of the regression, variables considered are:

- the annual return of the *i-th* Bank unlisted r_{nq} , as dependent variable;
- the market portfolio return r_m , as independent variable.

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[13]Emissioni BOT annuali:*www.dt.tesoro.it/debito_pubblico/dati_statistici/le_emissioni_del_tesoro.html*
[14]Emissioni BTP a 10 anni: *www.dt.tesoro.it/debito_pubblico/dati_statistici/le_emissioni_del_tesoro.html*

The *i-th* Bank return has been calculated as the ratio between operating income reported in year *t* on risk capital. Since there are no dividends and considering the relative advantages of the business partners, as they are difficult to quantify:

$$r_{nq} = \frac{U_t}{CR_t} \tag{12}$$

The time interval considered is 9 years, from 2006 to 2014.

Finally we have made an additional rectification of Beta calculated in the second step of the work, that is we have determined a *BRI*, in this case relating to BCC market. We have adjusted the Beta levered by the weight of the financial structure of each BCC, obtaining the *BRI* which is Beta unlevered average of BCC, equal to **0.19**, then we have relevered it according to each individual BCC financial structure to obtain Beta relevered used to determine future returns.

Table 1. Beta in the three hypotheses. Verification of the test T Student. Expected return

	I HYPOTHESIS						II HYPOTHESIS				III HYPOTHESIS			
	$\beta_{L,2}$	T_β	T_α	BCC	β_{RL}	$E(r_i)$	$\beta_{L,2}$	T_β	T_α	$E(r_i)_2$	β (RL)2	T_β	T_α	$E(r_i)_2$
Unicredit	2,2869	1,9271	-0,518	**1**	1,4806	6,4939	1,1229	2,4331	-0,072	5,6426	1,6485	3,3097	-1,023	6,8935
Ubi Banca	1,9921	1,7783	0,4527	**2**	1,2949	6,0518	-0,423	-0,58	1,283	1,9644	1,4417	1,2163	-0,636	6,4012
Mediobanca	1,7821	1,2224	0,1395	**3**	0,841	4,9717	0,7413	4,4546	0,1077	4,7342	0,9364	4,5878	-0,778	5,1986
Intesa San Paolo	1,9708	1,0159	0,4629	**4**	1,1674	5,7484	1,6272	3,1511	0,1736	6,8427	1,2998	2,3451	0,6969	6,0635
Finecobank	0,5811	0,4893	-1,069	**5**	1,4363	6,3883	1,8316	1,5899	-0,711	7,3291	1,5991	1,3717	-0,522	6,7759
Credito Vellinese	-0,422	-0,878	-2,684	**6**	0,8805	5,0655	0,7761	2,2166	-0,078	4,8172	0,9803	2,6532	-0,575	5,3031
Credito Emiliano	0,0515	0,0263	0,6919	**7**	1,0149	5,3854	0,6915	4,524	-0,893	4,6157	1,13	4,1831	-1,976	5,6593
B.co Popolare	1,0637	3,8671	4,0058	**8**	1,2234	5,8817	2,6565	2,7313	-1,48	9,2924	1,3621	1,1247	-0,22	6,2118
B.co di Sana Rsp	0,3411	0,6715	1,6345	**9**	0,7584	4,7749	0,9196	1,962	-0,222	5,1586	0,8443	1,8041	-0,077	4,9795
B.co di De e Briz	-1,507	-0,558	-1,646	**10**	1,8444	7,3597	1,0939	2,3341	1,064	5,5734	2,0535	3,486	-0,629	7,8574
B.ca Profilo	-0,271	-0,091	-1,109	**11**	1,0034	5,358	1,0315	1,5917	-0,357	5,425	1,1171	1,721	-0,476	5,6288
B.ca Pop Sondrio	1,7347	1,1901	-0,081	**12**	1,0035	5,3583	0,6007	1,721	2,117	4,3996	1,1173	2,547	0,6176	5,6291
B.ca Pop Milano	1,8071	2,0485	0,8103	**13**	0,8558	5,0068	0,7542	4,1248	2,5338	4,7651	0,9528	4,3765	1,3016	5,2378
B.ca Pop E. Roa	0,4184	0,586	1,842	**14**	1,0261	5,4122	1,4285	1,9378	-0,687	6,3698	1,1425	1,5141	-0,328	5,6891
B.ca M di P.di S.	1,3259	0,7308	1,0924	**15**	1,7976	7,2483	0,5541	0,8069	0,4966	4,2888	2,0014	2,1445	-1,04	7,7334
B.ca Finnat	1,9988	0,9157	0,0974	**16**	1,0994	5,5866	1,7823	2,0335	-0,305	7,2118	1,2241	1,3142	0,2563	5,8833
B.ca Carige	2,185	0,8735	0,7844	**17**	0,9568	5,2472	1,1773	2,8411	0,4721	5,7719	1,0653	2,5447	0,7096	5,5054
				18	0,9187	5,1565	0,5382	1,4755	-0,455	4,251	1,0229	2,2803	-1,349	5,4045
				19	1,077	5,5333	0,8775	5,5646	-2,138	5,0583	1,1991	5,4884	-2,877	5,824
				20	2,3174	8,4853	1,1594	1,755	0,8698	5,7295	2,5801	3,0709	-0,848	9,1107
				21	0,8539	5,0024	0,9917	5,9256	-0,338	5,3301	0,9508	5,6968	-0,117	5,2328
				22	1,8376	7,3435	0,5192	1,1921	0,2789	4,2058	2,0459	2,5662	-1,582	7,8394
				23	0,1773	3,3921	1,0074	4,0246	-1,076	5,3677	0,1974	0,5092	1,198	3,4399

Even if the determination coefficient R^2 of the considered portfolio in the first hypothesis, is quite low, on average 0.22, does not affect on our choice, because these values have been used in an indirect way, they are served for *BRI* determination qual to 0.17, while the test T Student provides acceptable values of Beta for less than 24% of the sample, instead the Alpha coefficient is corrected for a good 80%. It remains comforting the market beta, which is 1.0856, so tendentially it approaches unity.

In the second and third case the determination coefficients are on average higher, equal to 0.44, compared to the previous, moreover also the results provided by the test T Student are much better, both as regards the Beta value, and more for the Alpha nullity, positive values that are around 90%, so in almost perfect consistency with the *CAPM* line. And also the market Beta gives us a value of 0.9636, almost equal to the unity. Therefore expected returns in this case are strongly reliable.

Further improve the results provided by the test T Student, in the third studied case, the Beta risk coefficients are correctly calculated for about 90% of cases, while is total the Alpha coefficient valuation in line with the *CAPM*. Slightly less satisfying is the market beta, equal to 1.2087. The following table is a summary the results obtained.

Table 2.Results summary

	R^2	$E(\bar{r})$	σ^2	σ	T_β	T_α	β_m
I HYPOTHESIS	0,22	5,75	1,18	1,08	24%	82%	1,0856
II HYPOTHESIS	0,44	5,3976	2,13	1,42	87%	87%	0,9636
III HYPOTHESIS	0,44	6,0653	1,46	1,21	87%	100%	1,2087

6. Conclusions

The choice that we feel to suggest for the Beta determination of the unlisted banks and thus for the evaluation of the risk capital return employed in the Cooperative Credit Banks, is in the second and third studied hypotheses. This, naturally is only a first step which is precisely concretized on the intrinsic risk evaluation in these types of banks. The next step to be analyzed to improve the valuation of the expected return is the consideration of all the additional services that are offered to the partners of these banks.

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