

Assessment of Financial Risk in Uncertainty Environments

Juan Carlos Martínez Barrio
CEEI-Burgos

An operational composite indicator to evaluate the estimated recovery probability of an entrepreneur's loan, or any other business-oriented loans, given by

$$ERP = \alpha(RR) + \beta(SOA) + \gamma(COA) - [NCR] - [CI]$$

is presented. The resulted indicator evaluates the recovery probability of an entrepreneur/SME/company loan in uncertainty environments, without guarantees or collaterals. This indicator has been named "Estimated Recovery Probability", ERP. Being a totally new approach, ERP methodology has been tested in actual scenarios showing its efficiency in comparison with current risk assessment methods used by the traditional financial system, pointing out the fact that guarantees or collaterals have not been requested.

Keywords: financial risk analysis, micro finances, risk estimation

INTRODUCTION

Guarantees and collaterals are determining factors in the financial risk analysis. The lack of these forces assessment methodologies to be radically different from the methods used by the traditional banking institutions, which are mainly based in the three following principles:

- Security: Feasibility of the operation itself.
- Solvency: Profitability of the operation itself.
- Exit: Guarantee in case of default.

The absence of this last principle is an essential characteristic of the ERP methodology, focusing, therefore, the whole analysis on first two ones, mainly in the first one, the feasibility of the project itself. For the second one, solvency, it is a more a decision element rather than a component of the risk analysis. However, it should be taking into account in order to properly assess whether the given risk should be assumed or accepted. For this purpose, a comparison between the current market interest rate and the financial profitability of the operation itself given by a standard yield/profitability ratio should be done. The "Estimated Recovery Probability" compound indicator with terms:

$$ERP = \alpha(RR) + \beta(SOA) + \gamma(COA) - [NCR] - [CI]$$

calculates an estimated probability being RR, SOA and COA indexed variables which values range from 0 to 1; α , β y γ weighting coefficients ranging from 0 to 1 as well.

The concept “estimated probability” does not refer to a pure mathematical probability calculation, for it is an estimation which value is the result of the enunciated equation. It is an estimation of the measure of the likelihood that an event will occur, but it is not calculated as the quotient:

$$P = \frac{\textit{The number of ways an event can occur}}{\textit{The total number of possible outcomes}}$$

Therefore, ERP ranks from 0 to 1, as a mathematical probability would be, being regularly presented as a percentage for common use.

Another way of this concept to be presented would be:

$$\text{ELP} = 1 - \text{ERP}$$

being ELP the “estimated loss probability”, which values ranks from 0 to 1, regularly presented as a percentage as well.

This formula, based on a totally innovative approach, is successfully being implemented in an actual economic environment as the methodology used for the financial risk assessment of the credit operations of a micro finance fund since 01/01/2013.

ERP method or approach is not based upon any other previous financial risk analysis work, with the exception of the part related to the Structural Operational Analysis (SOA) component which is inspired in empirical tools designed for start-up evaluation.

The following sections will include a detailed description of the components of ERP method, an explanation of the weighting coefficients and the empirical testing description. This work will be concluded by some final remarks and the acknowledgment and bibliography sections.

COMPONENTS

The ERP composite indicator is formed by four main components and a corrector index:

- Risk Ratio (RR).
- Structural Operational Analysis (SOA).
- Credit Officer Assessment (COA).
- Negative Credit Record (NCR).
- Experience based corrector index (CI)

The component Risk Ratio (RR) is a statistical and financial evaluation of the risk shown for a specific company for the present and the next 3 years. Different variables are analysed to calculate this ratio, such as, economic feasibility of the project, indebtedness, equity, liquidity ratios and loan regular payments.

The Structural Operational Analysis (SOA) is a general operational analysis of the project’s feasibility, but from the entrepreneur/SME/company point of view. Various characteristics and variables such as the owner’s ability and skills, product’s concept, knowledge of customer’s need, potential customers, cash amount ratio, business plan, break-even point, information network of partners, motivation and recruitment of employees and level of ICT use.

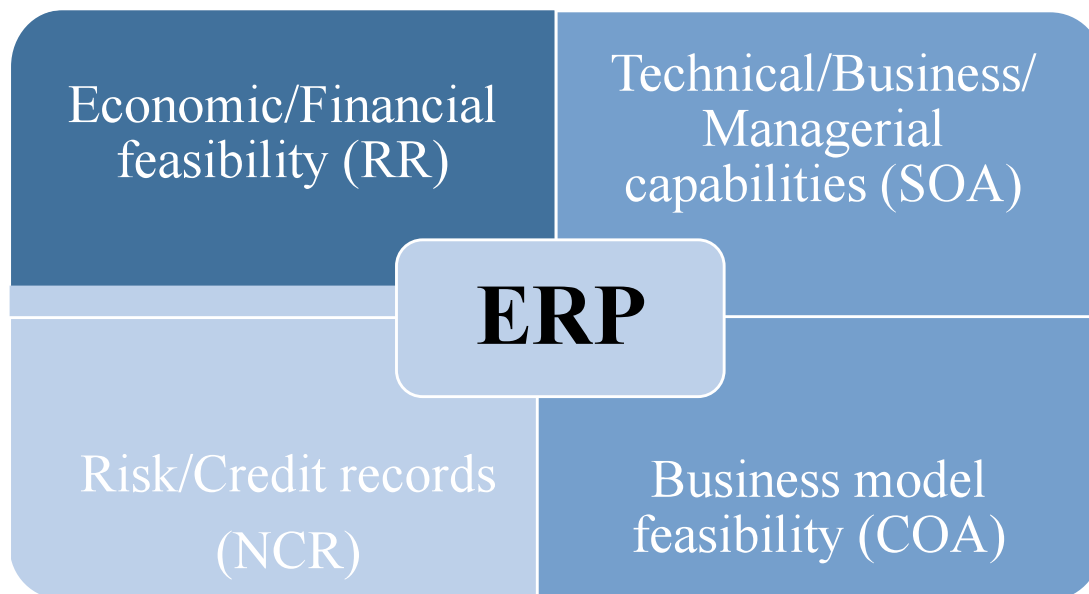
The Credit Officer Assessment (COA) is an expert evaluation of the overall business concept. The Credit Officer judge aspects such as the viability of the business, evolution of the sector, the stage of the project development, knowledge and experienced of the entrepreneur/promoter or pre-set agreements with potential customers.

The Negative Credit Record (NCR) is based on a risk and a credit records assessment that is supported, in the case of an operation based in Spain, by the CIRBE, a document issued by the Spanish Central Bank, to check the credit records of the micro credit/loan applicant.

The last component is the experience based Corrective Index (CI), which would be added to the formula after a determined number of years of implementation of the formula itself without this component, in accordance with the accuracy of the ERP value and the actual result of the operation assessed.

Components RR, SOA and COA are also adjusted by α , β and γ weighting coefficients. The first four component reflects a different axis of ERP methodology:

**FIGURE 1
AXIS OF ERP METHODOLOGY**



This way ERP composite indicator avoid biased approaches by integrating all aspects of the project assessed isolating the analysis itself from the subjectivity of the analyst and the Credit Officer, in order to provide the Credit Committee – the decision makers - with objective and valuable information to support their decision about the operation.

The corrector index CI will adjust the resulted value in accordance with actual data and feedback gathered as a result of a significant number of implementations, real loans assessments performed.

RISK RATIO (RR)

This first component is, in turn, also a composite sub-indicator formed by four annual values of two ad-hoc created financial ratios, which will be named, for denomination purposes, Yearly Quota Weighting (YQW) and Equity Capital Weighting (ECW):

- $$YQW = \frac{\text{Profit after taxes (PAT)} + \text{Loan yearly quota (LYQ)}}{\text{Loan Yearly Quota (LYQ)}}$$
- $$ECW = \frac{\text{Previous outstanding loans (POL)} + \text{Equity capital (EC)} + \text{Subsidies (S)}}{\text{Equity capital (EC)}}$$

So that,

- $$RR = 0,5 \{0,5 \{ \alpha YQW_1 + (1-\alpha)[0,5YQW_2 + 0,3YQW_3 + 0,2YQW_4] \} + 0,5 \{ \alpha ECW_1 + (1-\alpha)[0,5ECW_2 + 0,3ECW_3 + 0,2ECW_4] \} \}$$

Being $YQW_1, YQW_2, YQW_3, YQW_4, ECW_1, ECW_2, ECW_3$ and ECW_4 the Yearly Quota Weighting and Equity Capital Weighting values corresponding to the first four years of forecasted activity of the project analyzed. α default value is 0,5. Maximum value reachable for RR is 0,5.

STRUCTURAL OPERATIONAL ANALYSIS (SOA)

The SOA is formed by a set of 20 multiple choice questions with five possible answers each of them, aligned with the degree of accomplishment of the question formulated. One example of these questions, and its possible answers, would be:

- Knowledge and calculation of the break-even point:
- It does not exist.
- It has not been calculated.
- It is not realistic.
- It is not updated or it is not used.
- It is realistic, accurate and updated.

So that, proposed questions tackled the following topics relating both the project and the promoter themselves:

- Accuracy and veracity of the information provided by the promoter
- Viability of the product concept
- Knowledge of customer needs
- Number of clients
- Sufficient liquidity to start-up
- Sufficient liquidity to individual needs
- Income and expenditure plan
- Cash flow plan
- Calculation of the break-even point
- Calculation of costs and prices
- Information about potential or actual partners/Networking capabilities
- Business plan
- Family support
- Training and experience of the promoters
- Sector knowledge
- Commercialization strategy
- Processes and control mechanisms
- Level of ICT use
- Planning capabilities
- Motivation for promoters

SOA value ranges from 0 to 1, being possible to express it as a percentage (0 to 100) as well.

CREDIT OFFICER ASSESSMENT (COA)

The COA is made up by a set of 14 multiple choice questions with three possible answers each of them, aligned with the degree of accomplishment of the question formulated. One example of these questions, and its possible answers, would be:

- Is the information provided by the developer/s consistent with the project presented?
- The provided information is consistent with the project.
- The provided information about the project presents inconsistencies.
- The provided information about the project, idea and market presents important inconsistencies.

Full set of questions is as follows:

- Is the information provided by the promoter/s consistent with the project presented?
- Is the loan applied relevant for the business?
- Is the project already ongoing?
- How is the evolution of the sector?
- How does competition affect the project?

- Are there any barriers for the implementation of the business?
- In a hypothetical cessation of activity, are there any barriers out?
- Are the sales seasonal?
- What is the validity of the business model in relation to the market opportunity?
- Is the investment consistent in accordance with the project submitted?
- Has the promoter/s another additional sources of income outside the business?
- What is the promoter/s personal motivation?
- Does the promoter/s personality affect the management of the business?
- Is the promoter/s actually established in the environment of the activity carried out?

COA value ranges from 0 to 1, being possible to express it as a percentage (0 to 100) as well.

NEGATIVE CREDIT RECORD (NCR)

In accordance with the official credit record presented by the loan applicant, a pre-defined value from 0 to 1 will be deducted. Therefore, this is always a negative value which will be 0 exclusively in the cases were the credit record do not show any unpaid quota from another previously taken loan and the level of risk is low, not exceeding a predetermined level.

EXPERIENCE BASED CORRECTOR INDEX (CI)

The CI component has been included into the ERP formula in order to adjust it in accordance with data and information gathered from actual implementations in relation with critical issues that could noticeably affect the result. These would be experienced tested factors and circumstances that eventually could negatively affect the correct process of the assessed project itself, such an incoherent location of the premises in accordance with the activity to be carried out or a total disregard of the promoter/entrepreneur. Therefore, the CI can be considered as a safety component in order to avoid previously detected causes or factors of potential failure not included or foreseen in the default formula. This will imply a permanent adaptation of the algorithm aligned with relevant experienced results gathered during actual implementation periods.

As for the NCR, the CI is always 0 or a negative value ranging from 0 to 1.

WEIGHTING COEFFICIENTS

α , β y γ are coefficients aligned with the relative strength assigned to each one of the three components RR, SOA and COA. α , β y γ coefficients range from 0 to 1. Default values are 0.5, 0.25 and 0.25 respectively.

EMPIRICAL TESTING

As result of different factors, most of them direct consequences of the global financial crisis initiated in 2007, SMEs and entrepreneurs were forced to face the crudest credit crunch of last decades. Besides, guarantees and collaterals required by regular financial and banking institutions in Spain were higher than ever, often impossible to be gathered. Traditional financial institutions were avoiding small credit operations which was particularly dramatic for medium - low sized investments, directly affecting entrepreneurs, start-ups and SMEs. In fact, credit facilities under 25.000.- € were very restricted and limited in Spanish regular financial markets. In commercial terms, this supposed a market gap with real needs to be covered. In accordance with this, it was decided to offer microcredit services through a fund provided by the Regional Government of Burgos to these collectives (Entrepreneurs, SMEs and self-employees), mainly aiming at start-ups, and taking into account social issues such unemployment and rural development. It was, therefore, understood that financial support, in combination with mentoring, is essential in order to foster the creation of new enterprises. The geographical reach was, initially, Burgos province. Further

extensions to the whole Castilla y Leon region would be considered. The financial instrument conceived for that purpose was a micro credit with the following characteristics:

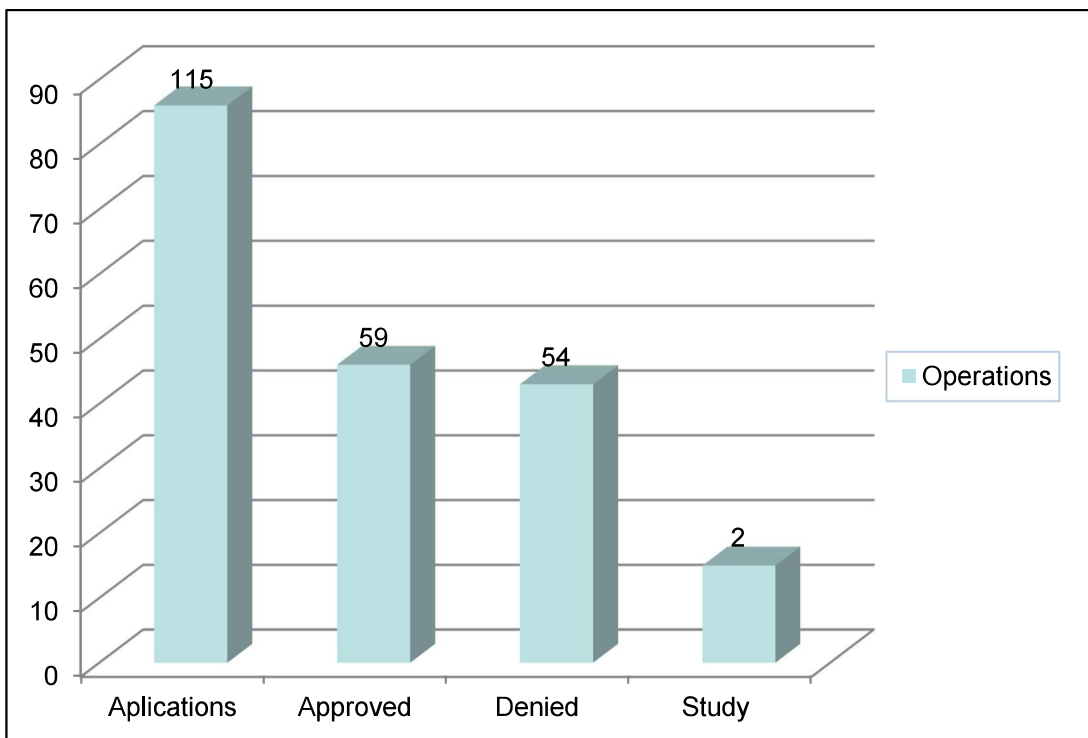
- 4/5 years term.
- 6 months grace period (Optional).
- 1,5 – 3% fix interest rate.
- Maximum amount 25000 €, including 5000 € for working capital.
- No fees charged.
- No guarantees/No collaterals.

The methodology itself is determined by this lack of guarantees or collaterals, being, therefore, based on the four subsequent pillars:

- Financial figures and ratios of the operation.
- Business project features (Business model, structure, market trends...).
- Entrepreneur management skills.
- Credit record.

The referred micro credit fund, managed by CEEI-Burgos, was raised and set up on 01/01/2013. From this moment onwards the fund was fully operative summing and initial capital of 150000€. This amount has been yearly increased till 825000€ by June 2017. The number of operations for the period of 01/01/2013 – 03/07/2017 are the following ones:

FIGURE 1
ERP OPERATIONS



For this period the following indicators of performance have been extracted:

TABLE 1
ERP PERFORMANCE INDICATORS

INDICATORS OF PERFORMANCE	
Total budget (Microfinance fund)	825.000,00 €
Fully repaid	412.645.99 €
Total leveraged investment (approved applications)	3.652.563,99 €
Total loans granted	1.097.354,88 €
Jobs created	69
PAR (NPL 30)	1,21 %
LAR 30	2,12 %
Write-off ratio	0 %
Survival projects/companies ratio	98,31%

Being NPL 30 the standard ratio to assess the quality of the portfolio indicating the portfolio at risk (PAR) past due more than 30 days. NPL stands for “Non-performing loans”. NPL 30 is given by:

$$\text{NPL 30} = \frac{\text{Total amount at risk}}{\text{Outstanding principal balance of all loans}}$$

Being: *Total amount at risk = Outstanding principal balance of all loans with at least one payment past due more than 30 days + Outstanding balance of loans that are not more than 30 days late but have been renegotiated.*

LAR, which does not differ much from PAR, is a simple indicator that counts the number of loans at risk instead of their amounts. According to this:

$$\text{LAR 30} = \frac{\text{Number of loans more than 30 days late}}{\text{Total number of outstanding loans}}$$

Finally:

$$\text{Write-off ratio} = \frac{\text{Value of loans written off during period}}{\text{Average gross loan portfolio during period}}$$

These empirical results show the efficacy and efficiency of this methodology, which have been tested in actual scenarios and environments, in comparison with current financial risk assessment methods used by the traditional banking and financial system, pointing out the fact that guarantees or collaterals have not been requested in ERP field implementations which, theoretically, would increase the risk factor itself. However, the NPL 30 ratio shows figures far below the banking system ones, despite the common and general used of guarantees and collaterals in its operations.

CONCLUDING REMARKS

In this work, a new method of financial risk assessment, presented as an operational composite indicator to evaluate the estimated recovery probability of an entrepreneur’s loan, or any other business-oriented loans, has been introduced.

The core aspect of this methodology is the ad hoc coined concept of “Estimated Recovery Probability” as an estimation of the measure of the likelihood that an event will occur. Not being a pure mathematical probability calculation, the value is, however, equally expressed as a percentage.

This approach integrates not only pure financial aspects of the operation but also management skills of the promoter and the business model of the project assessed itself. This analysis is determined by the lack of guarantees or collaterals, therefore focusing in the security principle understood as the feasibility of the operation itself.

ERP concept has been tested in actual environments with outstanding results in terms of accuracy in accordance with the actual developments of the assessed projects themselves. The calculated NPL 30 ratio which value is 1,21% positively stands out among average traditional banking default rates.

In order to avoid the formula to get out-dated, it includes a corrector index (CI) able to allow the adaptation of the algorithm to actual present and future circumstances that could affect the correct assessment process.

ERP method is a useful tool to be used by MFIs (Micro Finance Institutions) or any other finance institution providing credits or loans in highly uncertain environments or circumstances.

Future research will be focused in further adjustments of the “Experience based corrector index (CI)” and potential inclusion of other standard financial ratios.

CONCEPTUAL BACKGROUND

Since ERP method is a totally new approach, not based on previous works, the below listed references should be considered as general concepts not specifically mentioned in any particular parts of the text:

EFQM Excellence Model

Start – up Lifecycle Strategy Analysis by Harvard Business School

BLUES Brain Logistics Start-Up Evaluator, JIC (South Moravian Innovation Centre)