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Triangular Financial Service: Innovation in Credit Granting

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Abstract

This paper describes an innovative financial service for granting credit involving three actors simultaneously: an employee, a company, and a financial institution. In this innovative method of financing, the employee is the borrower, and the company bears the risk of default in its capacity as the entity responsible for reimbursing the timelines. That requires that both parties are contractually bound. The FinTech is the financing organization. From an example of salary advances, we demonstrate that this financial service is advantageous for the employee, profitable for the financial institution for any positive interest rate, and the employer in terms of loyalty and motivating high-potential executives.

Keywords

FinTech, Reverse Distribution, Credit Risk, Pension FinTech, Wealth Management, Triangular Financial Service, Credit Granting, Financial Innovation

1. Introduction

FinTech has progressed rapidly in recent years with the rise of the Internet and the introduction of a variety of innovations in the financial sector, prompting market participants to rethink their business models (McKinsey & Company, 2019; Petralia et al., 2019; Boot et al., 2021). The most notable shift has occurred in the payments segment, then gradually moving towards core banking services, including credit activities. Thus, a growing literature focuses on FinTech credit (Branzoli & Supino, 2020), such as its dependence on local eco-

nomic development and the presence of a legal system protecting property rights and guaranteeing the rule of law (e.g. Braggion et al., 2018; Haddad & Hornuf, 2019; Rau, 2020), and its high development where the banking sector is less competitive (e.g. Claessens et al., 2018; Jagtiani & Lemieux, 2018; Frost et al., 2019).

However, although there is huge market potential for FinTech pension products, academic research is still embryonic (Agnew & Mitchell, 2019). Our work complements this gap by proposing a financial innovation that will make it possible to reverse the distribution of work income within the individual career. Indeed, in the context of a professional activity broken down into the beginning, middle, and end of a career, the individual will have substantial funding at the start of their career, allowing them to begin the launch phase under advantageous conditions. This phenomenon can be a salary advance financed by a third-party organization. Indeed, financial innovation concerns the subscription of long-term credit, which involves the employee, the employer, and a credit institution. The difference in remuneration is borne by the financial institution and not by the employer. This credit offer creates a virtuous circle for the employee in the sense that they will obtain higher purchasing power at the start of their career, leading to less stress, better mental health, and increased motivation, therefore better productivity generating promotions, bonuses, an increase in salary, and ultimately higher purchasing power. The financial arrangement also generates advantages for the employer. Indeed, high employee productivity leads to increased profitability, which allows the employer to offer more benefits to its employees and better working conditions. This system could allow a company to retain its high-potential employees and recruit new ones. It could also make it possible to propose new managerial approaches to remedy the obsolescence of certain companies' remuneration systems. At the macroeconomic level, this financial innovation could provide its share of solutions in a situation of high inflation, deterioration of purchasing power, and imbalance in pay-as-you-go pension systems.

Our paper contributes to the academic literature because it is the first to develop financial technology on the distribution of labor income and its positive impact on employee motivations and employers' financial gains. The rest of this article is as follows. Section 2 describes how financial innovation works. Section 3 is devoted to modeling. The results are presented in Section 4. Finally, we conclude in Section 5.

2. Scenarios and Assumptions

The triangular financial service involves the FinTech as a financing organization, the employee as an agent requesting credit, and the employer as an organization responsible for reimbursement of the latter. This financial service allows employees to benefit from salary advances equivalent to the difference between their future and current wages. Therefore, the distribution of salaries will become decreasing.

Over the first half of the individual career, the credit organization, minus the discounted interest, finances a positive salary gap. Over the second half of the career, there will be a negative pay gap, which represents the reimbursement by the employer of the perceived positive gap, such that the employer pays what he should have paid. This approach generates several scenarios depending on whether the employee dies, resigns, or is made redundant.

In the case of the employee's death, temporary death insurance is mandatory the duration of which covers his entire career with a maximum capital representing the total of the salary differences received by the employee during the first half of his career. Indeed, in the case of the employee dying during the first half of his career, the insurance company reimburses the credit received by the employee. In the case of an employee dying during the second half of his career, temporary death insurance will make it possible to reimburse the credit remaining to be collected by the credit organization.

If the employee resigns during the first part of his career, he must repay the credit received. If he resigns during the second half of his career, he will have to repay the credit to be received as if he had remained in the company until his retirement. In the case where the company dismisses the employee during the first half of his career, the employment contract (or the collective agreement) serves as the basis for compensation for the credit received, and during the second half of his career, it serves as the basis for compensation of the credit remaining to be collected.

We make some simplifying assumptions:

- The rate of professional experience allowance and the capitalization/discount rate are constant throughout the employee's career;
- The salary is annual;
- No promotion throughout the employee's career;
- The entire career is in the same company;
- Capitalization/updating is carried out continuously;
- Flows are recorded at the end of each year;
- The credit is with the same credit organization.

3. Modeling

We require data about the employee (age, years of professional experience, current salary, rate of professional experience allowance, number of years of work necessary to claim retirement), and the capitalization/discount rate.

$S_1, S_2, \cdots, S_{\frac{T}{2}}, \cdots, S_{T-1}, S_T$, are the wages received by an individual (hereafter X) throughout his career (of duration T). They constitute an increasing geometric sequence of first-term S_0 and ratio $(1 + r)$.

$S_T, S_{T-1}, \cdots, S_{\frac{T}{2}}, \cdots, S_2, S_1$, are the temporal inversions of wages received by X throughout his career of duration T. They constitute a decreasing geometric

sequence of first S_T term and ratio $\frac{1}{1+r}$.

$D_1, D_2, \cdots, D_{\frac{T}{2}}, \cdots, D_{T-1}, D_T$, represent the difference between the received salaries and the temporal inversion of the received wages, decreasing $\forall t = \overline{1,T}$. Equation (1) indicates that D_t is positive when t varies from 1 to $\frac{T}{2}$, and negative when t varies from $\frac{T}{2}+1$ to T.

$$D_t = S_{T-t+1} - S_t \tag{1}$$

When D_t is positive, the credit organization (hereafter Z) finances it for the employee benefit. If D_t is negative, Z is reimbursed for the difference by the employer. However, Z immediately receives the interest (discounted because recorded on date t) by X on D_t. In other words, X will receive the difference minus the interest, and Z will receive the interest from 1 to $\frac{T}{2}$ and the principal during the period from $\frac{T}{2}+1$ to T.

Given the amount of financing F_t, such that $F_t = D_t - I_t \mathrm{e}^{-i(T-t)}$, we deduce I_t, the interest received by the financing organization (Equation (2)):

$$I_t = D_t \mathrm{e}^{i(T-t)} - D_t = D_t \left(\mathrm{e}^{i(T-t)} - 1\right) \tag{2}$$

The interest is capitalized over the period $T-t$ because of the symmetric distribution of D_t. We deduce financing at time t, i.e. the discounting of this difference over $T-t$, knowing that the salary difference is perceived at the end of the period (Equation (3)):

$$F_t = D_t - D_t \left(\mathrm{e}^{i(T-t)} - 1\right)\mathrm{e}^{-i(T-t)} = D_t - D_t \left(1 - \mathrm{e}^{-i(T-t)}\right)$$

$$F_t = D_t \left(1 - 1 + \mathrm{e}^{-i(T-t)}\right)$$

$$F_t = D_t \mathrm{e}^{-i(T-t)} \tag{3}$$

Then, we proceed to the equalization between the inputs and the outputs of the flows recorded by the funding organization to locate the values taken by the capitalization/discount rate i. The distribution of D_t is increasing between $\frac{T}{2}+1$ to T. By decreasing this distribution we have values in the time interval between 1 and $\frac{T}{2}$ while maintaining the same discount period for each salary difference (Equation (4)).

$$\mathrm{INPUTS}\left(D_t\right)_{\mathbb{1}_{t\in\left[\frac{T}{2}+1;T\right]}} = \mathrm{OUTPUTS}\left(F_t\right)_{\mathbb{1}_{t\in[1;T/2]}}$$

$$\sum_{t=\frac{T}{2}+1}^{T} D_t \mathrm{e}^{-it} = \sum_{t=1}^{T/2} F_t \mathrm{e}^{-it}$$

$$\sum_{t=1}^{T/2} D_t e^{-i(T-t+1)} = \sum_{t=1}^{T/2} F_t e^{-it}$$

$$\sum_{t=1}^{T/2} D_t e^{-i(T-t+1)} = \sum_{t=1}^{T/2} D_t e^{-i(T-t)} e^{-it}$$

$$\sum_{t=1}^{T/2} D_t e^{-i(T-t+1)} = \sum_{t=1}^{T/2} D_t e^{-iT} \quad (4)$$

$\forall i > 0$, we consider the left part of the equation greater than the right part. Thus, if an employee gets a promotion at time τ, with $1 < \tau < T$, then the salary gap will be higher. That is true on both sides of equation, so the profitability generated by FinTech will always be there.

4. Results and Discussion

We pose $T = 36$ years, $S_0 = 100\%$, $r = 2\%$, and $i = 1\%$. Figure 1 shows the distribution of salaries and inverted salaries. If the employee has 100% of the salary during the first year of his career, the salary will increase according to the allowance for professional experience to exceed 200%[1] after 36 years of work (salary curve). By inverting this curve, we obtain the reverse salary curve. The salary received in $t + T$ will be received in t, the salary received in $t + T - 1$ will be received in $t + 1$, and so on until the year $t + \frac{T}{2}$. From the year $\frac{T}{2} + 1$, the inverted salary becomes lower than the conventional salary. The difference between the two salaries will be positive from t to $t + \frac{T}{2}$, and negative between $t + \frac{T}{2} + 1$ to T. Employees at the start of their careers may be willing to receive higher compensation and immediate benefits, such as fully paid family medical plans or maternity/paternity leave. At the end of their career, professional opportunities are more limited, although they can assert their experience. These employees might prefer stock options or most company contributions to their retirement plans.

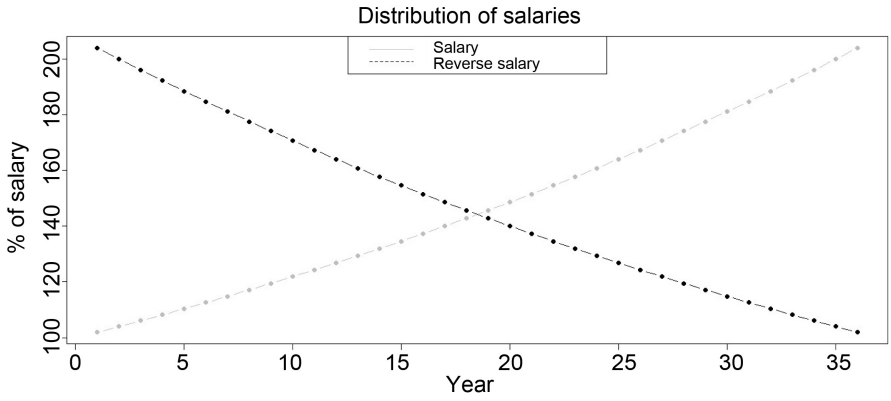

Figure 1. Distribution of salaries and inverted salaries over a 36-year career.

[1]That was calculated based on a professional experience allowance of 3% per year, used as a salary growth rate (calculated based on the annual composition of interest rates).

Figure 2 presents the diagram of the financial flows of credit organization Z. This organization begins to record positive flows from the date $\frac{T}{2}+1$, i.e. at the beginning of the second half of the employee career. The (negative) cash flows recorded during the first half of the career are net of interest. By subscribing to the credit offered, an employee immediately agrees to receive his future salary net of interest. This decision will depend on the interest rate applied by the credit institution. The latter will therefore have to find a balance between this rate and the expected utility of the employee to make this service attractive. It will have to carry out rigorous asset-liability management and use hedging products, allowing it to fix interest rates over a long period, such as rate swaps.

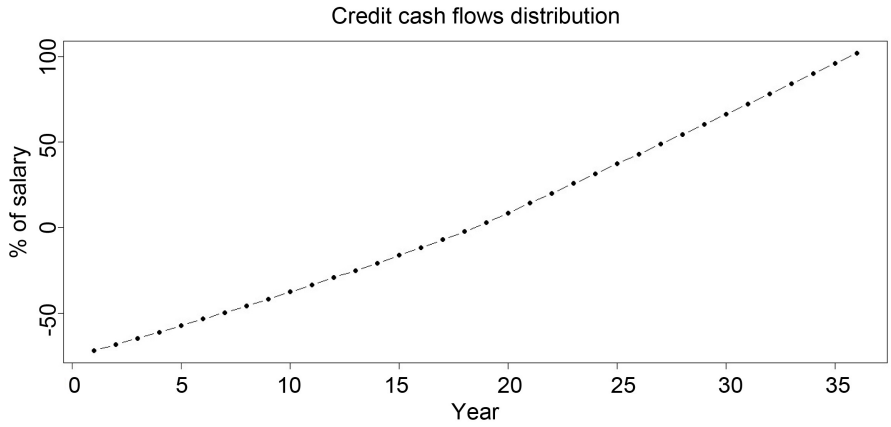

Figure 2. Flow diagram of the credit operation over a 36-year career.

Figure 3 presents the distribution of the new salary of employee X. A downward trend appears given the employee will receive advances on these future salaries.

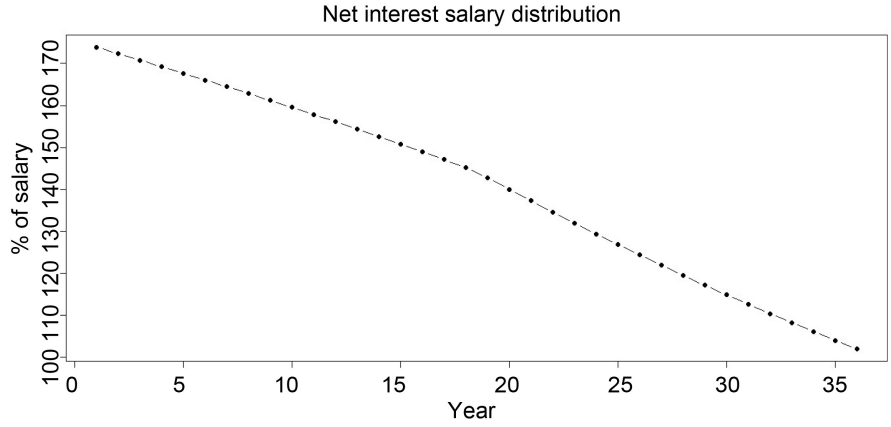

Figure 3. Distribution of the new salary received by the employee.

If the employee takes out this credit, he will get an annual salary at the start of his career slightly above 170%, i.e. his income will be 70% higher than his usual

salary. The salaries distribution paid by employer Y is into two parts. The first (see Figure 4) paid to the employee increases during the first half of the career and then decreases during the second half. The employer will pay the wages to his employee as if the credit had not taken place. Employees can change employers whenever they want. This flexibility is crucial, especially for the new generations, who want more freedom in their choice of employer, status, remuneration, and working conditions. However, this flexibility is only possible if the new employment contract includes different scenarios, such as death, resignation, and dismissal, and by reviewing the contribution rate to social security. The second part will be paid to the credit institution from $\frac{T}{2}+1$ (Figure 5). Finally, Figure 6 indicates that the employer pays the same salary as S.

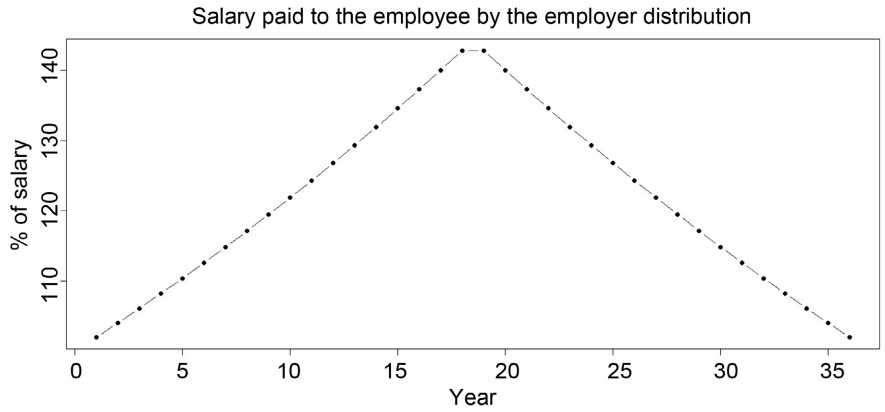

Figure 4. Distribution of salaries paid by the employer to the employee.

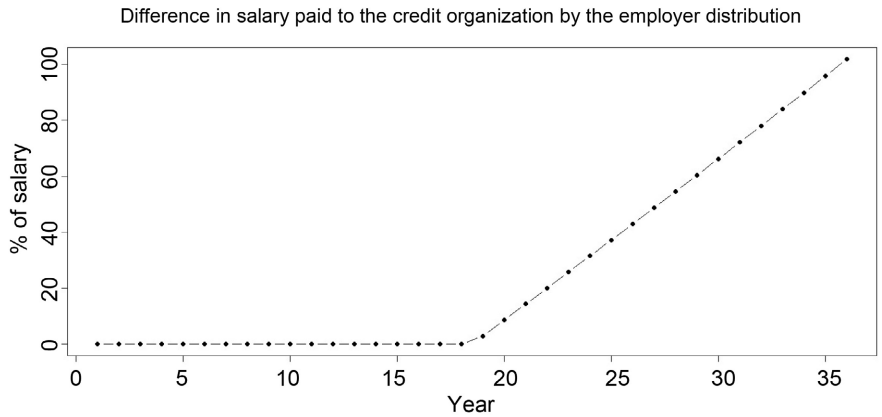

Figure 5. Distribution of salaries paid by the employer to the credit organization.

Thus, by replacing the parameters (r, D_t, i, and T) in Equation (4), we obtain: For the FinTech inputs:

$$\sum_{t=1}^{T/2} D_t \mathrm{e}^{-i(T-t+1)} = \sum_{t=1}^{18} D_t \mathrm{e}^{-0.01(36-t+1)} = 689.96\%$$

For the FinTech outputs:

Figure 6. Distribution of salaries paid by the employer.

$$\sum_{t=1}^{T/2} D_t \mathrm{e}^{-iT} = \sum_{t=1}^{18} D_t \mathrm{e}^{-0.01\times 36} = 652.55\%$$

Depending on the parameters chosen, the net present value generated by this credit will be 37.41%. That represents the effective rate of return obtained on the credit transaction carried out by FinTech, i.e. the difference between collections and disbursements, for a strictly positive interest rate. **Figure 7** provides different scenarios on net present values depending on the annual interest rate fixed at 1% and work experience allowances equal to 3% annually. The analysis of the sensitivity of the net present value to the variation of two parameters indicates that the net present value is an increasing function interest (and no linear) rate. Thus, **Figure 7** provides different net present values according to the conjoint evolution of two previous parameters. The compensation rates for professional experience represent the salary amounts. That reinforces the results obtained in Equation (4), given with higher salaries, the return on investment increases for FinTech.

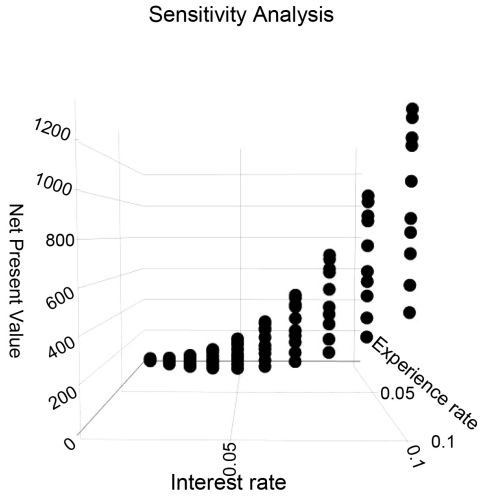

Figure 7. Sensitivity of net present value to interest rates and work experience allowances.

5. Conclusion

Our article presents an innovative approach to granting credit based on the principle of an advance on wages, which involves three actors: an employer, an employee, and a credit organization. We calculate the generated profitability according to the interest rate applied. A practical case concluded by a sensitivity analysis illustrates our approach. The risk of default is on the employer and not the employee. The advantage of the credit for the employee is that it will cost him nothing in disbursement, provided that he agrees to have a decreasing salary and pay pre-computed interest during the first half of his career. This financial innovation is also profitable for a credit institution. Although the payback period may seem long in our 36-year simulation, the payback period will be shorter for shorter credit periods. The main beneficiary of this financial arrangement is the company since he will have a better-paid employee with extended advantages without spending any extra in return. He can therefore make every effort to improve the working conditions of his employees, thus generating a win-win relationship. This financial service could allow indirect financing of the pay-as-you-go pension system, with the contributions collected by the social security funds resulting in an equilibrium in the medium to long term. The limitations of this study lie in the different hypotheses formulated. The professional experience compensation rate is constant and could be subject to modeling including promotions during the employee's career and employer changes. In addition, the credit interest rate could be the subject of stochastic modeling. Finally, we could determine the impact of the death insurance premium on the salary differences received by the employee and on the credit offer (if the insurance coverage is in a package offered by FinTech).

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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