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# Modeling for investment on scenarios TIIE 28 and TIIE 91 days

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## Abstract

This article presents through mathematical modeling two hypothetical scenarios of investment with monthly savings in the format of early annuity. In both cases, the term is referenced to one year, with deposits in different periods and changing effective rates. The development of modeling used information got from official sources about interest rates. The result seeks to determine the most profitable scenario based on the interest rate and its capitalization.

**Keywords:** Investment; early annuity; savings; compounded interest; interest rate.

## 1. Introduction

There is evidence that the level of financial education in Mexico is low, even in scenarios of higher education. Moreno, Garcia-Santillánand Munguía (2013) identified that undergraduate students lack appropriate knowledge of short and long-terminvestment, and they tend to make inappropriate handling of the money.

According to Van Horne (2014), to invest efficiently a company financial manager must plan carefully. They must, on the one hand, project future cash flows and then evaluate the

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possible effect of these flows in the finances of the company. Based on these projections, they handle maintaining sufficient liquidity to pay bills and debts at the time of its expiration. These obligations may require additional funding.

Given the need to manage resources, business or personal level, it is relevant to understand and analyze the culture of anticipation and savings in Mexico. In that sense, there is in the literature an area of study for generating evidence to carry out a more comprehensive analysis of the effect of taxes or other fiscal incentives, the effect of inheritances and the size of the family, as well as programs of pensions, of the policies of credit consumption, fiscal policy and economic uncertainty. It is also necessary to analyze in depth the issue of savings from a microeconomic perspective, as well as its behavior in the informal markets (Villagómez, 1993).

Under a savings perspective, this document seeks to demonstrate if comparing two hypothetical scenarios of savings schemes with different mexican interbank equilibrium rates of interest (TIIE) and with similar capitalization, we can observe a significant difference in the outcome. This states that:

**Ho:** TIIE 28 versus TIIE 91 = 0

**Hi:** TIIE 28 versus TIIE 91≠ 0

### 1.1.- Development of scenarios

Now, two hypothetical investment scenarios are presented, one with a 28-day benchmark rate (stage A) and the other with a rate of 91 days (scenario B). To start the mathematical modeling in both scenarios the nominal rate of 28 and 91 days is converted to its corresponding effective rate, according to the capitalization of each of these, starting from the following formula (García-Santillán, 2014):

$$Te = \left[ \left( 1 + {i_{tiie}}/{m_c} \right)^{n_t/m_c} - 1 \right] * 100 \tag{1}$$

Where:
*Te= effective interest rate*
$i_{tiie}$ *= nominal interest rate*
$m_c$ *= capitalization*
$n_t$ *= time*

With the result the rates are got that will be used in the calculation of the investment in the early annuity format, from the following formula:

$$Fv = Pq\left(1+\left(\frac{i_r}{m_c}\right)\right)^{n/m}\left[\frac{\left(1+\left(\frac{i_r}{m_c}\right)\right)^{n_t/m_c}-1}{i_r/m_c}\right] \quad (2)$$

Where:
$Fv$= future value
$Pq$= periodical quote (deposit)
$i_r$= interest rate
$m_c$ = *capitalization*
$n_t$ = *time*

In Table 1 are shown the interest rates to be used for the calculation of effective rates, and the latter are presented in Table 2.

Table 1. Nominal interest Rate

| Month | TIIE 28 days | TIIE 91 days |
|---|---|---|
| January | 3.80% | 3.81% |
| February | 3.77% | 3.79% |
| March | 3.79% | 3.81% |
| April | 3.82% | 3.81% |
| May | 3.79% | 3.81% |
| June | 3.78% | 3.82% |
| July | 3.31% | 3.33% |
| August | 3.31% | 3.32% |
| September | 3.29% | 3.30% |
| October | 3.28% | 3.31% |
| November | 3.28% | 3.30% |
| December | 3.30% | 3.39% |

Table 2. Effective interest rate

| Month | 28 Days Effective Rate | 91 Days Effective Rate |
|---|---|---|
| January | 3.8674% | 3.811% |
| February | 3.8363% | 3.791% |
| March | 3.8570% | 3.811% |
| April | 3.8881% | 3.811% |
| May | 3.8570% | 3.811% |
| June | 3.8467% | 3.821% |
| July | 3.3611% | 3.300% |
| August | 3.3611% | 3.200% |
| September | 3.3404% | 3.300% |
| October | 3.3301% | 3.310% |
| November | 3.3301% | 3.300% |
| December | 3.3507% | 3.390% |

Source: own

Below is an example of the calculations that are performed for each rate, both the Mexican TIIE 28 days, as the Mexican TIIE 91 days.

From formula 1:

$$Te = \left[\left(1+{}^{i_{tiie}}\!\!/_{m_c}\right)^{n_t/m_c}-1\right]*100 \quad (1)$$

We have 28 days to the effective interest rate of:

$$Te=\left[\left(1+\left(\frac{0.0380}{365}*28\right)\right)^{365/28}-1\right]*100=(1.00291123)^{13.0357143}-1*100 \quad (1.1.)$$

$$Te_1\_January=3.8674\% \quad (1.2.)$$

We have 91 days to the effective interest rate of:

$$Te=\left[\left(1+\left(\frac{0.0381}{365}*91\right)\right)^{365/91}-1\right]*100=(1.00291123)^{4.01098901}-1*100 \quad (1.3.)$$

$$Te_1\_January=3.8105\% \quad (1.4.)$$

After calculating the effective interest rates, future values are obtained for the twelve months with a Mexican TIIE 28% from Formula 2. For the second accumulation period, formula 2 is modified to bring the calculation the amount retrieved from $Fv_1$, becoming the $Fv_2$ formula described in section 2.1:

$$Fv_1=Pq\left(1+\left(\frac{i_r}{m_c}\right)\right)^{n/m}\left[\frac{\left(1+\left(\frac{i_r}{m_c}\right)\right)^{n_t/m_c}-1}{i_r/m_c}\right] \quad (2)$$

$$Fv_2=Fv_1\left(1+\left(\frac{i_r}{m_c}\right)\right)^{1}+Pq\left(1+\left(\frac{i_r}{m_c}\right)\right)^{n/m}\left[\frac{\left(1+\left(\frac{i_r}{m_c}\right)\right)^{n_t/m_c}-1}{i_r/m_c}\right] \quad (2.1)$$

Then develop cases using theorems of early annuitieswith capitalizations every 28 days, using the formula 1 and for the subsequent period, the formula 2.1 to effect to future value amount that is accumulating. The frequency of deposit is done every 30 days for$1,000.00 each one of them.

(2)

$$F_{v_1} = \$1,000.00\left(1+\frac{0.038674}{365}*28\right)^1\left[\frac{\left(1+\frac{0.038674}{365}*28\right)^{30/28}-1}{\left(\frac{0.038674}{365}*28\right)}\right]$$

$$F_{v_1} = \$1,000.00\left(1+0.00296677\right)^1\left[\frac{\left(1+0.00296677\right)^{1.07142857}-1}{0.00296677}\right]$$

$$F_{v_1} = \$1,000.00\left(1.00296677\right)\left[\frac{0.00317902}{0.00296677}\right]$$

$$F_{v_1} = \$1,000.00\left(1.00296677\right)\left[1.07154245\right]\ F_{v_1} = \$1,074.72$$

For the second period, i.e. for the second deposit applies the formula 2.1., hence the amount obtained in (2) is integratedinto the (2.1.1.), and so on.

$$Fv_2 = \$1,074.72\left(1+\left(\frac{0.038363}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.038363}{365}*28\right)\right)^1\left[\frac{\left(1+\left(\frac{0.038363}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.038363}{365}*28\right)}\right] \quad (2.1.)$$

$$Fv_2 = \$1,074.72\left(1+.00294292\right)^{1.07142857} + \$1,000.00\left(1+.00294292\right)^1\left[\frac{\left(1.00294292\right)^{1.07142857}-1}{.00294292}\right]$$

$$Fv_2 = \$1,074.72\left(1.00315345\right) + \$1,000.00\left(1.00294292\right)^1\left[\frac{\left(1.00315345\right)-1}{.00294292}\right]$$

$$Fv_2 = \$1,078.11 + \$1,000.00\left(1.00294292\right)\left[\frac{0.00315345}{.00294292}\right]$$

$$Fv_2 = \$1,078.11 + \$1,000.00\left(1.00294292\right)\left[1.07153779\right]\ \begin{array}{l} Fv_2 = \$1,078.11 + \$1,074.69 \\ Fv_2 = \$2,152.80 \end{array}$$

$$Fv_3 = \$2,152.80\left(1+\left(\frac{0.038570}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.038570}{365}*28\right)\right)^1\left[\frac{\left(1+\left(\frac{0.038570}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.038570}{365}*28\right)}\right] \quad (2.2.)$$

$$Fv_3 = \$2,152.80\left(1+.00295879\right)^{1.07142857} + \$1,000.00\left(1+.00295879\right)^1\left[\frac{\left(1.00295879\right)^{1.07142857}-1}{.00295879}\right]$$

$$Fv_3 = \$2,152.80(1.00317047) + \$1,000.00(1.00295879)^1 \left[ \frac{(1.00317047) - 1}{.00295879} \right]$$

$$Fv_3 = \$2,152.80 + \$1,000.00(1.00295879) \left[ \frac{0.00317047}{.00295879} \right]$$

$$Fv_3 = \$2,152.80 + \$1,000.00(1.00295879)[1.06579041] \quad \begin{array}{l} Fv_3 = \$2,152.80 + 1,068.94 \\ Fv_3 = \$3,221.74 \end{array}$$

$$Fv_4 = \$3,221.74\left(1+\left(\frac{0.038881}{365}*28\right)\right)^{30/28} + Pq\left(1+\left(\frac{0.038881}{365}*28\right)\right)^1 \left[ \frac{\left(1+\left(\frac{0.038881}{365}*28\right)\right)^{30/28} - 1}{\left(\frac{0.038881}{365}*28\right)} \right] \quad (2.3.)$$

$$Fv_4 = \$3,221.74(1+.00298265)^{1.07142857} + \$1,000.00(1+.00298265)^1 \left[ \frac{(1.00298265)^{1.07142857} - 1}{.00298265} \right]$$

$$Fv_4 = \$3,221.74(1.00319604) + \$1,000.00(1.00298265)^1 \left[ \frac{(1.00319604) - 1}{.00298265} \right]$$

$$Fv_4 = \$3,232.04 + \$1,000.00(1.00298265) \left[ \frac{0.00319604}{.00298265} \right]$$

$$Fv_4 = \$3,232.04 + \$1,000.00(1.00298265)[1.07154376] \quad \begin{array}{l} Fv_4 = \$3,232.04 + \$1,074.74 \\ Fv_4 = \$4,306.78 \end{array}$$

$$Fv_5 = \$4,306.78\left(1+\left(\frac{0.038570}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.038570}{365}*28\right)\right)^1 \left[ \frac{\left(1+\left(\frac{0.038570}{365}*28\right)\right)^{30/28} - 1}{\left(\frac{0.038570}{365}*28\right)} \right] \quad (2.4.)$$

$$Fv_5 = \$4,306.78(1+.00298265)^{1.07142857} + \$1,000.00(1+.00298265)^1 \left[ \frac{(1.00298265)^{1.07142857} - 1}{.00298265} \right]$$

$$Fv_5 = \$4,306.78(1.00319604) + \$1,000.00(1.00298265)^1 \left[ \frac{(1.00319604) - 1}{.00298265} \right]$$

$$Fv_5 = \$4,320.54 + \$1,000.00(1.00298265) \left[ \frac{0.00319604}{.00298265} \right]$$

$$Fv_5 = \$4,320.54 + \$1,000.00(1.00298265)[1.07154376] \quad \begin{array}{l} Fv_5 = \$4,320.54 + \$1,074.74 \\ Fv_5 = \$5,395.28 \end{array}$$

$$Fv_6 = \$5,395.28\left(1+\left(\frac{0.038467}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.038570}{365}*28\right)\right)^1 \left[ \frac{\left(1+\left(\frac{0.038570}{365}*28\right)\right)^{30/28} - 1}{\left(\frac{0.038570}{365}*28\right)} \right] \quad (2.5.)$$

$$Fv_6 = \$5,395.28\left(1+.00295089\right)^{1.07142857} + \$1,000.00\left(1+.00295089\right)^{1}\left[\frac{\left(1.00295089\right)^{1.07142857}-1}{.00295089}\right]$$

$$Fv_6 = \$5,395.28\left(1.00316200\right) + \$1,000.00\left(1.00295089\right)^{1}\left[\frac{\left(1.00316200\right)-1}{.00295089}\right]$$

$$Fv_6 = \$5,412.34 + \$1,000.00\left(1.00295089\right)\left[\frac{0.00316200}{.00295089}\right]$$

$$Fv_6 = \$5,412.34 + \$1,000.00\left(1.00295089\right)\left[1.07154113\right] \quad \begin{matrix} Fv_6 = \$5,412.34 + \$1,074.70 \\ Fv_6 = \$6,487.04 \end{matrix}$$

$$Fv_7 = \$6,487.04\left(1+\left(\frac{0.033611}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.033611}{365}*28\right)\right)^{1}\left[\frac{\left(1+\left(\frac{0.033611}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.033611}{365}*28\right)}\right] \quad (2.6.)$$

$$Fv_7 = \$6,487.04\left(1+.00257838\right)^{1.07142857} + \$1,000.00\left(1+.00257838\right)^{1}\left[\frac{\left(1.00257838\right)^{1.07142857}-1}{.00257838}\right]$$

$$Fv_7 = \$6,487.04\left(1.0027628\right) + \$1,000.00\left(1.00257838\right)^{1}\left[\frac{\left(1.0027628\right)-1}{.00257838}\right]$$

$$Fv_7 = \$6,504.96 + \$1,000.00\left(1.00257838\right)\left[\frac{0.0027628}{.00257838}\right]$$

$$Fv_7 = \$6,504.96 + \$1,000.00\left(1.00257838\right)\left[1.07152553\right] \quad \begin{matrix} Fv_7 = \$6,504.96 + \$1,074.29 \\ Fv_7 = \$7,579.25 \end{matrix}$$

$$Fv_8 = \$7,579.25\left(1+\left(\frac{0.033611}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.033611}{365}*28\right)\right)^{1}\left[\frac{\left(1+\left(\frac{0.033611}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.033611}{365}*28\right)}\right] \quad (2.7.)$$

$$Fv_8 = \$7,579.25\left(1+.00257838\right)^{1.07142857} + \$1,000.00\left(1+.00257838\right)^{1}\left[\frac{\left(1.00257838\right)^{1.07142857}-1}{.00257838}\right]$$

$$Fv_8 = \$7,579.25\left(1.0027628\right) + \$1,000.00\left(1.00257838\right)^{1}\left[\frac{\left(1.0027628\right)-1}{.00257838}\right]$$

$$Fv_8 = \$7,600.19 + \$1,000.00\left(1.00257838\right)\left[\frac{0.0027628}{.00257838}\right]$$

$$Fv_8 = \$7,600.19 + \$1,000.00\left(1.00257838\right)\left[1.07152553\right] \quad \begin{matrix} Fv_8 = \$7,600.19 + \$1,074.29 \\ Fv_8 = \$8,674.48 \end{matrix}$$

$$Fv_9 = \$8,674.48\left(1+\left(\frac{0.033404}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.033404}{365}*28\right)\right)^1\left[\frac{\left(1+\left(\frac{0.033404}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.033404}{365}*28\right)}\right] \quad (2.8.)$$

$$Fv_9 = \$8,674.48(1+.0025625)^{1.07142857} + \$1,000.00(1+.0025625)^1\left[\frac{(1.0025625)^{1.07142857}-1}{.0025625}\right]$$

$$Fv_9 = \$8,674.48(1.00274579) + \$1,000.00(1.0025625)^1\left[\frac{(1.00274579)-1}{.0025625}\right]$$

$$Fv_9 = \$8,698.30 + \$1,000.00(1.0025625)\left[\frac{0.00274579}{.0025625}\right]$$

$$Fv_9 = \$8.698.30 + \$1,000.00(1.0025625)[1.0715278] \quad Fv_9 = \$8,698.30 + \$1,074.27$$

$$Fv_9 = \$9,772.57$$

$$Fv_{10} = \$9,772.57\left(1+\left(\frac{0.033301}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.033301}{365}*28\right)\right)^1\left[\frac{\left(1+\left(\frac{0.033301}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.033301}{365}*28\right)}\right] \quad (2.9.)$$

$$Fv_{10} = \$9,772.57(1+.0025546)^{1.07142857} + \$1,000.00(1+.0025546)^1\left[\frac{(1.0025546)^{1.07142857}-1}{.0025546}\right]$$

$$Fv_{10} = \$9,772.57(1.00273732) + \$1,000.00(1.0025546)^1\left[\frac{(1.00273732)-1}{.0025546}\right]$$

$$Fv_{10} = \$9,799.32 + \$1,000.00(1.0025546)\left[\frac{0.00273732}{.0025546}\right]$$

$$Fv_{10} = \$9,799.32 + \$1,000.00(1.0025546)[1.07152587] \quad Fv_{10} = \$9,799.32 + \$1,074.26$$

$$Fv_{10} = \$10,873.58$$

$$Fv_{11} = \$10,873.58\left(1+\left(\frac{0.033301}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.033301}{365}*28\right)\right)^1\left[\frac{\left(1+\left(\frac{0.033301}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.033301}{365}*28\right)}\right] \quad (2.10.)$$

$$Fv_{11} = \$10,873.33(1+.0025546)^{1.07142857} + \$1,000.00(1+.0025546)^1\left[\frac{(1.0025546)^{1.07142857}-1}{.0025546}\right]$$

$$Fv_{11} = \$10,873.33(1.00273732) + \$1,000.00(1.0025546)^1\left[\frac{(1.00273732)-1}{.0025546}\right]$$

$$Fv_{11} = \$10,903.09 + \$1,000.00(1.0025546)\left[\frac{0.00273732}{.0025546}\right]$$

$$Fv_{11} = \$10,903.09 + \$1,000.00(1.0025546)[1.07152587] \quad Fv_{11} = \$10,903.09 + \$1,074.26 \quad Fv_{11} = \$11,977.36$$

$$Fv_{12} = \$11,977.36\left(1+\left(\frac{0.033507}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.033507}{365}*28\right)\right)^{1}\left[\frac{\left(1+\left(\frac{0.033507}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.033507}{365}*28\right)}\right] \quad (2.11.)$$

$$Fv_{12} = \$11,977.36(1+.0025704)^{1.07142857} + \$1,000.00(1+.0025704)^{1}\left[\frac{(1.0025704)^{1.07142857}-1}{.0025704}\right]$$

$$Fv_{12} = \$11,977.36(1.00275425) + \$1,000.00(1.0025704)^{1}\left[\frac{(1.00275425)-1}{.0025704}\right]$$

$$Fv_{12} = \$12,010.35 + \$1,000.00(1.0025704)\left[\frac{0.00275425}{.0025704}\right]$$

$$Fv_{12} = \$12,010.35 + \$1,000.00(1.0025704)[1.07152583] \quad Fv_{12} = \$12,010.35 + \$1,074.28 \quad Fv_{12} = \$13,084.63$$

Now early annuities scenarioB is developed by what the formula 2 is used and for the subsequent period, using the formula 2.1.1.bfor raising to future value the amount that is accumulating. The frequency of deposit is made every 30 days for$1,000.00 each one of them,and the effective rate that was previously calculated is taken and is presented in Table 2. To compare the second scenario with rates referenced TIIE 91 days, with the scenario proposed for the 28-day TIIE rate, using the same frequency of capitalization and, with the proportional part of the 91 day TIIE rate, its share was taken up to 28 days. Hence we have:

$$F_{v_1} = \$1,000.00\left(1+\frac{0.03811}{365}*28\right)^{1}\left[\frac{\left(1+\frac{0.03811}{365}*28\right)^{30/28}-1}{\left(\frac{0.03811}{365}*28\right)}\right] \quad (2.b)$$

$$F_{v_1} = \$1,000.00(1+0.00292351)^{1}\left[\frac{(1.00313266)^{1.07142857}-1}{0.00292351}\right]$$

$$F_{v_1} = \$1,000.00(1.00292351)\left[\frac{0.00313266}{0.00292351}\right] \quad F_{v_1} = \$1,000.00(1.00292351)[1.07154072] \quad F_{v_1} = \$1,074.67$$

$$Fv_2 = \$1,074.67\left(1+\left(\frac{0.03791}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.03791}{365}*28\right)\right)^{1}\left[\frac{\left(1+\left(\frac{0.03791}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.03791}{365}*28\right)}\right] \quad (2.1.b)$$

$$Fv_2 = \$1,074.67(1+.00290816)^{1.07142857} + \$1,000.00(1+.00290816)^{1}\left[\frac{(1.00290816)^{1.07142857}-1}{.00290816}\right]$$

$$Fv_2 = \$1,074.67(1.00311621) + \$1,000.00(1.00290816)^{1}\left[\frac{(1.00311621)-1}{.00290816}\right]$$

$$Fv_2 = \$1,078.02 + \$1,000.00(1.00290816)\left[\frac{0.00311621}{.00290816}\right]$$

$$Fv_2 = \$1,078.02 + \$1,000.00(1.00290816)[1.07154072]$$

$$Fv_2 = \$1,078.02 + \$1,074.66$$

$$Fv_2 = \$2,152.68$$

$$Fv_3 = \$2,152.68\left(1+\left(\frac{0.03811}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.03811}{365}*28\right)\right)^{1}\left[\frac{\left(1+\left(\frac{0.03811}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.03811}{365}*28\right)}\right] \quad (2.2.b)$$

$$Fv_3 = \$2,152.68(1+.00292351)^{1.07142857} + \$1,000.00(1+.00292351)^{1}\left[\frac{(1.00292351)^{1.07142857}-1}{.00292351}\right]$$

$$Fv_3 = \$2,152.68(1.00313266) + \$1,000.00(1.00292351)^{1}\left[\frac{(1.00313266)-1}{.00292351}\right]$$

$$Fv_3 = \$2,159.42 + \$1,000.00(1.00292351)\left[\frac{0.00313266}{.00292351}\right]$$

$$Fv_3 = \$2,159.42 + \$1,000.00(1.00292351)[1.07154072]$$

$$Fv_3 = \$2,159.42 + \$1,074.67$$

$$Fv_3 = \$3,234.09$$

$$Fv_4 = \$3,234.09\left(1+\left(\frac{0.03811}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.03811}{365}*28\right)\right)^{1}\left[\frac{\left(1+\left(\frac{0.03811}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.03811}{365}*28\right)}\right] \quad (2.3.b)$$

$$Fv_4 = \$3,234.09(1+.00292351)^{1.07142857} + \$1,000.00(1+.00292351)^{1}\left[\frac{(1.00292351)^{1.07142857}-1}{.00292351}\right]$$

$$Fv_4 = \$3,234.09(1.00313266) + \$1,000.00(1.00292351)^{1}\left[\frac{(1.00313266)-1}{.00292351}\right]$$

$$Fv_4 = \$3,234.09 + \$1,000.00(1.00292351)\left[\frac{0.00313266}{.00292351}\right]$$

$$Fv_4 = \$3,234.09 + \$1,000.00(1.00292351)[1.07154072] \quad \begin{matrix} Fv_4 = \$3,234.09 + \$1,074.67 \\ Fv_4 = \$4,308.76 \end{matrix}$$

$$Fv_5 = \$4,308.76\left(1+\left(\frac{0.03811}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.03811}{365}*28\right)\right)^{1}\left[\frac{\left(1+\left(\frac{0.03811}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.03811}{365}*28\right)}\right] \quad (2.4.b)$$

$$Fv_5 = \$4,308.76(1+.00292351)^{1.07142857} + \$1,000.00(1+.00292351)^{1}\left[\frac{(1.00292351)^{1.07142857}-1}{.00292351}\right]$$

$$Fv_5 = \$4,308.76(1.00313266) + \$1,000.00(1.00292351)^{1}\left[\frac{(1.00313266)-1}{.00292351}\right]$$

$$Fv_5 = \$4,322.26 + \$1,000.00(1.00292351)\left[\frac{0.00313266}{.00292351}\right]$$

$$Fv_5 = \$4,322.26 + \$1,000.00(1.00292351)[1.07154072] \quad \begin{matrix} Fv_5 = \$4,322.26 + \$1,074.67 \\ Fv_5 = \$5,396.93 \end{matrix}$$

$$Fv_6 = \$5,396.93\left(1+\left(\frac{0.03821}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.03821}{365}*28\right)\right)^{1}\left[\frac{\left(1+\left(\frac{0.03821}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.03821}{365}*28\right)}\right] \quad (2.5.b)$$

$$Fv_6 = \$5,396.93(1+.00293118)^{1.07142857} + \$1,000.00(1+.00293118)^{1}\left[\frac{(1.00293118)^{1.07142857}-1}{.00293118}\right]$$

$$Fv_6 = \$5,396.93(1.00314088) + \$1,000.00(1.00293118)^{1}\left[\frac{(1.00314088)-1}{.00293118}\right]$$

$$Fv_6 = \$5,413.88 + \$1,000.00(1.00293118)\left[\frac{0.00314088}{.00293118}\right]$$

$$Fv_6 = \$5,396.93 + \$1,000.00(1.00293118)[1.07154115] \quad \begin{matrix} Fv_6 = \$5,396.93 + \$1,074.68 \\ Fv_6 = \$6,471.61 \end{matrix}$$

$$Fv_7 = \$6,471.61\left(1+\left(\frac{0.033000}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.033000}{365}*28\right)\right)^{1}\left[\frac{\left(1+\left(\frac{0.033000}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.033000}{365}*28\right)}\right] \quad (2.6.b)$$

$$Fv_7 = \$6,471.61(1+.00253151)^{1.07142857} + \$1,000.00(1+.00253151)^{1}\left[\frac{(1.00253151)^{1.07142857}-1}{.00253151}\right]$$

$$Fv_7 = \$6,471.61(1.00271257) + \$1,000.00(1.00253151)^{1}\left[\frac{(1.00271257)-1}{.00253151}\right]$$

$$Fv_7 = \$6,489.16 + \$1,000.00(1.00253151)\left[\frac{0.00271257}{.00253151}\right]$$

$$Fv_7 = \$6,489.16 + \$1,000.00(1.00253151)[1.07152253] \quad \begin{array}{l} Fv_7 = \$6,489.16 + \$1,074.24 \\ Fv_7 = \$7,563.40 \end{array}$$

$$Fv_8 = \$7,563.40\left(1+\left(\frac{0.032000}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.032000}{365}*28\right)\right)^1\left[\frac{\left(1+\left(\frac{0.032000}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.032000}{365}*28\right)}\right] \quad (2.7.b)$$

$$Fv_8 = \$7,563.40(1+.00245479)^{1.07142857} + \$1,000.00(1+.00245479)^1\left[\frac{(1.00245479)^{1.07142857}-1}{.00245479}\right]$$

$$Fv_8 = \$7,563.40(1.00263037) + \$1,000.00(1.00245479)^1\left[\frac{(1.00263037)-1}{.00245479}\right]$$

$$Fv_8 = \$7,583.29 + \$1,000.00(1.00245479)\left[\frac{0.00271257}{.00253151}\right]$$

$$Fv_8 = \$7,583.29 + \$1,000.00(1.00245479)[1.07152253] \quad \begin{array}{l} Fv_8 = \$7,583.29 + \$1,074.15 \\ Fv_8 = \$8,657.45 \end{array}$$

$$Fv_9 = \$8,657.45\left(1+\left(\frac{0.033000}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.033000}{365}*28\right)\right)^1\left[\frac{\left(1+\left(\frac{0.033000}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.033000}{365}*28\right)}\right] \quad (2.8.b)$$

$$Fv_9 = \$8,657.45(1+.00253151)^{1.07142857} + \$1,000.00(1+.00253151)^1\left[\frac{(1.00253151)^{1.07142857}-1}{.00253151}\right]$$

$$Fv_9 = \$8,657.45(1.00271257) + \$1,000.00(1.00253151)^1\left[\frac{(1.00271257)-1}{.00253151}\right]$$

$$Fv_9 = \$8,680.93 + \$1,000.00(1.00245479)\left[\frac{0.00271257}{.00253151}\right]$$

$$Fv_9 = \$8,680.93 + \$1,000.00(1.00245479)[1.07152253] \quad \begin{array}{l} Fv_9 = \$8,680.93 + \$1,074.24 \\ Fv_9 = \$9,755.17 \end{array}$$

$$Fv_{10} = \$9,755.17\left(1+\left(\frac{0.03310}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.03310}{365}*28\right)\right)^1\left[\frac{\left(1+\left(\frac{0.03310}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.03310}{365}*28\right)}\right] \quad (2.9.b)$$

$$Fv_{10} = \$9,755.17(1+.00253918)^{1.07142857} + \$1,000.00(1+.00253151)^1\left[\frac{(1.00253918)^{1.07142857}-1}{.00253918}\right]$$

$$Fv_{10} = \$9,755.17(1.00272079) + \$1,000.00(1.00253918)^1\left[\frac{(1.00272079)-1}{.00253918}\right]$$

$$Fv_{10} = \$9,781.71 + \$1,000.00(1.00253918)\left[\frac{0.00272079}{.00253918}\right]$$

$$Fv_{10} = \$9,781.71 + \$1,000.00(1.00253918)[1.07152309] \quad \begin{aligned} Fv_{10} &= \$9,781.71 + \$1,074.24 \\ Fv_{10} &= \$10,855.96 \end{aligned}$$

$$Fv_{11} = \$10,855.96\left(1+\left(\frac{0.03300}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.03300}{365}*28\right)\right)^1\left[\frac{\left(1+\left(\frac{0.03300}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.03300}{365}*28\right)}\right] \quad (2.10.b)$$

$$Fv_{11} = \$10,855.96(1+.00253151)^{1.07142857} + \$1,000.00(1+.00253151)^1\left[\frac{(1.00253151)^{1.07142857}-1}{.00253151}\right]$$

$$Fv_{11} = \$10,855.96(1.00271257) + \$1,000.00(1.00253151)^1\left[\frac{(1.00271257)-1}{.00253151}\right]$$

$$Fv_{11} = \$10,885.41 + \$1,000.00(1.00253151)\left[\frac{0.00271257}{.00253151}\right]$$

$$Fv_{11} = \$10,885.41 + \$1,000.00(1.00253151)[1.07152253] \quad \begin{aligned} Fv_{11} &= \$10,885.41 + \$1,074.24 \\ Fv_{11} &= \$11,959.64 \end{aligned}$$

$$Fv_{12} = \$11,959.64\left(1+\left(\frac{0.03390}{365}*28\right)\right)^{30/28} + \$1,000.00\left(1+\left(\frac{0.03390}{365}*28\right)\right)^1\left[\frac{\left(1+\left(\frac{0.03390}{365}*28\right)\right)^{30/28}-1}{\left(\frac{0.03390}{365}*28\right)}\right] \quad (2.11.b)$$

$$Fv_{12} = \$11,959.64(1+.00260055)^{1.07142857} + \$1,000.00(1+.00260055)^1\left[\frac{(1.00260055)^{1.07142857}-1}{.00260055}\right]$$

$$Fv_{12} = \$11,959.64(1.00278656) + \$1,000.00(1.00260055)^1\left[\frac{(1.00278656)-1}{.00260055}\right]$$

$$Fv_{12} = \$11,992.97 + \$1,000.00(1.00260055)\left[\frac{0.00278656}{.00260055}\right]$$

$$Fv_{12} = \$11,992.97 + \$1,000.00(1.00260055)[1.07152718] \quad \begin{aligned} Fv_{12} &= \$11,992.97 + \$1,074.31 \\ Fv_{12} &= \$13,067.28 \end{aligned}$$

Table 3 shows a summary of both scenarios, pre-calculated:

Table 3. Summary of the behavioral

| Month | TIIE 28 days | TIIE 91 days |
|---|---|---|
| January | $1,074.72 | $1,074.67 |
| February | $2,152.80 | $2,152.68 |
| March | $3,221.74 | $3,234.09 |
| April | $4,306.78 | $4,308.76 |
| May | $5,395.28 | $5,396.93 |
| June | $6,487.04 | $6,471.61 |
| July | $7,579.25 | $7,563.40 |
| August | $8,674.48 | $8,657.40 |
| September | $9,772.57 | $9,755.17 |
| October | $10,873.58 | $10,855.96 |
| November | $11,977.36 | $11,959.64 |
| December | $13,084.63 | $13,067.28 |
| *Accumulated* | **$13,084.63** | **$13,067.28** |

**2.- Discussion**

The data shown in Table3 reveal that the results, in terms of the accumulated amount are very similar in both cases. If one year twelve deposits are made these represent $12,000.00, hence that with the 28-day TIIE rate, earnings amounted to $1,084.63, while on the 91 day TIIE rate, are reached earnings of $1,067.28.It casts a differential of $17.35, of the TIIE 91 days with respect to the TIIE 28 dayscenario. The difference between the dividends obtained in each scenario is not significant, as it represents less than 1.6%.

Reference rates, which referred to the hypothesis Ho: TIIE 28 versus TIIE 91 = 0, there are not significant differences that suppose that not is should reject Ho. However, the 1.6% minimum difference is an element that promotes acceptance of Hi: TIIE 28 versus TIIE 91≠ 0. Therefore, H0 is rejected in theoretical terms.

**Conclusion**

Interpretation can be given to this result, beyond to test the hypothesis: both rates presented in the market, it is appropriate to transform them to their effective rate, to subsequently perform the calculations, under the criterion of"similar capitalization", where rate compared in scenario B, should be calculated from the proportional part of their effective rate, the capitalization of scenario A.

Finally, we can say that the mathematical model developed in this paper is a tool that could serve for supporting the decision-making of depositors or investors who decide to start a project of saving. Of course, data and the operational mechanics are aligned mainly to Latin American contexts, and particularly in the case of Mexico.

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