



How do Investors Make Investment Decision by NPV Rule

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Abstract

This paper explains the application of the net present value rule to actual investment scenarios. Examples are given of how the NPV rule can be used in actual machine production to help investors decide the best time to sell in a single or repeated investment scenario and thereby maximize the benefits. NPV and yield to maturity are used as reference standards to compare three different types of bonds: coupon bonds, zero-coupon bonds, and perpetual bonds. In addition, the paper discusses the impact of monetary policy changes on NPV in the U.S. and Chinese financial markets, as well as changes in investor income and investment behavior under the influence of the COVID-19 pandemic. The paper also summarizes the irrational factors that influence investors' decisions: for example, the uncertainty of the required information, the complexity of mental activities and the different emotional intelligence of different investors. The study concludes that investors should choose investment options with large NPV values and avoid some irrational factors. Investors should apply a combination of different methods to make investment decisions to complement their strengths and weaknesses.

Keywords-component; NPV rule; COVID-19; bond; investment decision

1. INTRODUCTION

The present value of future cash flows is discounted by the opportunity cost of capital minus the initial investment under the net present value rule. If NPV is positive, it indicates that the discounted value of all future cash flows associated with the project or investment will be positive and hence appealing. In general, the bigger the NPV, the better the investment's future return. The market interest rate, the projected minimum rate of return on investment, and the business's average cost of capital are the major factors in calculating the discount rate. For most financial analysts, net present value (also known as NPV) is the instrument of choice [1]. The inherent type of valuation is net present value analysis. It is commonly used in financial analysis and accounting by investors to estimate the worth of firms, investment opportunities, capital projects, new enterprises, and cost-cutting strategies.

This strategy can be applied to practically any problem involving future financial flows.

The present discounted value of all future cash inflows minus the cash outflows in the first period (purchase price, implementation costs, initial investment amount) and any projected further expenditures over the project's life is calculated as the net present value of all future cash inflows minus the cash outflows in the first period (purchase price, implementation costs, initial investment amount) and any projected further expenditures over the project's life.

A positive net present value is achieved when the present value of predicted future cash inflows exceeds the present value of projected future cash withdrawals. With a positive NPV, we can assume that a project or investment is lucrative. Because the rate of return is lower than the discount rate, if the NPV is less than zero, the project does not add to the business's profitability. A negative NPV, on the other hand, does not always imply that the project will lose money. It could be useful for calculating accounting profit and net income [2].

We utilize net present value (NPV) to calculate the profitability of a similar capital project in real life over the best suited investment horizon.

The NPV is a metric that has three major alternatives.

Table.1 THREE MAJOR ALTERNATIVES OF NPV

<i>NPV>0</i>	The project is profitable	Investors should pursue the project.
<i>NPV<0</i>	The project is not profitable	Investors should reject the project.
<i>NPV=0</i>	The project will neither gain nor lose value.	Investors need to consider other factors to help them make further decisions.

2. THE APPLICATION OF NPV RULE --- OPTIMAL MACHINE LIFE

2.1. Determine Optimal Machine Life Exploiting NPV rule

Suppose that a company plans to operate a single machine on a project to produce its output. The purchase of the machine is 300 dollars. Technically, the machine lasts 3 years and would yield a cash inflow of 200 each year. The cost of maintenance increases with the age of machine. These costs are shown in the table below, along with the salvage values. In order to maximize the value of the project, the company needs to consider whether to keep the machine or not at each point in time. Assume a constant discount rate of 10%.

Table.2 THE MAINTENANCE COSTS AND SALVAGE VALUE OF MACHINE

	<i>t1</i>	<i>t2</i>	<i>t3</i>
Maintenance costs	35	65	125
Salvage value	240	165	114

What is the optimal machine life if the project can be repeated once through the replacement by an identical machine with same price, cash-flows, maintenance costs and salvage values?

It is better to use backward induction to solve this problem. So, we need to calculate cycle 2 first. By using the NPV formula, we calculated the value of NPV for each period of the second investment (The results are shown in the table below).

Table.3 THE CASH FLOW AND NPV OF CYCLE 2ND

<i>LIFE</i>	<i>T0</i>	<i>T1</i>	<i>T2</i>	<i>T3</i>	<i>NPV</i>
T=1	-300	405			68.18
T=2	-300	165	300		97.93
T=3	-300	165	135	189	103.57

According to Table.2, we can see that the maximum value of NPV is 103.57, then we need to add the value to the last period of cycle 1 and recalculate the value of NPV for each period (The results are shown in the table below).

Table.4 THE CASH FLOW AND NPV OF ENTIRE LIFE

<i>LIFE</i>	<i>T0</i>	<i>T1</i>	<i>T2</i>	<i>T3</i>	<i>NPV</i>
T=1	-300	508.57			162.34
T=2	-300	165	403.57		133.53
T=3	-300	165	135	292.57	131.38

According to Table.3, we can see that when T=1, the value of NPV is maximum. So, a machine life of T1 is optimal.

2.2. Two Competing Opportunity Cost

In fact, according to table.2, the value of NPV is maximum when t is equal to 3. So, a machine life of T3 is optimal. That is exactly the answer if the project can only be conducted once. Why are two optimal machine life different in the two instances? Why the difference in the number of investments can lead to a difference in the time a company holds a financial product? It is related to two competing opportunity cost.

In cycle 1, there is a trade off if the company continue holding the existing machine another period. If the company continue holding the existing machine another period, this will certainly result in a loss in discounting a new machine at market rates. The present value of the next investment cycle will decrease if the company defer the purchase of a new machine for one year. If the company decides to invest the next cycle, there will also be a loss of revenue that the current machine can generate in the next period and the profit generated by the current machine is different in different periods. The opportunity cost of cycle 1 is the greater one between the two costs. If the company keep the existing machine another period, they need to make sure the profit that they will receive in the future must surpass its opportunity cost. However, the opportunity cost of cycle 1 is greater than cycle 2 because the company have no replacement after cycle 2, so there is no trade off. The opportunity cost of cycle 2 is only the market rate. That is why the company need to hold the machine longer if the project can only be repeater once.

3. THE APPLICATION OF NPV RULE ON DIFFERENT FINANCIAL PRODUCTS--- BONDS

3.1. Global Bond Markets Background

Apart from the optimal machine life mentioned above, there are different financial products in financial markets. In recent years, bonds have become popular among investors.

According to global data, at the end of 2011, markets for global bond had reached \$83 trillion, which was nearly triple the \$30 trillion in 2001 [3]. The size of global bond markets is growing rapidly and becoming a principal element which has an impact on the GDP growth of country. So, investors are inclined to choose to invest bonds with many benefits, including greater market liquidity and more stable earnings than stocks.

3.2. Calculate NPV and Yield to Maturity of Bonds with Different Methods of Interest Payments

Bonds have different methods of interest payments, such as coupon bond, perpetual bond, and zero-coupon bond. By calculating the yield to maturity and NPV of these three bonds, it can be concluded that different methods of interest payment with the same current price and discount rate will lead to different yield to maturity and NPV, thereby helping investors make investment decisions.

3.2.1. The NPV and Yield to Maturity of Coupon Bond

Coupon bond is the bond with regular interest payment and the entire payment of principal occurs at maturity.

The NPV of coupon bond can be written as follows,

$$NPV = -P + \sum_{t=1}^n \frac{C}{(1+r)^t} + \frac{M}{(1+r)^n} \quad (1)$$

Where, P is current price, M is face value, r is discount rate, and C is coupon value, which multiply coupon rate by face value.

The yield to maturity y_2 of coupon bond can be written as follows,

$$P = \sum_{t=1}^n \frac{C}{(1+y_1)^t} + \frac{M}{(1+y_1)^n} \quad (2)$$

Suppose there is a liquid bond A in the market

Bond A: Face value=\$1000, current price=\$800, coupon rate=7%, maturity= 5 years. And the bond will be held to maturity.

Assume a constant discount rate of 7%.

So, we could know,

$$\begin{aligned} NPV &= -800 + \sum_{t=1}^5 \frac{1000 \times 7\%}{(1+7\%)^t} + \frac{1000}{(1+7\%)^5} \\ &= 200 \\ 800 &= \sum_{t=1}^5 \frac{1000 \times 7\%}{(1+y_1)^t} + \frac{1000}{(1+y_1)^5} \end{aligned}$$

We obtain NPV is 200 and y_1 is 12.64%, which means in this condition, coupon bond has a positive NPV and yield higher than market discount rate. So, we can choose to invest it.

3.2.2. The NPV and Yield of Perpetual Bond

Perpetual bond is the bond without maturity, but with regular interest payment.

The NPV of perpetual bond can be written as follows:

$$NPV = -P + \frac{C}{r} \quad (3)$$

The yield y_2 of perpetual bond can be written as follows:

$$\begin{aligned} P &= \frac{C}{(1+\frac{y_2}{f})} + \frac{C}{(1+\frac{y_2}{f})^2} + \dots + \frac{C}{(1+\frac{y_2}{f})^q} + \dots = \\ &= \frac{C}{f} \lim_{q \rightarrow \infty} \frac{\frac{1}{(1+\frac{y_2}{f})} + \frac{1}{(1+\frac{y_2}{f})^2} + \dots}{1 - \frac{1}{1+\frac{y_2}{f}}} = \frac{C}{y_2} \end{aligned} \quad (4)$$

So, in the same conditions but without maturity,

$$\begin{aligned} NPV &= -800 + \frac{1000 \times 7\%}{7\%} = 200 \\ 800 &= \frac{1000 \times 7\%}{y_2} \end{aligned}$$

We obtain NPV is 200 and y_2 is 8.75%, which means in this condition, perpetual bond has a positive NPV and yield higher than market discount rate. So, we can choose to invest it.

3.2.3. The NPV and Yield to Maturity of Zero-Coupon Bond

Zero-coupon bond is the bond without any cash flow before maturity and the entire payment of principal occurs at maturity.

The NPV of zero-coupon bond can be written as follows,

$$NPV = -P + \frac{M}{(1+r)^n} \quad (5)$$

The yield of maturity y_3 of zero-coupon bond can be written as follows,

$$P = \frac{M}{(1+y_3)^n} \quad (6)$$

So, in the same conditions but coupon rate is 0,

$$NPV = -800 + \frac{1000}{(1+7\%)^5} = -87.01$$

$$800 = \frac{1000}{(1 + y_3)^5}$$

We obtain NPV is -87.01 and y_3 is 4.56%, which means in this condition, zero-coupon bond has a negative NPV and yield lower than market discount rate. So, we cannot choose to invest it.

3.3. Compare Three Bonds

Table.5 NPV AND YIELD OF THREE BONDS

	<i>Coupon bond</i>	<i>perpetual bond</i>	<i>zero coupon bond</i>
NPV	200	200	-87.01
YIELD	12.64%	8.75%	4.56%

According to Table.4, we could find coupon bond and perpetual bond have the same positive NPV (200), but coupon bond has the higher yield (12.64%). And zero-coupon bond both has the lowest negative NPV (-87.01) and yield to maturity (4.56%), which is lower than discount rate. The results indicate that investors should not choose to invest zero-coupon bond in the same conditions. It is hard to compare coupon bond with perpetual bond if we only compare NPV, so we also calculate yield of each bond. Obviously, we should choose to invest bond with higher yield, that is coupon bond. We hypothesize that investors always consider three factors when they choose which project to invest in-- liquidity, earnings and risk. When bonds have same liquidity, yield reflects only earnings and NPV considers both earnings and risk. So, investing which bond depends on investors how to weight earnings and risk. In the outcomes of this paper, investing installment bond is a better choice for investors being more sensitivity to risks. Conversely, if investors pay more attention to their profits and are less sensitivity to risks, they are supposed to invest discount bond to gain more benefits.

4. THE IMPACT OF COVID-19 ON FINANCIAL MARKETS AND OTHER FACTORS IN INVESTORS' DECISIONS

4.1. Changeable financial market during the COVID-19

At the earliest stage of the COVID-19 crisis, financial market was in turmoil.

In 2020, COVID-19 broke out and spread globally, causing a serious impact on financial markets. Volatility in financial markets has spiked significantly, and the market has also seen a rare phenomenon of risk assets and safe-haven assets falling in tandem.

According to existing data, we can see volatility of financial market began to raise remarkably at the end of February 2020 and reached the highest point in the middle of March 2020[4]. Then there was a gradual declining trend. Even though the stability was restored after July 2020, the volatility of overall financial market was still higher than the levels common before the COVID pandemic.

The results indicated that COVID-19 pandemic had a negative impact on financial market, and made a continuous influence on future conditions. It also made long-term uncertainties of market increasing, leading to an unstable market. Governments have taken many policies to ease off the influences COVID-19 pandemic brought. The main reason for this was the unanticipated spread of COVID-19 in many countries, which caused a change in investors' risk appetite and expectations and triggered a liquidity run on financial markets. The spread of the epidemic has created fears of a recession and a financial systemic outbreak. Using the plunge in crude oil as a trigger, global financial markets experienced a liquidity crisis, increasing the plunge in U.S. stocks.

4.1.1. China Monetary Policy

Since the beginning of the crisis, the People's Bank of China has cut interest rates several times. The one-year rate fell from 4.05% to 3.85%, while the five-year rate fell from 4.75% to 4.65%. The reduction in the one-year medium-term lending facility brought the rate on the facility down to 2.95 percent from 3.25 percent and the rate on the targeted medium-term loan facility (TMLF), a lending program designed to help struggling economies, down to 2.95 percent from 3.15 percent. China conducted a number of repo operations during the epidemic. As of June 11, 2020, the key financial institution injected approximately \$650 billion of liquidity into the economy through repo operations and medium-term lending facilities. In addition, the PBOC also increased lending, mainly to SMEs and the rural sector, through a \$254 billion refinancing and rediscounting center.

On May 22, 2020, the Chinese authorities announced a RMB 3.6 trillion stimulus package, which also included investments in nearby governments to prevent the unfolding of COVID-19 and tax cuts for business enterprises. Since then, Beijing issued unique treasury bonds for the first time in 2007, while increasing restrictions on unique bonds that may be issued by nearby governments [5].

Since the outbreak of the epidemic, the central bank has arranged 300 billion yuan of special refinancing, 500 billion yuan of refinancing and rediscounting lines, 1 trillion yuan of refinancing and rediscounting lines, a total of 1.8 trillion yuan. In line with the implementation of the policy, the central bank in the first quarter in the MPA set up a "relending use" assessment indicator, to

guide local corporate banks to better use the new re-lending and re-discounting quota, the issuance of small and medium-sized micro enterprises preferential interest rate loans.

4.1.2. U.S. Monetary Policy

The Fed has adopted three types of stimuluses, interest rate cuts, loans and asset purchases, and changes in regulations.

Through loans and asset purchases, the Fed created lines of credit, created special purpose vehicles (SPVs), and made general purchases as part of quantitative easing (QE) and repo operations. While fueling the epidemic response and stabilizing the U.S. economy, it also led to a rapid expansion of the Fed's asset size, rapid growth in base money and broad money M2, and a prominent inflationary problem.

The Fed lowered the federal funds rate twice, 0.50% and 1.00%.

On March 15, 2020, the Fed also lowered its discount rate (another key rate) to 0.25%. The Fed has not raised rates in increments greater than 0.25 percent since it lowered rates during the Great Recession [6].

Along with the adjustment of quantitative monetary policy tools, the Fed also released information on the adjustment of price-based monetary policy tools. the December 2021 Fed FOMC meeting acknowledged that inflation had exceeded the 2% target for some time and explicitly adjusted the Taper in a timely manner in response to U.S. inflation and employment.

4.1.3. The Impact of Monetary Policies on Market and NPV

In terms of monetary policy, China's central bank is used to provide sufficient liquidity to ensure the stable operation of the economy through measures such as lowering deposit reserves and providing medium-term and short-term lending facilities. At the same time, the central bank continues to take some targeted credit support measures but also to prevent financial easing measures such as preferential interest rates and online financing from being abused without restrictions.

The tightening of the Fed's monetary policy helps to curb inflation to some extent. This is mainly due to the fact that high inflation in the U.S. is influenced by a combination of increased money supply, increased demand and blocked supply. The current increase in demand no longer continues, and the tightening of monetary policy reduce money supply to depress inflation, but the role of monetary policy as an aggregate demand management policy in regulating increased

supply is relatively weak, so the monetary policy may not completely curb inflation.

These policies and data show that governments are going to promote economic recovery by focusing on encouraging investments and development of small and medium-sized enterprises. At the same time, apparently, all these financial policies have turned market discount rate down. It would have an effect on NPV of investment projects. Provided that other conditions are invariant, the lower the market discount rate, the higher the NPV. Higher NPV may attract investors to invest, which will promote economic recovery.

4.2. The Impact of Market Changing on Investors

4.2.1. The Impact on Investors Income

Since the outbreak of COVID-19, global economy has been in a serious recession. Companies were unable to resume work in time. Large enterprises started mass layoffs because of the lack of capital, while small and medium-sized enterprises were stuck in stagnation and even bankruptcy due to broken capital chain. So, the average unemployment rate raised remarkably. From 2020 data, the weighted average employment rate for the ten Latin American countries decreased by almost 9 percentage from the first quarter of 2020 to the second quarter of 2020 [7]. It led to a decline in labor income [7], which made investors and potential investors income drop. Falling income was reflected in dramatic reducing cash flow in market. Some financial products and investment projects influenced by falling cash flow could not continue operating, resulting in being beset with a crisis of investment market.

4.2.2. The Impact on Investors Investment Behavior

Baldwin analyzes the expectation shock, which causes economic agents to adopt a "wait-and-see" approach. It is universal, according to the author, amid economic climates marked by uncertainty, because investors lose faith in the financial markets [8]. And with the cash flow in financial market decreases, NPV would be lower. By this way, investors are inclined to invest less in financial market in despite of being in a position to encourage investments. But with the growth of small and medium-sized enterprises, more and more investors will be affected by governments policies, turning their savings into investments. It proposes that financial market after experiencing depression for a while, it will attract more investors and there is a growing tendency among the sizes of investments.

4.3. Other Contributing Factors For Investment Decision

4.3.1. Irrational Factors on Investment Decision

The magnitude of risk depends mainly on the subjective probability and the value of profit and loss. Each investor can get some useful information and make predictions accordingly, but no investor can guarantee the accuracy of his predictions, so his investment behavior is always full of risks. The uncertainties in our investment decisions are mainly in the following two areas:

1. Uncertainty of the required information

Information is the basic condition for decision makers to make decisions. Investment requires a large amount of information, and the necessary screening, classification, identification, interpretation and other work. Uncertainty of information refers to the uncertainty of the authenticity of information and sources of information. The information sources can be divided into two aspects, namely, public information sources and non-public information sources. The former is the information publicly disclosed by formal communication media in accordance with relevant regulations in China, which is provided and released by listed companies, market regulators or relevant government agencies.

2. The complexity of mental activities of investment subjects increases the uncertainty of decision making

As mentioned above, decision makers as living subjects with thinking, feeling and personality are constantly collecting, selecting and interpreting information, and deciding what action to take based on the analysis, evaluation and weighing of various situations. Differences in personal factors such as environment, habits, knowledge, thinking, attitudes and personality can lead to different investors searching for and using information. Different investors search for and use different information, and even though they have the same intelligent mind and the same tenacious personality, some buy and some sell on the same stock at the same time. In the process of stock investment, individual psychological factors have an important influence on the decision. Here we discuss the following factors.

First, the limited nature of human rationality increases the uncertainty of decision making. Man is a rational animal, but his rationality is limited. The psychologist Simon, after examining the actual decision-making behavior of human beings, believes that human rationality is limited.

Second, the different frames of risk preferences lead to different decisions. Investors' attitudes toward risk are different, depending on their economic strength, cultural literacy, and knowledge of stock price times, especially their values.

Third, people's biases in probability judgments also increase uncertainty. Investors' probability judgments about the nature of decision outcomes are often biased by motivation and emotion. Optimists and those who actively pursue success are prone to overestimate the probability of a positive outcome and underestimate the probability of a negative outcome, while pessimists and those with a motivation to avoid failure tend to do the opposite of the former. In addition, studies have found that people often overestimate the likelihood of low-probability events and underestimate the likelihood of high-probability events. [9]

And research also indicates that emotional intelligence can improve individual's confidence level [10]. And emotional intelligence is the determinant factor for investment decision [11]. It means emotional intelligence will determine whether investors make optimal investment decision or not. Simultaneously, investors with higher emotional intelligence will have stronger self-awareness, which is helpful to make optimal investment decision [12]. We can conclude that investors with higher emotional intelligence have the greater possibility of making optimal and successful investment decision [13].

5. DISCUSSION

The NPV rule is not infallible, it also has its own advantages and limitations

Net Present Value Advantages:

a). Use of cash flow. The company can directly use the cash flow obtained from the project, in contrast to profit, which contains many artificial factors. In capital budgeting profit is not equal to cash.

b). NPV includes all the cash flows of the project, other capital budgeting methods tend to ignore the cash flows after a specific period. Such as the payback period method.

c). The net present value of cash flows are reasonably discounted, some methods tend to ignore the time value of money when dealing with cash flows. Such as the payback period method, accounting rate of return method.

Net present value disadvantages:

a) The determination of the discount rate is difficult, and the use of the NPV rule must first determine a benchmark rate of return that is consistent with economic reality. The difficulty in determining this rate is compounded by the fact that interest rates in the capital markets change frequently, especially in unstable economic conditions. In the same case, if the investment risk is to be considered, the required risk-reward rate is not easily determined.

- b) Not applicable to the decision of comparing independent investment options. In the comparison of independent investment options, the NPV of a project is large, but the required investment is also large and the profitability is low. And the project is not mutually exclusive with other projects, and only applies to the evaluation of mutually exclusive programs. So, the decision cannot be based on the size of NPV alone.
- c) NPV is sometimes not a direct decision for mutually exclusive investment projects with different lifetimes. In mutually exclusive programs, the financial NPV must carefully consider the life of mutually exclusive programs. One project has a small NPV, but its life is short; the other project has a large NPV, but a long life. These two projects have different lifetimes, and the NPVs are not comparable. In order to use the NPV method to make decisions about investment options with different lifetimes, a contemporaneous analysis period must be constructed in order to compare the options.
- d) The NPV method describes the total profit and loss of the input project, but fails to describe the benefit status of each unit of input, i.e., the actual input rate of return of the input project itself. This can result in input planning that focuses on projects with large inputs and large benefits while ignoring better input solutions with small inputs, small benefits, and high input payoffs.

In addition to the NPV rule there are other methods that can be used for investment decisions.

a) IRR (International Rate of Return)

IRR is a commonly used indicator in the industry today because it takes into account the Time Value of Capital (Time Value), which is a very important concept in the financial field. IRR is the sum of the present value of each cash flow over a certain period of time so that the sum of the cash flows is equal to zero, i.e., the net present value is zero ($NPV=0$). And the IRR rule is that investors should accept projects when IRR of project is higher than market discount rate and reject projects when IRR is lower than discount rate. In the calculation of IRR, to make the NPV zero, there must be cash outflow and cash inflow, and the first one must be cash outflow, otherwise the result cannot be obtained. For the purpose of calculating IRR, the fair value of the project is often used as the cash inflow. In addition, there are multiple values of IRR, which are divided into Growth IRR and Net IRR. the calculation of Net IRR will exclude fund-related cash flows such as fund management fees and fund excess returns, while the calculation of Growth IRR will take all of them into account.

The advantages of using IRR to measure fund performance are: firstly, IRR takes into account the time

value and considers the cash flow of the fund throughout its life cycle, compounding interest and reducing the volatility of returns. Secondly, the fund has more cash outflows in the early period and more cash inflows in the later period, and using IRR will make the return converge to the true return. Finally, the longer the period for calculating IRR, the more stable the result is, which means that there is less deviation between the result of the current period of calculation and the final fund return.

b) MOC (Multiple of Capital Contributed)

There are two types of MOC: Realized MOC and Unrealized MOC. When the project is not exited, MOC refers to Unrealized MOC, which refers to the ratio of the current fair value of the business to the cost of the investment. MOC is a static indicator that should be used in conjunction with IRR to better measure the level of return on investment. In fact, the industry is also doing so, so there are many MOC and IRR quick checklist for use, according to the MOC and investment time can easily find out the IRR. but MOC does not take into account the time value of capital, which is his biggest problem.

c) DPI (Distribution over Paid-In)

In the early stages of a fund's life cycle, when there are no project exits, most of the income from projects is distributed. DPI can be used to measure fund performance. DPI refers to the ratio between distribution and paid-in capital of a project, and this indicator is a better indicator of cash return. Where Distribution refers to the fund's distributions, including cash distributions and stock distributions which includes the fund's share of costs and management fees that have been invested. Paid-in capital distribution ratio equals to 1 is the break-even point, which means the cost has been recouped; greater than 1 indicates that the investor gets excess return; less than 1 indicates that not all costs have been recovered; and DPI equals to 0 if there is no any distribution.

6. CONCLUSION

The main objective of our research paper is to investigate how NPV can help investors make investment decisions and the impact of monetary policy changes on NPV and investment decisions during the COVID-19 epidemic. We give two examples of solving NPV problems to illustrate how NPV can be used to select investment projects and to show that investors can make decisions by comparing the rates of return of projects when different projects have the same NPV. We build on previous research to analyze the negative impact of COVID-19 on financial markets, the government policies introduced in response to the shock, and the changes in investor behavior. In addition, we discuss other irrational influences on investment decisions.

The study proposes that investors should choose the project with higher NPV among different projects to

invest in. When the projects such as bonds, have the same NPV, we can make investment decisions by comparing their yield to maturity.

The literature also suggests that in countries facing economic crises, investors should not have too much fear of investment and risk. After the government has introduced policies that are favorable to economic recovery, investors can consider investing in some low-risk projects. In addition, it is helpful for investors to have high emotional intelligence, which will increase the probability of successful investment decisions. Then, the uncertainty of information, irrationally emotional, psychological, and behavioral factors of investors can also lead to wrong investment decisions. Investors should be aware of these risk factors in order to make the best investment decisions.

Admittedly, the net present value rule is not infallible. In the discussion, we discuss the advantages and limitations of using the NPV rule for investment decisions and introduce other investment decision methods such as IRR, MOC, DPI.

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