Middle-East Journal of Scientific Research 21 (9): 1605-1610, 2014
ISSN 1990-9233

DOI: 10.5829/idosi.mejsr.2014.21.09.21741

A New Way to Increase the Company Value

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Abstract: One of the modern postulates of financial management says that "the aim of a commercial company is the maximization of its value." A company must use special financial indicators to monitor the achievement of this aim. Let's focus on the activity of companies making real investments. When "Capital Budgeting" (by Joel Dean) was published in 1951, net present value (NPV) and later internal rate of return (IRR) became popular in the evaluation of efficiency of real investments. The time has come to offer a new indicator that will allow us to achieve great results. This article shows the benefits of its use.

Key words: NPV · IRR · NCF · IS · Company value

INTRODUCTION

Methods evaluating the efficiency of real investments imply the estimation of NPV and IRR as a final evaluation in the world today [1, 3, 9].

There is a number of other indicators to evaluate the efficiency of investments, however NPV and IRR are the most popular, which is confirmed by the studies carried out in the USA, Australia, China, Great Britain, Canada and the Netherlands [2, 10].

So, NPV "runs the show" and it seems that it is no use having further discussions in this area, since there is nothing better than NPV. Let us note that specialists often give in to temptation to criticize NPV for not solving all problems at once, for not being a panacea for all ills. But this is not a problem of NPV, since it is impossible to choose the best investment project only on the basis of a financial indicator.

Risks and many other (non-financial) components should be taken into account in order to make a correct choice of the best investment project. But finally, after we have selected several alternative projects that are comparable in terms of risks and other non-financial characteristics, we should use a financial indicator to choose the best alternative.

A well-known formula is used to estimate NPV:

$$NPV = \sum_{t=0}^{n} \frac{NCF_t}{(1+k)^t}, \quad (1)$$

where

- k - a discount rate;
- NCF_t - elements of net cash flow (negative, null or positive);
- t - a certain period of time;
- n - a period to implement an investment project.

IRR is equal to such a value of the discount rate in formula (1), at which NPV=0. Today any investment project can be implemented by different methods. For example, we can buy equipment made by a Chinese or a European manufacturer in order to produce siding. The former will be cheap, with a short service life and high operation expenses. The latter will be expensive, with a long service life and low operation expenses [1].

Thus, these alternative investment projects differ in three main economic parameters: terms of implementation, investment amounts and periodic results. Let's call these alternatives "different parametric." Let's show that IRR and NPV are not applicable in the comparison of efficiency of different parametric investment projects [2].

Criticism of IRR, NPV, Description of IS: Some projects cannot be compared on the basis of IRR, since there may be no IRR or it can have several values. There are situations, when IRR is in conflict with NPV. There is no IRR for NCF= 1,000, -2,505, 1,400, 700, -490 thousand dollars (at the increments of 0, 1, 2, 3, 4, respectively). And if we somewhat change these numbers and set

*This article was prepared by the grant No. 14-12-54007 issued by the Russian Humanitarian Scientific Fund
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the values of NCF= 1,000, -2,505, 1,320, 700, -490 thousand dollars, we'll have two values of IRR: 15% and 28.2% [3].

IRR is in conflict with NPV in comparing project E and project F that have the following cash flows: NCF^E=-250, 100, 100, 100, 100 thousand dollars; NCF^F=-250, 50, 50, 150, 175 thousand dollars. With k=10%, we have NPV^E=67 thousand dollars, which is less than NPV^F=69 thousand dollars, hence project B is more profitable. But IRR gives an opposite estimate: IRR^E=22%, which is more than IRR^F=20%, hence project F seems to be more profitable [4].

Let us compare project G, whose NCF^G= -100, 59, 64 thousand dollars, with project H, whose NCF^H= -150, 62, 64, 66 thousand dollars. Let us accept that an investor comparing G and H has 100 thousand dollars and he can raise 50 thousand dollars more at the same rate (i.e., k=10% both for G and H). With these data, NPV^G= 6.53 thousand dollars and NPV^H= 8.84 thousand dollars and it seems that project H is more profitable [5].

However the reality is that project G is more profitable for this investor. Let's prove it as follows. If we divide NCF^H by the investor's cash flow ($NCF^H_{investor}$) and the partner's cash flow ($NCF^H_{partner}$) proportionately to their contributions (100/150 - the investor's share, 50/150 - the partner's share), we'll have $NCF^H_{investor}$ = -100, 41.3, 42.7, 44 thousand dollars, $NCF^H_{partner}$= -50, 20.7, 21.3, 22 thousand dollars. The efficiency indicators will have the following values: $NPV^H_{investor}$ = 5.9 thousand dollars, $NPV^H_{partner}$= 2,95 thousand dollars. Thus, launching project H and rejecting project G, the investor chooses the worse alternative: he receives less NPV (the total amount is 6.53-5.9=0.63 thousand dollars), but waits for results one year longer.

This confusion with projects G and H can be avoided, if we use the "specific value growth speed index" (IS) [4]:

$$IS = \frac{NPV}{n \times I}, \qquad (2)$$

where I - a total amount of investments made at the current moment of time.

The formula is described in this way for the ordinary cash flow. According to the idea implied in IS, the alternative with the largest indicator is the most profitable one among several different parametric alternatives. This indicator combines two principles: "faster" and "more" and shows the amount of rubles of NPV, that are annually obtained per each invested ruble (rub./rub. per year). The project is not efficient, if IS is negative [6].

This indicator will have the following values for projects G and H:

$$IS^G = \frac{6.53\,thousand\ dollars}{2\,years \times 100\,thousand\ dollars} = 0.0327\,dollars/dollars\ per\ year, \qquad (3)$$

$$IS^H = \frac{8.84\,thousand\ dollars}{3\,years \times 150\,thousand\ dollars} = 0.0197\,dollars/dollars\ par\ year, \qquad (4)$$

Comparing these results, we come to a conclusion that project G is more profitable, i.e. IS has given accurate information. Let us draw your attention to the fact that there is a conflict between NPV and IS in the comparison of these alternatives.

Let us call negative elements of NCF "outflows" and denote them COF_t. Let us call positive (and null) elements of NCF "inflows" and denote them CIF_t. Thus, the formula of IS for the analysis of the non-ordinary cash flow is as follows:

$$IS = \frac{NPV}{n \times \sum_{t=0}^{n} \frac{COF_t}{(1+k)^t}}, \qquad (5)$$

We believe that IS rather than NPV should be used to compare the efficiency of different parametric alternatives. However, the above "internal" logic of IS is not convincing for all theoreticians and practicians. That's why we are going to substantiate that it is necessary to use this indicator by means of a business game.

Investment Projects: Let the players choose projects from the alternatives described in Table 1. The pair of projects W and X are long-term projects, the pair of projects Y and Z are short-term projects. There is a conflict between NPV and IS in each pair: project X is more profitable according to NPV and project W is more profitable according to IS. Project Z is more profitable according to NPV and project Y is more profitable according to IS in the other pair. Project X has the highest value of NPV, project Y has the highest value of IS in all these four projects [7].

Game Rules:

Players: Two teams of 6 players in each team take part in the game, each player having 200 thousand dollars. The players act rationally, maximizing their own profit.

Table 1: Characteristics of alternative investment projects

		Moment (project increment)				
	Indicator	0	1	2	3	4
1.	Discount rate (k)	10%	10%	10%	10%	10%
2.	PVIF	1	0.91	0.83	0.75	0.68
	Project W					
3.	NCF^W, thousand dollars.	-200	55	65	75	85
4.	$DNCF^W$, thousand dollars.	-200	50	54	56	58
5.	NPV^W, thousand dollars.	18.1				
6.	IS^W, dollars/dollars per year	0.0227				
	Project X					
7.	NCF^X, thousand dollars.	-400	145	135	125	125
8.	$DNCF^X$, thousand dollars.	-400	132	112	94	85
9.	NPV^X, thousand dollars.	22.7				
10.	IS^X, dollars/dollars per year	0.0142				
	Project Y					
11.	NCF^Y, thousand dollars.	-100	70	60		
12.	$DNCF^Y$, thousand dollars.	-100	64	50		
13.	NPV^Y, thousand dollars.	13.2				
14.	IS^Y, dollars/dollars per year	0.0661				
	Project Z					
15.	NCF^Z, thousand dollars.	-200	130	120		
16.	$DNCF^Z$, thousand dollars.	-200	118	99		
17.	NPV^Z, thousand dollars.	17.4				
18.	IS^Z, dollars/dollars per year	0.0434				

Win Condition: The game has three rounds, each consisting of four years. The team, that has the maximum value of assets at the end of a certain period, wins. In other words, the team, that has an investment portfolio with the highest value, wins [8].

Characteristics of Investment Projects: All investment projects start at the current moment and have an ordinary NCF. The projects are described with the breakdown by years. The amounts of money are released at the ends of the years and are immediately invested in the projects that are available on the market at the moment. Let us accept that the players annually have the same set of projects given in Table 1. The projects cannot be divided, i.e. it is not possible to finance, for example, 60% of the required amount of investments at the current moment and 40% at the following moment (i.e., in a year).

Project Selection Criterion: The first team makes its choice on the basis of NPV ("the NPV team"), the second team makes its choice on the basis of IS ("the IS team") [9].

Rules to Form the Portfolio of Projects: A team, forming its portfolio of projects, can include an unlimited number of projects of the same type in it (for example, 5 projects of type W). The other team can include in its portfolio an unlimited number of projects of the same type as the first team (for example, 3 projects of type W). The money that the team cannot invest in a project are given to third persons for a year with the return rate that is equal to the discount rate (in this game it is 10% per annum) [10].

Cooperation of Players: The players can cooperate (combine their capitals) within the team as they like. Players of one team cannot cooperate with players of the other team. Players of one team do not redistribute the win of the team between themselves.

Informedness of Players: All players of both teams have the same complete information about the investment projects at the same time.

Limits on the Amount of Investments: The players cannot take out loans or raise money in any way other than the use of income from the projects financed by them.

Algorithm to Form an Investment Portfolio: In accordance with the specified game rules (that reflect the behavior of firms in the market economy), the investment portfolio will be formed in two stages. Let us accept that all projects, that the team can finance, form a certain finite multitude. Let us call it the A-multitude. We rank the A-multitude by the decrease of the efficiency indicator (one team does it on the basis of IS, the other team - on the basis of NPV). After that the teams can start forming their investment portfolios.

Stage A: We choose the maximum number of projects from the A-multitude in such a way that:

$$L^A = Inv - \sum_{a=1}^{p} I_a^A \rightarrow \min, \quad (6)$$

- L^A - the team's money balance, after all possible projects are included in the portfolio at stage A;
- a - the rank of the project in the A-multitude;
- I_a^A - the amount of investments in the project with rank a, that is included in the portfolio at stage A (A-project);
- Inv - the amount of the team's money;
- p - the number of projects that were included in the portfolio at stage A (an endogenous value).

If $L^A=0$, the portfolio is optimal, otherwise the portfolio formation should be continued, with the principle of project selection being changed (stage B should be implemented).

Stage B: "The best of the available" was selected at stage A, "the best of the suitable" will be selected at stage B. Projects are selected from the remaining part of the A-multitude (after stage A), the amount of investments of which is not more than the money balance after stage A, i.e. $I^B = L^A$. These projects form the B-multitude. We rank this multitude by the decrease of the indicator. We select the maximum number of the first projects from the B-multitude such that:

$$L^B = L^A - \sum_{b=1}^{q} I_b^B \rightarrow \min, \quad (7)$$

- L^B - the money balance (in the economy or in the company) after all possible projects are included in the portfolio at stage B;
- b - the rank of the project in the B-multitude;
- I_b^B - the amount of investments in the project with rank b, that is included in the portfolio at stage B (the B-project);
- q - the number of projects that were included in the portfolio at stage B (an endogenous value).

The obtained portfolio is conditionally optimal, let's explain that. Let us accept that the projects remaining after stages A and B form the C-multitude. In some cases it can be found out that there is a project in the C-multitude, the substitution of which into the portfolio instead of the B-project that was included in it will increase the efficiency of the whole portfolio. It is also possible that the combination of several projects from the C-multitude (or a combination of projects from the C-multitude and B-multitude) can be more efficient than the B-project (or than the combination of B-projects, or than the combination of B-projects and A-projects) that were included in the portfolio. Thus, even if $L^B=0$, the portfolio cannot be recognised to be optimal without additional studies.

Game

Let's Start the Game: Table 2 gives results of the NPV team, Table 3 gives results of the IS team.

Table 2: Financial results of the NPV team

No.	Investment project	Moment (project increment) 0	1	2	3	4	5	6	7	
1	3 projects X	-1,200	435	405	375	375				
2	Project X		-400	145	135	125				
3	One-year loan		-35	38.5						
4	Project X			-400	145	135				
5	Project Y			-100	70	60				
6	One-year loan			-88.5	97.4					
7	2 projects X				-800	290				
8	One-year loan				-22.4	24.6				
9	Total, NCF at the end of the 4-th year					1,010				
10	NCF (beyond the 4-th year)						876	710	575	335
11	DNCF (beyond the 4-th year) at the end of the 4-th year						796	587	432	229
12	Current value of the flow beyond the 4-th year					2,044				
13	Total, team assets value					3,053				

Table 3: Financial results of the IS team

		Moment (project increment)						
No.	Investment project	0	1	2	3	4	5	6
1	12 projects Y	-1,200	840	720				
2	8 projects Y		-800	560	480			
3	12 projects Y			-1,200	840	720		
4	One-year loan			-80	88			
5	14 projects Y				-1,400	980	840	
6	One-year loan				-8	8.8		
7	17 projects Y					-1,700	1,190	1,020
8	One-year loan					-8.8	9.7	
7	Total, NCF for the end of the 4-th year					1,709		
8	NCF (beyond the 4-th year)						2,040	1,020
9	DNCF (beyond the 4-th year) for the end of the 4-th year						1,854	843
10	Current value of the flow beyond the 4-th year					2,697		
11	Total, team assets value					4,406		

Let us explain the calculations given in Table 2. The NPV team at the current (null) moment chooses three projects X (line 1): it is the most profitable type of projects for this team (it has the highest value of NPV). These three projects give 145 thousand dollars each at the end of the 1st year, which makes it possible to launch one more project X (line 2) and to give the remaining 35 thousand dollars as a loan to a third person for a year with 10% per annum (line 3).

The NPV team has 588.5 thousand dollars at the end of the second year, due to which another project X (line 4) and project Y (line 5) can be financed and the remaining 88.5 thousand dollars can be given as a loan (line 6).

The NPV team receives 822.4 thousand dollars at the end of the third year, which is invested in two projects X (line 7) and the remaining 22.4 thousand dollars is given as a loan (line 8). Since we have accepted, that one round lasts four years, let's sum up the result for the end of the 4-th year. All investment projects give 1,010 thousand dollars at this moment (line 9). However several projects continue to give results for several 4years more (line 10) and we must determine the current value (at the end of the 4-th year) of these effects (line 11), in order to take them into account. The sum of these values (line 12) and the above income at the end of the 4-th year (line 9) form the result of the team (line 13). The value of assets of the NPV team at the end of the 4-th year is 3,053 thousand dollars.

Table 3 is drawn up in the same way, with the only difference being that project Y is the most profitable project for the IS team. The value of assets of the IS team at the end of the 4-th year is 4,406 thousand dollars (line 11). Thus, the NPV team loses to the IS team in the first round. Making more calculations, we can see that in the second round (at the end of the 8-th year) the assets of the NPV team cost 4,735 thousand dollars and those of the IS team cost 7,359 thousand dollars. The advantage of IS is even more obvious in the third round: at the end of the 12-th year the value of assets of the NPV team is 5,200 thousand dollars, the value of assets of the IS team is 10,566 thousand dollars.

Thus, the offered indicator (IS) helps make a more accurate choice of an investment project. The IS team increased the value of its companies two times within 12 years, in comparison with the result of the NPV team. A conclusion suggests itself that an economy, the subjects of which use IS instead of NPV, has an opportunity to develop at higher rates.

IS can be applied in any tasks related to the choice of an investment project or to the determination of economic characteristics of an investment project. Innovative developments imply the creation of projects, the characteristics of which differ from the existing analogs. Thus, an axiom can be accepted that the innovation efficiency analysis is aimed at the comparison of efficiency of different parametric alternatives. It was shown above that this task can be solved only with the use of IS. Algorithms to solve such tasks were earlier suggested by the author of this article [5].

The same indicator can be used instead of NPV in the evaluation of the public (global) efficiency of real investments [6]. Here different methods can be used to determine the public investments and profits, including methods of input-output analysis [7].

Surely IS is not a panacea, this indicator can be applied with all those reservations that are made in the use of NPV.

CONCLUSION

It is also possible that the combination of several projects from the C-multitude (or a combination of projects from the C-multitude and B-multitude) can be more efficient than the B-project (or than the combination of B-projects, or than the combination of B-projects and A-projects) that were included in the portfolio.

REFERENCES

1. Guide to Cost Benefit Analysis of Investment Projects. DG Regional Policy, European Commission, 2008.
2. Hermes, N., P. Smid and L. Yao, 2007. Capital budgeting practices: A comparative study of the Netherlands and China. International Business Review, 16: 630-654.
3. International Good Practice Guidance, 2013. Project and Investment Appraisal for Sustainable Value Creation. International Federation of Accountants.
4. Kogan, A.B., 2009. Analysis of methods to compare different-scale projects. Economic Analysis: Theory and Practice. No., 35(164): 52-56.
5. Kogan, A.B., 2010. Ways to determine economic characteristics of innovations. Siberian Financial School. No. 1, Novosibirsk: SAFBD, pp: 106-111.
6. Kogan, A.B., 2011. Integrated evaluation of efficiency of large-scale investment projects. Bulletin of Irkutsk State Technical University. No. 8, Irkutsk, pp: 211-215.
7. Kogan, A.B., 2013. Novations of evaluation of global efficiency of investments on the basis of the input-output model. Bulletin of Irkutsk State Technical University. No., 10(81): 299-308.
8. Rubinstein, M., 2003. Great moments in financial economics: I. Present value,Journal of Investment Management, 1(1): 45-54.
9. State of the Practice for Cost-effectiveness Analysis (CEA), Cost-Benefit analysis (CBA) and resource allocation, World Road Association (PIARC), 2012.
10. Truong, L.G., G. Partington and M. Peat, 2005. Cost of capital estimation and capital budgeting practice in Australia. Working Paper, University of Sydney. Sydney.