HOKKAIDO UNIVERSITY

Title	Interaction of Financing & Investment Decisions Through Transition
Author(s)	Shahzdah.Nayyar, JEHAN
Citation	ECONOMIC JOURNAL OF HOKKAIDO UNIVERSITY, 30, 47-54
Issue Date	2001
Doc URL	https://hdl.handle.net/2115/30606
Type	departmental bulletin paper
File Information	30_P47-54.pdf

Hokkaido University Collection of Scholarly and Academic Papers : HUSCAP

Econ. J. of Hokkaido Univ.,
Vol. 30 (2001), pp. 47～54

Interaction of Financing & Investment Decisions Through Transition

Shahzdah Nayyar JEHAN

This article looks into the interaction between the investment and financing decision-making through transition. First bringing into light the desirability of such an interaction between these two major areas of the finance activity; it looks into the efficacy or the otherwise of the conventional approaches to the investment evaluation. The article points out that the conventional approaches to investment evaluation either lack any reference to the such an interaction needed for optimal decision making or are inadequate to incorporate the financing side of the finance activity; thus regarding them as inadequate approaches to the investment evaluation. The article in the end suggests the use of the more recent and rather better equipped approaches to the investment evaluation that also take care of the interacting nature of the financing and investment decisions to allow the optimal decision-making.

1. Introduction

Consideration of organizational capital structure while deciding about capital investment projects necessarily means that we are making financing decision an integral part of the investment decisions. This integration of the financing and investment decisions has several important implications. As upcoming discussion will reveal, we shall see that this integration is not optional rather is important to make project investment decisions reflecting the true type of risk and return characteristics of each individual project. This is also the point mainly where this paper is going to bring out one of the important differences between the conventional approaches to investment evaluation and the new ones.

Capital structure can be defined as a firm's mix of different securities. A firm may have 100% equity in its capital structure or can have any other mix of debt and equity capital. The choice of the mix or the optimal mix forms part of the capital structure decision making as well as the investment decision of the firm. As this has an important impact on the investment evaluation decision making, so it seems pertinent to look into the interactions of the investment and financing aspects of an organizational decision making. This paper will,

first, bring out the importance of interaction between investment and financing decisions and, then will look into that how conventional and recent approaches to investment evaluation take care of this interactive decision making process.

2. Interdependence of Financing & Investment Decisions:

To start with, it seems appropriate to quote Erza Solomon (1955) about capital investment decisions, which states:

> the determination of a company's capital budget is an intricate process that requires several simultaneous decisions by management: the total extent of capital expenditures; the form these expenditures will take ; and the form of financing to be used in meeting these expenditures[1]

Here Solomon has referred to a simultaneous process of deciding about extent and form of capital expenditures being undertaken alongwith deciding that what form of financing will be used to meet these capital expenditures. So, for him capital investment decision is not separate from the investment decision. This is all right as we set side overly unrealistic assumptions made by MM theory and the school of thought flanking such theories which construe the theorem of separation of firm value from its financing mix. It is should be noted that a capital budgeting decision is an exchange of funds for tangible assets. As the goal of a firm can be described as to maximize the shareholder's wealth, it requires that this change must be profitable. To be profitable for the exchange, the return on the assets acquired must exceed the cost of the funds necessary to acquire the assets. Profitability cannot be ascertained without knowledge of the cost of the funds used to acquire the assets; as profitability is a function of the value added/deleted from the firm which in turn is the funclion of the cost of funds used up for the project.

While considering cost of capital, all implicit and explicit cost inflicted thereto must be considered. The explicit cost would be the nominal cost apparent on the face of the type of security or the source of fund used. Whereas implicit costs incurred may be the costs arising in connection with increased marginal funds costs which may alternatively be a result of changes in the financing mix of the organization. This implicit cost may be reflected either in the increase in the marginal capital acquisition costs or in increase in the cost of the existing funds. Any capital investment decision ignoring these implicit costs associated with acquisition of some project is likely to lead to sub-optimal investment decision. It will be because an inaccurate cutoff rate will be applied while evaluating the projects. It shows that the acceptance or rejection of any capital investment project is contingent upon the type and source of the funds

applied. It is also very much likely that the cost of additional funds needed to take up the project will not be equal to the cost of existing funds for the organization ; as additional funds are very likely to change the existing risk and return characteristics of the firm. The risk and return characteristics of the overall firm from the proposed project will differ as long the additional funds inducted for the purpose are going to alter the capital mix for the organization. This means that the capital mix and the risk return characteristics are interrelated. Gordon (1961) has treated extensively the relationship between an organization's business risk and the optimal capital mix.[2]

Elaborating further, it turns out that a firm's financing decision represents a choice between alternative sources of funds for financing its assets. Again this acquisition of funds is interrelated with the use of funds decision. Although traditional financing models like that of Solomon (1955) base evaluation decisions under an implicit assumption of a given investment decision or the policy. But, as it has been looked earlier that an effective and optimal financing decision is possible only when it is made in conjunction with the capital investment decision. This dependence between financing decision and the investment decision comes from the concept of dependence between the financial risk and the business risk. So, it seems advisable here to have a look into the dependence between financial and the business risks.

As business risk can be defined as the variability of net operating income before interest, similarly the financial risk for a business firm can be defined as variability of the after interest earnings. It should be noted that a popular contention about risk and return relationship is that a risk-averse investor requires higher return for the riskier investments and vice versa. This proposition has been joined by a number of financial researchers in addition to the MM in their risk-return deliberations.[3] This implies that capital budgeting projects with riskier returns have higher cost of capital associated with them. So, a minimum cost of capital devoid of any financial risk premium is basically based upon the business risk. It entails the contention that the amount of debt financing appropriate for a project is dependent upon the project's business risk and relative costs of debt and equity funds treated as functions of their business and financial risks respectively.

Having identified the interrelationship between the financing and investment decisions, now it is the time to look into that how the traditional CBTs were able to deal with the financing and in what way the capital structure was incorporated in their treatment of capital investment evaluation situations. It should be noted here that in this thesis the cost of capital is treated not separately from the treatment of the capital structure of the firm. So, in the upcoming section, the treatment of cost of capital and capital structure by the tradi-

tional CBTs will be looked into jointly.

3.1 The Traditional Non-discounting Methods &The Capital Structure.

In the traditional non-discounting methods Payback method simply does not carry any reference to the cost of capital and the decision to accept or reject the proposed project is based on some cutoff period required. The ARR method is based on accounting profit and calculates the accounting rate of return offered by the proposed investment and hence lacks any reference to the opportunity cost of capital or the hurdle rate which compensates for the time value and the opportunity costs involved. At maximum, these methods take into account the dollar amount of the financial charges before reaching the net income or the cash flows needed to calculate ARR & Payback Period respectively. But, these methods simply fail to provide any premium for the riskier projects as well as to take into consideration the risk and return characteristics of the capital investment opportunities. So, at the same time these methods ignore the capital structure of the organization.

3.2 The Traditional Discounting Methods & The Capital Structure

In the traditional discounting methods IRR is a method whereby we calculate the rate of return offered by the proposed project which is later on compared with a minimum acceptable hurdle rate i.e. the cost of capital for the firm. In this way the IRR method implicitly involves a consideration of cost of capital, as no project will be accepted unless it satisfies the minimum acceptable cost of capital. So, the matter rests upon the setting of the hurdle rate upon which to base the decision. If risk & return characteristics of the business firm remain unchanged after the acceptance of the proposed project, only then we can say the IRR method has been properly applied to reflect the true cost of capital and the capital structure. Care must be then taken to see that the cost of capital is calculated to reflect the post acceptance scenario of the risk and return characteristics for the organization and not the pre-acceptance scenario. Most analysts here take refuge in the acceptance of *WACC* as representative cutoff rate for the decision making. But the main problem with *WACC* is the assumption of a static capital structure that does not hold in most of the capital investment cases. This major assumption alongwith a host of other abnormalities with the *WACC* as a cutoff rate make IRR as an inappropriate capital investment analysis tool. This is so because IRR itself does not embody the cost of capital in its calculation like NPV method which is calculated using an appropriate discount rate supposed to reflect the true cost of

capital of the firm.

NPV is rather better at incorporating the cost of capital in project evaluation. This is done by using an appropriate discount rate reflective of the cost of capital to discount the cash flows relevant for the project analysis purpose. With the development of *WACC*, most financial analysts found an all-inclusive discount rate that would reflect the capital structure of the organization. The *WACC* approach calculated a weighted average of costs of various types of funds applied by the organization. In equation form it can be defined as :
Here,

$$WACC = \left(\frac{E}{E+D+P}\right)(K_e) + \left(\frac{D}{E+D+P}\right)(K_d)(1-t) + \left(\frac{P}{E+D+P}\right)(K_P)$$

D = amount of debt
E = amount of equity capital
P = amount of preferred stock
K_e= cost of equity capital
K_d= cost of debt capital
K_p= cost of preferred stock
t = tax rate

So, giving a weight to every individual cost component of the capital mix in proportion to its composition provided a valid ground to believe that *WACC* represents the risk and return characteristics of the organization. So it was taken for granted for most part that any method applying *WACC* would reach to a decision reflecting the representative risk and return characteristics of the firm. The discounted cash flow techniques using *WACC* became popular since 1970s when personal computers were not within the reach of every other financial analysts and the computer hardware as well as he software could do complex calculations only after taking long times. Luehrman (1997) noted that :

> The practical virtue of *WACC* is that it keeps calculations used in discounting to a minimum. Anyone old enough to have discounted cash flows on handheld calculator-a tedious, time-consuming chore-will understand immediately why *WACC* became the methodology of choice in the era before personal computers.[4]

So, under such a constrained situation, *WACC* came up as an all-inclusive tool to help with the discounted cash flow techniques. Later improvements in the *WACC* to include the tax considerations by adjusting the *WACC* for the tax shields offered by the debt financing made it even more handy and comprehensive.

But the use of *WACC* is not all that rosy that we should submit to it with-

out any qualification. *WACC*'s all-inclusiveness is the real blunder in the most practical situations, as most situations require a piece-meal analysis instead of one-step analysis due to complex and intricate interrelationships in today's dynamic business world. Even, now we are not handicapped as earlier for the want of PCs or the tailor-made software to conduct a detailed and piece by piece analysis needed for the complex financial interrelationships. *WACC* works better for the static capital structure as well as the simple capital investment situations. For the dynamic capital structure situations, which is a case more often, *WACC* needs to be adjusted drastically to fit the analysis. Here it will be worth quoting Luehrman (1997) on this point :

> *WACC*'s virtue comes with a price. It is suitable only for the simplest and most static of capital structures. In other cases (that is, in most real situations), it needs to be adjusted extensively-not only for tax shields but also for issue costs, subsidies, hedges, exotic debt securities, and dynamic capital structures. Adjustments have to be made not only project by project but also period by period within each project. Especially in its sophisticated, multilayered, adjusted-for-everything versions, the *WACC* is easy to misestimate.[5]

The assumption of static capital structure can be even more misleading than imagined. It can lead the investment manager to think that induction of cheaper debt into the organization is going to lower the overall cost of capital for the firm and hence lead to accepting the projects discounted at lower discount rates. Whereas in reality the situation can be quite different as what is relevant is the financing potential of the project itself and not the overall firm's debt capacity. It is so because a decrease in the cost of financing should be attributed to the financial worth of the existing assets of the firm i.e. the debt capacity utilized by the proposed project. The extra debt incurred by the proposed project will be increasing the cost of capital for the existing assets as increments of debt are likely to increase risk and hence the return demanded by the exiting stakeholders. But static structure assumption is unable to incorporate these incremental variations needed to reach at viable and relevant investment decisions representative of the true risk and return characteristics of the firm as well as the project. So, the *WACC* approximation will be valid only in case of the projects that are dittos of the firm's risk and return characteristics. Any substantial variation to the exiting risk and return characteristics will demand a re-estimation of the cost of capital to be used as a discount rate. Miles and Ezzell's (1980) suggested one variation to the *WACC* for adjustments in case a firm adjusts its future borrowings in order to keep its debt proportions intact.[6] The formula is consistent with *WACC* formula and is adjustable if any additional project carries a debt capacity different from the firm's existing assets. The Miles and Ezzell's formula is as follows :

$$WACC\,(Adjusted) = r - Lr_d T^* \left(\frac{1+r}{1+r_D}\right)$$

Here,

r = cost of capital assuming all equity financing

L = debt-to-value ratio

r_D = cost of debt

T^* = net tax saving per dollar of interest paid.

The formula is acceptable in the situations when firm is capable of adjusting its debt structure to maintain a constant capital structure in the long run. This formula adjusts the *WACC* upward for higher debt proportions upward. But the assumption of adjustability of the debt proportions may not be realizable in most practical situations. Again it can be noted that for very high debt proportions the scenario is more complicated and simple adjustments like this may not be very helpful.

Midigiliani and Miller also suggested a formula for the adjustment of *WACC*, which is as follows:[7]

$$r^* = WACC\,(Adjusted) = r(1 - T^* L)$$

Here,

r = opportunity cost of capital if all equity financed

T^* = tax cost

L = debt to value ratio

MM formula works under two strict assumptions i.e. the project generates perpetual cash flows and fixed permanent debt. But assets offering perpetual cash flow streams are unlikely to emerge in real world every other day. Also, the maintenance of fixed debt structures is not easily possible in real world.

4. The Present Day Recipe for Integrated Financing & Investment Decisions

In today's world with tailor-made financing schemes, financing comes mostly as part of the project and usually investors find lesser option in designing and choosing the mode of financing themselves. In such project related financing situations, analyzing the project's financing as part of the overall firm's financing will be another mistake. Such a scenario calls for looking towards the approaches that better incorporate the capital structures as well as make the financing and investment decisions as an integrated decision. The new approaches like APV seem to have a better answer for such situations.[8] The APV is basically a divide and conquer approach as in this approach all significant cash flows of a project that are identifiable separately from each other

on any grounds which can influence the project value differently are pieced out one by one. In the most simple and basic versions of APV model, operating cash flows are separated from the financial flows and they are discounted with different discount rates as they reflect different risk and return characteristics. This allows the proposed project to be evaluated first as if the firm was all equity financed and later on the financial side effects are incorporated into the analysis valued as per the risk characteristics they bear. APV has not only been found more useful approach towards dealing with the capital structure decisions and for integration of the financing and investment decisions, rather it is also managerially more relevant. Being based upon the idea of piecing out the evaluation problem it allows the continual reevaluation of the problem and hence carries planning and controllability potential. Another approach recently adopted by various analysts i.e. EVA also has a potential of aggregating the financing and investment decisions as it allows the cost of financing fully satisfied before reaching on the conclusion about the viability or the otherwise of an Investment project.[9]

Doctoral Student, Graduate School of Economics and Business Administration, Hokkaido University

References

1. EZRA Solomon, (October 1955), "Measuring a Company's Cost of Capital," *Journal of Business,* 28(4), pp. 240-252.
2. Gordon Donaldson, (1961), *Corporate Debt Capacity* (Boston Division of Research, Graduate School of Business Administration, Harvard University), pp. 156-222.
3. Miller, M. H. and Modigiliani, F., (June 1966), "Some Estimates of the Cost of Capital to the Electric Utility Industry: 1954-1957," *American Economic Review*, 56(3), pp. 333-391.
4. Luehrman, Timothy A., (May-June 1997), "What's it Worth?-A General Manager's Guide to Valuation," *Harvard Business Review*, 75(3), pp. 132-142.
5. As 4 above.
6. Miles, J. and Ezzell, R., (September 1980), "The Weighted Average Cost of Capital, Perfect Capital Markets & Project Life: A Clarification," *Journal of Financial & Quantitative Analysis*, 15(3), pp. 719-730.
7. Miller, M. H. and Modigiliani, F., (June 1966), "Some Estimates of the Cost of Capital to the Electric Utility Industry: 1954-1957," *American Economic Review,* 56(3), pp. 333-391.
8. Myers S. C., (March 1974), "Interactions of Corporate Finance and Investment Decisions-Implications for Capital Budgeting," *Journal of Finance,* 29(1), pp. 1-26.
9. Stewart G. Bennett, (1999), *The Quest for Value: the EVA ™ Management Guide*, USA.