



Lecture 7: The Company II

So far we have looked at how a company can rationally choose between different investment strategies. In this lecture, we will look at where the money for investment comes from, and how it flows within the company.

Funds for investment can come either internally or externally. Internal funds come from depreciation and retained earnings. This is illustrated by the attached sketch:

[cash.eps](#)

The distinction between depreciation and retained earnings is that they are treated differently by the tax collector; funds set aside to replace assets as they deteriorate are exempt from taxes.

Below, we will calculate the 'weighted cost of capital', as a way of determining the MARR. The cost of using retained earnings is the cost of losing the opportunity to pay those earnings out as dividends to the stockholders. For this reason, this cost is generally considered equal to the cost of capital obtained by the sale of stocks.

External Funds

External funds come from several sources; we can distinguish between long-term and short-term funding, where for our purposes, 'long-term' means longer than a year.

The source of long-term funds is the 'capital market'. Money can be raised in this market by several means, one of which is the selling of bonds. A bond is a promise to pay a certain sum of money at a certain date in the future, with or without the promise of interest. Governments often finance their operations by selling bonds, as do large corporations.

A second source of long-term funds is selling equity, where *equity* is ownership of the company. It is sold by selling stocks or shares. Shares can be voting or non-voting, though stockholders will generally expect some compensation for giving up their voting rights. 'Preferred stock' is stock which carries no voting rights, but entitles the holder to fixed dividends. A share of preferred stock typically has a fixed dollar value, which does not increase as the value of the company increases. Owning common stock does not give any guarantee of a particular payback at a particular time; the attraction of stock ownership is that you expect the value of the company to increase. For example, if you purchased \$50,000 in Apple stock in 1982, you would now be a millionaire.

It is easier for a small company to raise capital through the sale of stock than the sale of bonds, but one disadvantage is the loss of leverage. The basic principle of leverage can be illustrated by an example: suppose I need a million dollars to start a company, and I only have \$100,000. If I borrow \$900,000 at 10%

interest, and if the company doubles in value, I now owe \$990,000 repayment, and the remaining \$1,010,000 is mine. If, on the other hand, I sell \$900,000 worth of stock in the company, after the company's value has doubled I only own 10% of it, or \$200,000. In the former case, I have been able to leverage my investment.

The discovery of this mechanism often has an intoxicating effect upon investors; attracted by the prospect of multiplying their gains, they may set up multiple interlocking levers. For example, the Goldman Sachs Trading Company in 1928 set up the Shenandoah Corporation; Goldman Sachs held common stock in Shenandoah and sold preferred stock to the public. This established the first leverage. The Shenandoah Corporation then set up the Blue Ridge Corporation, holding the common stock itself and selling the preferred stock to the public. This provided a second level of leverage -- any gain in the value of Blue Ridge would be passed on to Shenandoah in concentrated form, and these gains would be further multiplied as they flowed back to Goldman Sachs.

In 1929, however, Goldman Sachs discovered the drawback of leverage, which is that it also works in reverse: if the value of Blue Ridge falls, this loss will be magnified before it hits Shenandoah, and magnified once again as it hits the parent company. Goldman Sachs Trading Corporation stock was worth \$104/share in 1928; in 1932, it was worth \$1.75.

We will see shortly that we need to know the effective interest rate on all sources of funds. What is the effective interest rate on money raised through the sale of stock?

One simple way of calculating this rate is to look at the dividends paid to stockholders. If the average dividend per share of preferred stock is **D**, and the price of a share of stock is **P**, then an estimate of the effective cost of the capital raised by this method is

$$k=D/P$$

This estimate tends to give a low value, since the dividend is only one reason for owning stock. Another is that its value is expected to increase over time. Thus an improved estimate of the cost of capital raised through stock sales is

$$k=D/P + \text{growth rate}$$

In general, the cost of capital raised by selling equity is greater than the cost of capital raised through taking out loans. Small, fast-growing firms may nevertheless find it preferable to raise funds by selling equity, paying out few dividends and relying on the expectation of growth to attract investors. Larger and older companies tend to pay higher dividends, and will therefore find debt capital cheaper.

A third source of long-term funds is a mortgage, that is, a loan secured by a lien or title on some real property, such as the company land or buildings. The loan is usually made by a bank and repaid in a series of regular installments.

Looking at short term funding (for a year or less), we have commercial bank loans, offered at a rate determined by negotiation. 'Commercial paper' consists of written promises to pay a fixed sum at a fixed future date. These are issued by a corporation and sold to other corporations. Lastly, we have *bankers' acceptances*. These are devices used to facilitate import and export, and are promises to pay at a future date, backed by a bank.

Weighted cost of capital

The origin of the funds a company has for investment sets a lower limit to the MARR that it must impose. If the company has obtained funds X_i from a number of different sources, and if the interest rate required by the i th source is A_i , then the weighted cost of capital is

$$\text{WCC} = \text{Sum}(X_i A_i) / \text{Sum } X_i$$

Note that this is a *lower* bound to the MARR. There is a limit to how much the company can acquire by borrowing money, and once that limit is reached, further funds can only be obtained by the sale of stock, which tends to have a higher cost. So if the number of fundable projects at a given MARR exceeds the supply of capital, it may be desirable to increase the MARR to the *marginal cost of capital*, that is, the cost of raising additional capital once the usual sources have been exhausted.

Capital Budgeting

There are several methods for deciding which projects should be funded. One is *capital inventory*. This method relies on arranging potential investments in decreasing order of IRR, and comparing them with the marginal cost of capital needed to fund the next project in line. This ensures that the projects with the greatest rate of return get funded with the highest priority.

[capInv.eps](#)

Capital Rationing

This method is based on selecting a predefined maximum to the amount of money that the company is prepared to invest. Comparing this maximum to the available projects, and funding those projects in descending order of IRR, establishes a default value of the MARR.

This method is subject to the criticism that, by setting a limit to investment, the company may be missing a chance to increase its total profits. However, there are reasons why this might be prudent. For example, the health of a company is measured by several non-dimensional ratios, of which the *current ratio*, (assets)/(liabilities), and the *acid-test ratio*, (cash + accounts receivable)/(liabilities), are two of the most important. Increasing company indebtedness, even in pursuit of added profit, can send a signal to potential investors that the company's health is shaky.

Both of these methods are over-simplifications. For example, if there are only a few, high-cost projects to be considered, it may be that selecting in strict order of IRR will leave a large sum of capital uninvested, while a different selection might commit all the available capital to attractive projects. Considerations of possible interactions between projects may also modify the selection imposed by one of the above methods.

An additional factor that should be taken into account is the degree of risk associated with each project; is a project with a 50% IRR and a high degree of risk to be preferred to a safer project with a lower rate of return?

The methods we have been discussing are purely economic. An intelligent manager will also take intangible

factors into account. For example, one project may have been suggested by a traditionally passive group of employees. The project does not offer as high an IRR as some others, but to turn it down will discourage its originators, while if it is approved, they can be counted on to pursue it to the best of their abilities. So it may be wise to fund it for the overall benefit to morale.



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